Asy Syar'iyyah: Jurnal Ilmu Syari'ah dan Perbankan Islam – ISSN 2089-7227 (p) 2598-8522 (e)
Vol. 8, No. 2, Desember 2023, pp. 162 - 185

THE EFFECT OF EXCHANGE RATES, INFLATION AND BI RATES ON PROFITABILITY IN ISLAMIC COMMERCIAL BANKS DURING THE 2016-2022 PERIOD

Fuad Hasyim[1], Ngestiaga Pratiwi[2], Bajwa Salsabila Asmaradhan[3], Kurniyadi[4]

[1,2,3] Universitas Islam Negeri Raden Mas Said Surakarta
[4] Yalova University Turkiye

* Corresponding author: ngestiagap@gmail.com

Abstract

A bank is a place to distribute and to raise the public funds. In addition, banks also provide payment services to the public. The main goal of a bank is to obtain profitability. This trial purpose to examine the effect of inflation, exchange rate, and BI rate on profitability (ROA) in Islamic commercial banks during the 2016-2022 period. The residents of this study incorporate all Islamic trade banks for the 2016-2022 period. The type of investigation used in this analysis is quantitative analysis. The data used is secondly data with a causal associative approach. The consequence of this study argues that the independent variables of Exchange Rate, Inflation, and the BI Rate have a significant effect on the dependent variable of Islamic Banking profitability (ROA). Furthermore partially, inflation and the BI Rate have a positive effect on ROA at the level a = 10%, while the exchange rate has a negative effect on ROA.

Keywords: Exchange Rate, Inflation, BI Rate, Profitability.

Abstrak

Bank merupakan tempat untuk menyalurkan dan menghimpun dana masyarakat. Selain itu bank juga menyediakan jasa layanan pembayaran. Adapun tujuan utama suatu bank adalah memperoleh profabilitas. Penelitian ini bertujuan untuk menguji pengaruh Inflasi, Kurs, dan *BI Rate* terhadap profitabilitas (ROA) pada Bank Umum Syariah Periode 2016-2022. Penelitian ini meliputi seluruh Bank Umum Syariah periode 2016-2022. Pada penelitian menggunakan penelitian kuantitatif. Data sekunder adalah data yang digunakan pada penelitian ini dengan pendekatan asosiatif kausal. Anggapan dari penelitian ini menunjukkan bahwasanya variabel independent Kurs, Inflasi dan *BI Rate* berdampak signifikan akan variabel dependent profitabilitas (ROA) Perbankan Syariah. Dan secara parsial inflasi dan *BI Rate* berdampak positif

terhadap ROA pada level α = 10 % sedangkan kurs berpengaruh negative terhadap ROA.

Keywords: Kurs, Inflasi, Bi Rate, Profitabilitas

A. Introduction

Bank is the center of the community's economy because it cannot be separated from transactions in the bank[1]. Banks, as financial institutions whose one of their duties are to collect public funds, must have a source to collect funds before they are distributed back to the community[2]. Islamic banks began to develop as an answer from economic groups and Muslim banking expounder who sought to oblige the insistence of many parties who wanted sanction solution in line with the Islamic Sharia principles[3].

Islamic banks do not use interest or usury applications when conducting business [4]. Islamic banking operates based on the Al-Hadith and Qur'an and Islamic sharia. Islamic banks were initially created in responses to the demands of many parties who wanted to deal services in line with Islamic Sharia and economic groupings and Muslim banking practitioner who attempted to meet their demands[5]. Muslims are expected to master the growth of Islamic banks and develop them if they are in a position as managers of Islamic banks who need to carefully identify all existing or potential partners for the improvement of Islamic banks.

Islamic banks are beginning to be known to the public. Even though the development of sharia banking in Indonesia is relatively slow compared to other Muslim countries, sharia banking in Indonesia has been able to show very rapid

[1] Arzi Prima, Fitrian Aprilianto, and Atut Frida, "Profitabilitas Bank Umum Syariah Di Indonesia," *Al-Uqud: Journal of Islamic Economics* 1, no. 95 (2022): 126–38.
[2] Rahmat Ilyas, "Manajemen Permodalan Bank Syariah," *Bisnis* 5, no. 2 (2017): 323–38.
[3] Agus Marimin and Abdul Haris Romdhoni, "Perkembangan Bank Syariah Di Indonesia," *Jurnal Ilmiah Ekonomi Islam* 1, no. 02 (2017): 75–87, https://doi.org/10.29040/jiei.v1i02.30.
[4] Prima, Aprilianto, and Frida, "Profitabilitas Bank Umum Syariah Di Indonesia."
[5] Marimin and Romdhoni, "Perkembangan Bank Syariah Di Indonesia."

development[6]. Sourced from Sharia Banking Statistics data published on the official website of the Otoritas Jasa Keuangan (OJK) in 2022, there are 14 Islamic Commercial Banks and 20 Islamic Business Units in Indonesia. According to the data, the total assets allowed by Sharia Commercial Banks every year have continued to grow, especially since the establishment of Bank Syariah Indonesia (BSI), which was formed in early 2020 as a result of the affiliation of three state-owned Sharia Commercial Banks (PT. Bank BRI Syariah, PT. Bank BNI Syariah, and PT. Bank Syariah Mandiri).

According to the 2022 Sharia Banking Statistics (SPS) report, the total assets of sharia banking have risen annually. In 2016, sharia banking had total assets of 254,184, which increased to 288,027 in 2017, 316,691 in 2018, 397,073 in 2019, 441,769 in 2020 and 2021, and reached 461,969 in 2022. Additionally, the number of sharia banking offices has increased every year from 2016 to 2022, with a slight decrease in 2022 compared to 2021, from 2,035 offices to 1,811 offices.

The expansion of Islamic banks in Indonesia is very good. This matter shows that the efficiency of Islamic banking is growing rapidly and has a positive impact on stakeholders, the government, investors, the public or for the bank itself[7]. For the government, the existence of Islamic banks has the potential to boost the nation's economy. For investors, if the development of Islamic banks is positive and significant, current investors and potential investors will be more interested in providing capital to Islamic banks because of the dividend payments and the promising future prospects of banks. In addition, the presence of Islamic banks can improve public welfare because it provides burdensome interest-free financing options. From the bank's own side, increasing profitability

[6] Wardati Mumtazah and Dina Fitrisia Septiarini, "Analisis Faktor-Faktor Yang Mempengaruhi Jumlah Dana Pihak Ketiga Pada Bank Umum Syariah Di Indonesia (Periode Triwulan I 2010-Triwulan I 2015)," *Jurnal Ekonomi Syariah Teori Dan Terapan* 3, no. 10 (2017): 800, https://doi.org/10.20473/vol3iss201610pp800-815.

[7] Prima, Aprilianto, and Frida, "Profitabilitas Bank Umum Syariah Di Indonesia."

and strong financial performance are indicators of a business that continues to be increasingly established[8].

Optimizing profits is banks' main goal. The banks' rising profits suggest that it adequately explains their financial performance. The profitability of a bank is assessed using the *Return on Assets* (ROA) ratio. Because Bank Indonesia grade profitability in its capacity as a regulator and bank supervisor. The utilization of a bank's profits and assets is directly correlated with the *return on assets*, which should be higher [9].

According to the research conducted Nadzifah & Sriyana [10] found that Inflation, Exchange Rate, Birate, GDP and Internal Bank Performance affect Profitability in Islamic and Conventional Banking. Meanwhile, research conducted by Alim [11] also stated that inflation and *BI rate* against *Return on Asset* (ROA). In some of the studies above, it can be noticed that the factors that affect profitability are inflation, exchange rates, *the Bi rate*, GDP and Internal Performance. Based upon the effect of previous research, this study is interested in conducting research by combining exchange rate variables, inflation, and *the BI rate* against profitability.

Inflation is one of the main factors affecting profitability. Facing these challenges and risks, Bank Indonesia (BI) and the government have strengthened synergy and implemented various policy mixes, while prioritizing macroeconomic stability and continuing to promote structural reforms to strengthen economic fundamentals. The policy mix adopted by the BI is directed

[8] U. Mufidhoh, I. Andriyanto, and H. Haerudin, "Analisis Pengaruh Inflasi, Suku Bunga, Dan Nilai Tukar Terhadap Kinerja Bank Syariah BUMN," *Journal of Islamic Banking and Finance* 1, no. 1 (2017): 71–90.
[9] Prima, Aprilianto, and Frida, "Profitabilitas Bank Umum Syariah Di Indonesia."
[10] Annafsun Nadzifah and Jaka Sriyana, "Analisis Pengaruh Inflasi, Kurs, Birate, PDB Dan Kinerja Internal Bank Terhadap Profitabilitas Pada Perbankan Syariah Dan Konvensional," *Jurnal Manajemen Dan Bisnis Indonesia* 6, no. 1 (2020): 79–87, https://doi.org/10.32528/jmbi.v6i1.3537.
[11] Syahirul Alim, "Analisis Pengaruh Inflasi Dan Bi Rate Terhadap Return on Assets (Roa) Bank Syariah Di Indonesia," *Jurnal Ekonomi MODERNISASI*, 2014, https://doi.org/10.21067/jem.v10i3.785.

at efforts to achieve the inflation target, reduce the current account deficit to a healthier level, and support financial system stability [12]. The tendency of the prices of general goods to increase gradually is known as inflation. Bank profitability is significantly negatively affected by inflation[13]. Research conducted by Alim and Utomo[14] stated that inflation affects profitability. In contrast, Nadzifah and Sriyana; Prastowo et al[15] has no effect on ROA because when inflation increases, banks' profits will experience a significant decrease.

Exchange rate is the second element that affects profitability. The significance of exchange rates in purchasing decisions cannot be overstated, as they enable us to convert prices from different countries into a common currency, thus facilitating comparison and understanding[16]. The extent of local currency, or Rupiah, is needed to buy a unit of international currency sometimes referred to as the exchange rate of a currency or foreign currency. According to Hidayati and Nadzifah and Sriyanal[17], because the exchange rate depreciates and appreciates, it affects banking profitability. In addition, Mufidhoh et al[18] mentioned that the exchange rate has no result on the ROA.

[12] Rafiuddin, "PENGARUH INFLASI DAN SUKU BUNGA TERHADAP RETURN ON ASSET BANK YANG LISTING PADA BEI Rafiuddin (Dosen Fakultas Ekonomi Unidayan Baubau)," *Fakultas Ekonomi Unidayan Baubau*, 2019, 213–19, www.idx.go.id.
[13] Prima, Aprilianto, and Frida, "Profitabilitas Bank Umum Syariah Di Indonesia."
[14] Syahirul Alim, "Analisis Pengaruh Inflasi Dan Bi Rate Terhadap Return on Assets (Roa) Bank Syariah Di Indonesia," *Jurnal Ekonomi MODERNISASI* 10, no. 3 (2014): 201, https://doi.org/10.21067/jem.v10i3.785; Novianto Utomo, "Analisis Pengaruh Tingkat Inflasi Dan Suku Bunga Bi Terhadap Kinerja Keuangan Pt. Bank Muamalat , T," 2007, 1–18.
[15] Nadzifah and Sriyana, "Analisis Pengaruh Inflasi, Kurs, Birate, PDB Dan Kinerja Internal Bank Terhadap Profitabilitas Pada Perbankan Syariah Dan Konvensional"; Puguh Roni Prastowo, Rony Malavia, and Budi Wahono, "Analisis Pengaruh Inflasi, Suku Bunga Dan Nilai Tukar Terhadap Profitabilitas Perbankan," *E-Jurnal Riset Manajemen PRODI MANAJEMEN* 7, no. 16 (2018): 27–41, http://riset.unisma.ac.id/index.php/jrm/article/view/1324.
[16] Dewi Sartika, "Dana Pihak Ketiga Dan Faktor-Faktor Yang Mempengaruhinya Pada Perbankan Syariah Di Indonesia," *Signifikan: Jurnal Ilmu Ekonomi* 2, no. 2 (2013): 163–71, https://doi.org/10.15408/sjie.v2i2.2426.
[17] Nadzifah and Sriyana, "Analisis Pengaruh Inflasi, Kurs, Birate, PDB Dan Kinerja Internal Bank Terhadap Profitabilitas Pada Perbankan Syariah Dan Konvensional."
[18] Mufidhoh, Andriyanto, and Haerudin, "Analisis Pengaruh Inflasi, Suku Bunga, Dan Nilai Tukar Terhadap Kinerja Bank Syariah BUMN."

BI Rate is the third element that affects profitability. The *BI Rate* is a publicly available tariff base set by the Bank of Indonesia. The *BI Rate* reflects the costs that must be incurred to borrow a certain amount of funds as well as the income obtained from borrowing these funds [19]. The banking system in Indonesia generally uses interest rates. This is offered by conventional banks to attract customers to save their money. In contrast to conventional banks, Islamic banks reject the interest system in their operational activities. However, theoretically the interest rate will be a consideration for Islamic banks in determining profit sharing and murabahah margin policies. An abnormal *BI Rate* growth can directly affect bank development[20]. According to Hidayati and Prastowo et al[21] *BI rate* positively affects profitability. Additionally, Mufidhoh et al and Prima et al[22] explained since in the implementation of its business, Islamic banks do not mention to the profits rate so that the *BI rate* has a negative effect.

According to Alim[23] research, it suggests that the inflation variable has a positive and insignificant impact on Return on Assets (ROA), which means that as the inflation value increases, the value of ROA also increases, albeit at not significant. On the other hand, the *BI Rate* variable has a negative and insignificant impact on Return on Assets (ROA). It is caused by the increase in *BI Rate* affects the operational activities of Sharia Banks in terms of financing and

[19] Ayif Fathurrahman and Yuyun Setiawansi, "Analisis Determinan Dana Pihak Ketiga Bank Umum Syariah Di Indonesia," *JPS (Jurnal Perbankan Syariah)* 2, no. 2 (2021): 226–36, https://doi.org/10.46367/jps.v2i2.389.
[20] Prastowo, Malavia, and Wahono, "Analisis Pengaruh Inflasi, Suku Bunga Dan Nilai Tukar Terhadap Profitabilitas Perbankan."
[21] Amalia Hidayati, "INDONESIA," *An - Nisbah* 01, no. 01 (2014): 73–97; Prastowo, Malavia, and Wahono, "Analisis Pengaruh Inflasi, Suku Bunga Dan Nilai Tukar Terhadap Profitabilitas Perbankan."
[22] Mufidhoh, Andriyanto, and Haerudin, "Analisis Pengaruh Inflasi, Suku Bunga, Dan Nilai Tukar Terhadap Kinerja Bank Syariah BUMN"; Prima, Aprilianto, and Frida, "Profitabilitas Bank Umum Syariah Di Indonesia."
[23] Alim, "Analisis Pengaruh Inflasi Dan Bi Rate Terhadap Return on Assets (Roa) Bank Syariah Di Indonesia," 2014.

distribution of funds, leading to a decrease in income and profits of Sharia Banks, although not significantly.

Research Dwijayanthy et al[24] also indicates that inflation affects bank profitability by impacting operational expenses, which increase as the inflation rate rises, and the real interest rate decreases, resulting in a decrease in people's desire to save in banks. The *BI Rate* has no effect on bank profitability, and its influence should not differ from the influence of inflation on bank profitability, as the *BI Rate* is a policy made in response to changes in the inflation rate. The currency exchange rates have proven a negative impact on bank profitability, indicating that if the currency experiences appreciation or depreciation, it will affect bank profits.

Based on the background and inconsistency of previous research, this study empirically examines the result of exchange rates, inflation, and *the BI rate* on the profitability of Indonesian Sharia commercial banks. This research differs from previous research in that the author included an additional research object and utilized a different time frame, specifically the years 2016-2022. This analysis uses a *time-series* data approach, in which some previous studies used panel data.

B. Research Method

Quantitative research was used in this trial. The data used were secondary data with a causal associative approach, that is, research that purpose to control the relation between two or more variables. A causal relation consists of influencing and affecting variables. Secondary data obtained by researchers include data from the internet, journals, and books that complement their research. The data analysis used was a various linear regression analysis with

[24] Febrina Dwijayanthy and Prima Naomi, "Analysis of Effect of Inflation, BI Rate, and Exchange Rate on Bank Profitability (Period 2003-2007)," *Karisma* 3, no. 2 (2009): 87–98.

time-series data. *Time series* type secondary data processing is processed by VAR modeling [25]

The completion of time *series* type secondary data processing with VAR modeling is as follows: Stationerity test (ADF), Determination of optimal lag, VAR Stability Test, Causality test, Cointegration test, VAR estimation, *Impulse Response Function* and Decomposition. [26]

This study examines whether there is an affect between the Exchange Rate, Inflation and *BI Rate* on ROA, so that the regression equation is:

$$\mathbf{Y = \alpha + \beta_1 Rate}\ t + \beta_2 \mathbf{Inflation}\ t + \mathbf{\beta_3 BI\ rate}_t + \mathbf{e}$$

Information:

Y= ROA (*Return on Asset*)

A= Constanta

β= Regression coefficient

e= Error

C. Theoretical Foundations

1. Islamic Banks

In Indonesia, Islamic banks are referred to as Islamic banks, which are financial firm that run their operations in accordance with sharia law. An islamic bank is a financial institution that collects funds and is distributed to the public according to the fundamentals of Islamic law, where business activities and financial products are carried out in accordance with the Qur'an and Hadith.

According to UU No. 21 of 2008, Chapter 1 Alinea (1), Sharia banking is concerned with islamic banks and sharia business units, including institutions, commercial operations, and techniques processes in which

[25] Fuad Hasyim, *Statistika Terapan Untuk Bisnis Dan Keuangan*, *Lintang Pustaka Utama*, vol. 1, 2021.
[26] Hasyim.

they do their business. Chapter 1, Alinea (7) of UU No. 21 of 2008 Indicates that Islamic banks which can be classifield as Islamic Comercial Bank or Islamic people's financing bank are those that conduct their busines operation in accordance with Islamic principles.

2. Profitability

Profitability is the competense of an enterprise to make a profit within a certain period. Profitability shows the company's ability to make a net income from the assets used and provides supporting evidence regarding the company's competense to make a net profit and the extent of the effectiveness of the company's management [27]

The assessment of banking profitability in this analysis used the *Return on Assets* (ROA) ratio. The bank's ROA level shows its management's ability to manage its funding to be channeled to potential and safe financing sectors.[28] The ROA formula from Alim[29] is as follows.

$$\text{A. } ROA = \frac{laba\ setelah\ pajak\ (after\ tax\ profit)}{total\ asset} \times 100\%$$

3. The Exchange Rate

The exchange rate is a *quotation* of the market price of a *foreign* currency in the domestic currency price (*domestic currency*), or the reciprocal, that is, the price of domestic currency in a foreign currency. The conversion rate of money is used in variety of transactions, such as international trade, tourism, international investment, and short-term

[27] Lulu Meivinia, "Pengaruh Likuiditas, Profitabilitas Dan Struktur Modal Terhadap Nilai Perusahaan Dengan Suku Bunga Sebagai Variabel Moderasi Pada Perusahaan Sektor Pertambangan Yang Terdaftar Di BEI," *Jurnal Muara Ilmu Ekonomi Dan Bisnis* 2, no. 2 (2018): 380–93.

[28] Nisa Friskana Yundi and Heri Sudarsono, "Pengaruh Kinerja Keuangan Terhadap Return on Asset (ROA) Bank Syariah Di Indonesia," *Al-Amwal : Jurnal Ekonomi Dan Perbankan Syari'ah* 10, no. 1 (2018): 18, https://doi.org/10.24235/amwal.v10i1.2759.

[29] Alim, "Analisis Pengaruh Inflasi Dan Bi Rate Terhadap Return on Assets (Roa) Bank Syariah Di Indonesia," 2014.

transfers between nations that cross legal or geographical boundaries. It also symbolizes the exchange rate between one currency to another [30].

4. Inflation

Inflation is the process of continuously rising average product costs. This does not mean that the prices of various types of goods rise by the same percentage. Perhaps, this increase may not coincide. An increase that occurs only once (albeit by a fairly large percentage) is not inflationary. The price increases were measured using a price index. There are three kinds of price indices used to calculate the rate of inflation, namely the Consumer Price Index (CPI), the Producer Price Index (IHP) and the Large Trade Price Index (IHPB)[31].

Inflation is measured by the rate of inflation, that is, the speed of price level change in general. The similarities are as follows (Karim, 2007) in Nadzifah and Sriyana (2020)[32].

$$\frac{Price\ level_t - Price\ level_{t-1}}{Price\ level_{t-1}} \times 100 = inflation\ rate$$

5. BI Rate

The BI Rate is an interest rate that reflects the attitude or substance of the publicly disclosed monetary policy adopted by Bank Indonesia. The Bank Indonesia board of governors announces the *BI Rate* once a month on the board of governors meeting, and Bank Indonesia uses it to perform monetary operations using liquidity control in the money market in order

[30] Mufidhoh, Andriyanto, and Haerudin, "Analisis Pengaruh Inflasi, Suku Bunga, Dan Nilai Tukar Terhadap Kinerja Bank Syariah BUMN."
[31] Mufidhoh, Andriyanto, and Haerudin.
[32] Nadzifah and Sriyana, "Analisis Pengaruh Inflasi, Kurs, Birate, PDB Dan Kinerja Internal Bank Terhadap Profitabilitas Pada Perbankan Syariah Dan Konvensional."

to meet operational goals for the monetary policy.[33] The development of the economy reflects the monetary policy's operational gpal of the Overnight Interbank Money Market Interest Rate (PUAB O/N). This movement in the developments are anticipated to be tracked through the interbank rate in the deposit rate, and in turn, the lending rate in the banking industry.

D. Results of Data Processing and Discussion

Secondary Data Processing (Time series / VAR)

The time series data model can be analyzed by looking at the lag value of the explanatory variable as a regressor or by considering the lag in the residual, and using the *autoregressive* (AR) model. As for the important assumption that is not present in *cross-sectional* regression, namely the variables in the model must have a property called stationarity. In this study, we used simple time-series data processing, namely, *vector autoregressive* (VAR). This study also used a stationarity test (ADF), Determination of Optimal Lag, VAR Stability Test, Causality Test (*Granger causality)*, Cointegration Test (Johansen), VAR estimation, *implant response function* (IRF), and decomposition (VD).

1. Data Stationarity Test

In the Stationarity Test (ADF), we compared stationarity at level, *1st differenc*e and *2nd difference* is the data stationary at the level or level of *difference*? Judging from the critical value of DF, if the probability value is greater than alpha (> 0,05), then there is a root unit problem in the autoregression model, or vice versa if the probability value is smaller (< 0,05) than the data being stationary.

Tabel 1. Stationarity Test

[33] Sandra Kurniawati, Zilal Hamzah, and Tri Kunawangsih, "Analisis Pengaruh CAR, LDR, DER, BI Rate Dan Inflasi Terhadap ROA Pada 10 Bank Besar Yang Ada Di Bursa Efek Indonesia," *Seminar Nasional Cendekiawan Ke 4* 2, no. 4 (2018): 1183–90.

2nd difference (Inflasi)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-13.32658	0.0001
Test critical values:	1% level	-3.516676	
	5% level	-2.899115	
	10% level	-2.586866	

*MacKinnon (1996) one-sided p-values.

1st difference (Kurs)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.649197	0.0000
Test critical values:	1% level	-3.514426	
	5% level	-2.898145	
	10% level	-2.586351	

*MacKinnon (1996) one-sided p-values.

1st difference (BI_Rate)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.836613	0.0000
Test critical values:	1% level	-3.515536	
	5% level	-2.898623	
	10% level	-2.586605	

*MacKinnon (1996) one-sided p-values.

(2nd difference (ROA)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-17.02644	0.0001
Test critical values:	1% level	-3.519050	
	5% level	-2.900137	
	10% level	-2.587409	

*MacKinnon (1996) one-sided p-values.

In this study, the data is tested at the 1st difference and 2nd difference levels, because the stationarity test at the level produces time series data that is not stationary. So, the output above produces the following data; Inflation and ROA variables are stationary at the 2nd difference level, while the exchange rate and BI rate variables are stationary at the 1st difference level.

2. Determination of the Optimal Lag

After determining the maximum lag of a stable VAR model, we can determine the optimal lag based on the criteria used. Some of the criteria for determining the optimal lag include the sequential modified likelihood ratio test statistics (LR), Akaike information criterion (AIC), Schwarz information criterion (SIC), final prediction error (FPE), and Hannan-Quinn information

criterion (HQ). The selection of optimal lag can be based on the largest LR value or on the smallest AIC, SIC, FPE, or HQ values.

Tabel 2. Determination of the Lag Optimal

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-72.70245	NA	0.000102	2.160632	2.288107	2.211325
1	231.3254	565.2348	3.06e-08	-5.952827	-5.315452*	-5.699363*
2	252.3424	36.70590	2.67e-08	-6.094153	-4.946879	-5.637919
3	269.2925	27.69298	2.62e-08	-6.120914	-4.463740	-5.461909
4	287.8107	28.16856*	2.50e-08*	-6.191850*	-4.024776	-5.330073
5	302.9850	21.37226	2.65e-08	-6.168591	-3.491618	-5.104044
6	316.2019	17.12615	3.02e-08	-6.090194	-2.903321	-4.822876
7	328.5919	14.65858	3.61e-08	-5.988504	-2.291731	-4.518415
8	346.5118	19.18192	3.80e-08	-6.042587	-1.835914	-4.369727

Based on the output above, it can be seen that the most signs (*) are on lag 4, so the largest LR value and the smallest AIC, SC, HQ, and FPE values are on lag 4, so lag 4 will be used for further data processing.

3. VAR Stability Test

The stability of the model can be observed from the modulus values in the AR root table. If the entire AR value is less than one, then the model is stable.

Tabel 3. VAR Stability Test

Root	Modulus
1.010937 - 0.082383i	1.014288
1.010937 + 0.082383i	1.014288
0.960780 - 0.195274i	0.980423
0.960780 + 0.195274i	0.980423
0.451632 + 0.816510i	0.933092
0.451632 - 0.816510i	0.933092
-0.288384 - 0.855840i	0.903121
-0.288384 + 0.855840i	0.903121
0.782642 - 0.405007i	0.881226
0.782642 + 0.405007i	0.881226
0.647701 - 0.593417i	0.878442
0.647701 + 0.593417i	0.878442
-0.043655 + 0.873256i	0.874347
-0.043655 - 0.873256i	0.874347
-0.723925 + 0.465275i	0.860551
-0.723925 - 0.465275i	0.860551
-0.823470 - 0.136393i	0.834689
-0.823470 + 0.136393i	0.834689
-0.699407 + 0.415480i	0.813507

-0.699407 - 0.415480i	0.813507
0.162370 - 0.732867i	0.750638
0.162370 + 0.732867i	0.750638
0.745864 + 0.025471i	0.746299
0.745864 - 0.025471i	0.746299
-0.249674 + 0.696509i	0.739906
-0.249674 - 0.696509i	0.739906
-0.424699 - 0.585440i	0.723263
-0.424699 + 0.585440i	0.723263
0.422929 + 0.579247i	0.717215
0.422929 - 0.579247i	0.717215
0.110690 + 0.299659i	0.319449
0.110690 - 0.299659i	0.319449

Warning: At least one root outside the unit circle.
VAR does not satisfy the stability condition.

In the output above, it turns out that there is a modulus that is more than 1, such that the model is unstable. However, it can be seen that the overall data has no problems, so in this model the data can be said to be stable.

4. Causality Test (Granger Causality)

In the causality test, it is known that the one with the causality relationship is the one with a smaller probability value than alpha 0.05, so H0 will be rejected later, which means that one variable will affect another variable. The Granger causality method is used to test the existence of a causality relationship between two variables. In addition, Granger causality is used to determine if there is a short-run equilibrium.

Tabel 4. Causality Test

Date: 11/30/22 Time: 23:24
Sample: 2016M01 2022M12
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
INFLASI does not Granger Cause BI_RATE	80	4.79445	0.0316
BI_RATE does not Granger Cause INFLASI		5.37920	0.0230
KURS does not Granger Cause BI_RATE	80	0.42584	0.5160
BI_RATE does not Granger Cause KURS		2.29564	0.1338
ROA does not Granger Cause BI_RATE	78	0.17208	0.6795
BI_RATE does not Granger Cause ROA		2.98242	0.0883
KURS does not Granger Cause INFLASI	81	7.95359	0.0061
INFLASI does not Granger Cause KURS		2.75267	0.1011
ROA does not Granger Cause INFLASI	78	1.87246	0.1753
INFLASI does not Granger Cause ROA		3.16384	0.0793
ROA does not Granger Cause KURS	78	2.44399	0.1222
KURS does not Granger Cause ROA		2.92945	0.0911

From Granger's test, we know the lead-reverse relationship as follows:

a. Inflation affects the *BI rate* (0.0316 < 0.05) then it affects inflation (0.0230 < 0.05) at the 5% level and lag 1, meaning that inflation affects the BI rate significantly (there is causality), and vice versa, there is a significant influence between the BI rate and inflation.
b. The exchange rate does not affect the *BI rate* (0.1338 > 0.05) nor does the BI rate affect the rate (0.5160 > 0.05), which means that the rate of the past period, in the short term, did not affect inflation significantly (there is no causality), and vice versa. indicates no short-term relationship (short-run equilibrium).
c. ROA has no effect on *BI rate* (0.6795 > 0.05) and *BI rate* has no effect on ROA (0.0883 > 0.05).
d. The Exchange Rate affects Inflation (0.0061 < 0.05) and Inflation has no effect on the Exchange Rate (0.1011 > 0.05). It means that there is a significant effect of the Exchange Rate on Inflation but not vice versa (no causality).

e. ROA does not affect Inflation (0.1753 > 0.05) and Inflation does not affect ROA (0.0793 > 0.05).
f. ROA does not affect the Exchange Rate (0.1222 > 0.05) and the Exchange Rate does not affect the ROA (0.0911 > 0.05).

5. Cointegration Test (Johansen)

The purpose of the cointegration test is to determine whether the non-stationary variables are cointegrated. The concept of cointegration was proposed by Engle and Granger (1987), as a linear combination of two or more non-stationary variables produces a stationary variable. If Johansen's cointegration test has a probability value (<0.05), then there is a cointegrating equation, which means it has a long-run equilibrium. If cointegration exists, the equation must be solved using the Vector Error Correction Model (VECM) method but if not co-integrate the equation must be solved using VAR Difference.

Tabel 5. Cointegration Test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None	0.253843	43.80944	47.85613	0.1140
At most 1	0.154912	21.55520	29.79707	0.3239
At most 2	0.085434	8.763265	15.49471	0.3877
At most 3	0.025666	1.976061	3.841466	0.1598

From the output results above it is known that the probability value (> 0.05). Thus, the variables did not co-integrate. It means there is no relationship between long-term balance stability and long-run equilibrium among inflation, BI rate, exchange rate, and ROA. In this case, there is no cointegration, so the test was continued by the regular VAR.

6. VAR estimation

In the previous discussion, the data is known to be un-cointegrated so that the estimation is sufficient to use VAR at 1st difference. Here is the analysis on the effects of exchange rates, inflation, and the BI rate on ROA.

Tabel 6. VAR Estimation

	D(BI_RATE)	D(INFLASI)	D(KURS)	D(ROA)
D(BI_RATE(-1))	0.297220	0.013662	0.003186	0.016693
	(0.11075)	(0.17400)	(0.01472)	(0.09853)*
	[2.68365]	[0.07852]	[0.21647]	[0.16942]
D(INFLASI(-1))	0.068738	0.203077	0.000230	0.042135
	(0.07685)	(0.12073)	(0.01021)	(0.06837)*
	[0.89448]	[1.68209]	[0.02253]	[0.61632]
D(KURS(-1))	-0.253247	0.639809	0.183174	1.890596
	(0.88085)	(1.38385)	(0.11705)	(0.78364)
	[-0.28750]	[0.46234]	[1.56497]	[2.41260]
D(ROA(-1))	0.086283	-0.034368	-0.006075	-0.211376
	(0.12743)	(0.20020)	(0.01693)	(0.11337)
	[0.67710]	[-0.17167]	[-0.35879]	[-1.86454]
C	-0.032979	0.008986	-0.001496	0.024410
	(0.02305)	(0.03622)	(0.00306)	(0.02051)
	[-1.43059]	[0.24813]	[-0.48845]	[1.19025]
R-squared	0.113574	0.043670	0.034861	0.109110
Adj. R-squared	0.064328	-0.009460	-0.018758	0.059616
Sum sq. resids	2.739862	6.762487	0.048377	2.168472
S.E. equation	0.195073	0.306469	0.025921	0.173544
F-statistic	2.306262	0.821951	0.650168	2.204516
Log likelihood	19.17380	-15.61030	174.5842	28.17836
Akaike AIC	-0.368151	0.535332	-4.404783	-0.602035
Schwarz SC	-0.215955	0.687528	-4.252588	-0.449840
Mean dependent	-0.045455	0.006753	-0.002208	0.015974
S.D. dependent	0.201668	0.305030	0.025681	0.178961

* $\alpha = 10\%$, ** $\alpha = 5\%$

When comparing the sig values of 0.09853* < 0.1, and 0.06837* < 0.1 mean that H0 is rejected and Ha is accepted, it can be interpreted that there is a significant influence on the BI rate and inflation on ROA. Moreover, the exchange rate has no effect on ROA by comparison of sig values 0.78364 > 0.1.

Effect of Kurs on Profitability

The results show that the exchange rate (currency exchange rate) did not have a significant effect on profitability. This statement can be proven by comparing the sig values of 0.78364 > 0.1. The exchange rate is the price of the domestic currency against the foreign currency. Exchange rate fluctuations and expectations of high Rupiah depreciation fluctuations

result in bank debtors experiencing business difficulties, with the subsequent consequence of not being able to pay debts to the bank. As a result, banks experienced liquidity difficulties, and ultimately, the profitability of Islamic banks decreased. This research is in line with the research that has been carried out by Mufidhoh et al[34].

The Effect of Inflation on Profitability

The results of this study show that inflation has a positive and significant influence on the profitability of Indonesian banks. This statement can be proven by comparing the sig values of 0.06837* < 0.1. Inflation increased, but the profit obtained by Islamic banks did not decrease significantly, and vice versa. If inflation falls, Islamic banks' profits do not increase significantly. This research is in line with research that has been carried out by Mufidhoh et al[35] which states that inflation has a significant effect on profitability.

Effect of BI Rate on Profitability

The results show that the BI rate has a positive and significant influence on the profitability of Indonesian banks. This statement can be proven by comparing the sig values of 0.09853* < 0.1, indicating a significant influence on profitability. The effect of the BI rate is not different from the effect of the inflation rate on the profitability of banks because the BI rate is a policy made as a result of changes in the inflation rate. If in the BI Board of Governors meeting, it is stated that it will increase or decrease the BI rate, then most banks will change bank interest rates, and this will affect the real

[34] Mufidhoh, Andriyanto, and Haerudin, "Analisis Pengaruh Inflasi, Suku Bunga, Dan Nilai Tukar Terhadap Kinerja Bank Syariah BUMN."
[35] Mufidhoh, Andriyanto, and Haerudin.

sector in general; this research is in line with the research conducted by Dwijayanthy and Naomi[36].

7. Impulse Response Function (IRF) Analysis

This test describes the rate of shock of one variable against another within a certain period span, so that it can be seen how long the dependent variable responds to the shock of its independent variable. This test was conducted to determine how long ROA responds to shocks that occur in exchange rates, inflation, and BI rates.

Tabel 7. Impulse Respond Function Analysis

Response of D(ROA):				
Period	D(BI_RATE)	D(INFLASI)	D(KURS)	D(ROA)
1	0.008566	0.035806	0.005522	0.169504
	(0.01977)	(0.01954)	(0.01932)	(0.01366)
2	0.005196	0.010861	0.047429	-0.035829
	(0.02034)	(0.02151)	(0.02086)	(0.01943)
3	0.001821	0.001476	-0.000603	0.005625
	(0.00628)	(0.00660)	(0.00800)	(0.00955)
4	0.000631	0.000614	0.001403	-0.001047
	(0.00223)	(0.00177)	(0.00220)	(0.00242)
5	0.000201	0.000159	-1.33E-05	0.000193
	(0.00080)	(0.00065)	(0.00049)	(0.00061)
6	6.46E-05	5.92E-05	5.10E-05	-2.83E-05
	(0.00027)	(0.00022)	(0.00014)	(0.00014)
7	2.04E-05	1.83E-05	2.83E-06	7.25E-06
	(9.3E-05)	(7.7E-05)	(3.4E-05)	(3.1E-05)
8	6.44E-06	6.15E-06	2.79E-06	-5.28E-07
	(3.1E-05)	(2.7E-05)	(1.1E-05)	(6.8E-06)
9	2.03E-06	1.95E-06	4.93E-07	3.34E-07
	(1.1E-05)	(9.2E-06)	(3.4E-06)	(1.7E-06)
10	6.41E-07	6.28E-07	2.20E-07	1.68E-08
	(3.6E-06)	(3.1E-06)	(1.1E-06)	(4.3E-07)
Cholesky Ordering: D(BI_RATE) D(INFLASI) D(KURS) D(ROA)				
Standard Errors: Analytic				

From the results of the table above, it can be seen that the BI Rate responds positively to ROA, although it experiences fluctuations which can be seen in the 6th period with a movement of 6.46%, then decreases

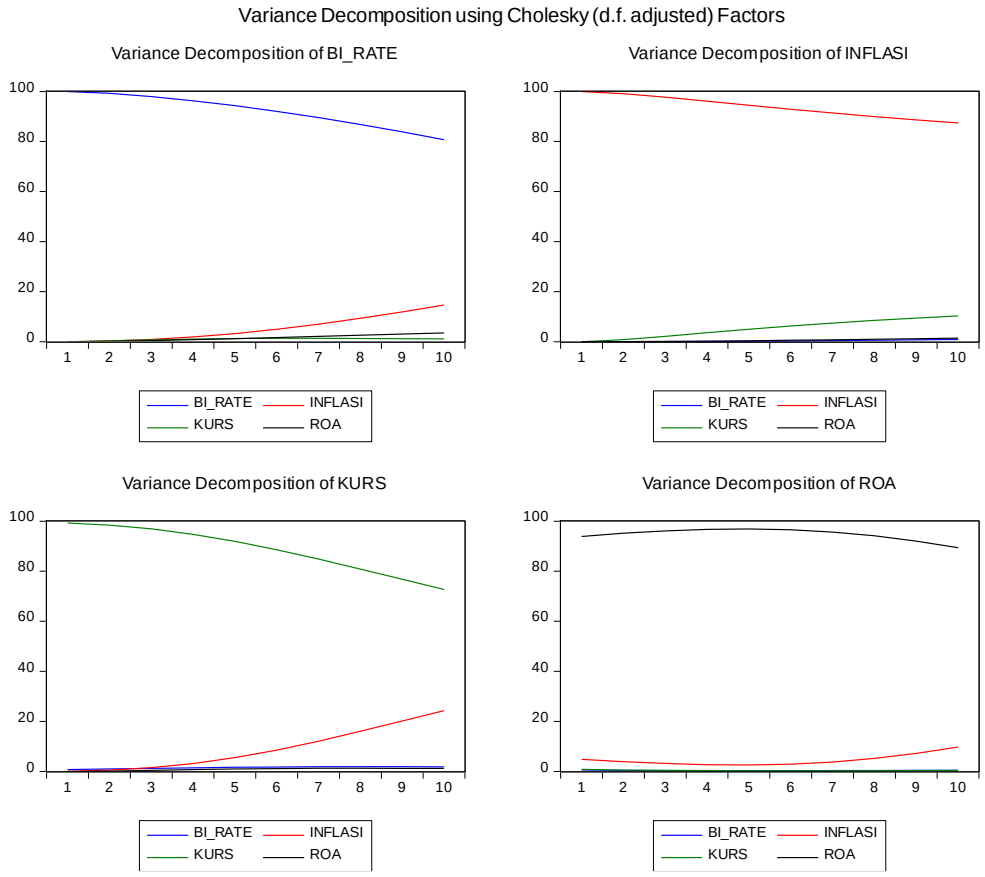
[36] Dwijayanthy and Naomi, "Analysis of Effect of Inflation, BI Rate, and Exchange Rate on Bank Profitability (Period 2003-2007)."

dramatically in the 9th period by 2.03% and rises again in the 10th period by 6.41%. Similarly, inflation also has a positive response to ROA as evidenced by the movement of inflation values which fluctuate in the 6th period by 5.92%, then decreases to 1.95% in the 9th period, however increases again in the 10th period by 6.28%.

Furthermore, the exchange rate responds negatively to ROA can be seen from the 6th period by 5.10% then continues to decline until the 10th period by 2.20%. The similar case happened with ROA which responds negatively to ROA itself which can be seen from the 6th period by 7.25% which continues to decline until the 10th period by 1.68%.

8. Variance Decomposition Analysis

This analysis describes the importance of each variable in the VAR system due to shocks and measures the magnitude of the contribution of each independent variable's influence on its dependent variables through the error variance.



The graph or table to be analyzed is the part that uses ROA as the dependent variable. Based on the results of the graph output above, the variable decomposition (VD) analysis shows that the variable that is expected to have the greatest contribution to ROA in the next 10 periods is ROA itself with a range of 95% to 85% in the next 10 periods. This illustrates that the dominant influence of ROA is itself, although the longer the influence gets smaller. The BI rate decomposition shows its stability from the first period to the end is stable in the 10% range, then the inflation decomposition actually increases in each period, from 10% in the first period, then increases to 15% in the next 10 observation periods. Similarly, the exchange rate increased in the first period of 0.44% to 10% in the next 10 periods.

E. Conclusion

After analyzing, the following conclusions can be drawn:

1. The exchange rate has a negative effect on profitability (ROA) in Islamic banking in Indonesia, it shows that an increase in the exchange rate has no impact on ROA because Islamic banking is able to manage excess liquidity in USD.
2. Inflation has a significant positive effect on profitability (ROA) in Islamic banking in Indonesia, it shows that the greater the value of inflation, the more value of ROA will increase significantly because the Islamic banking system does not embrace the interest system, so that the money managed does not experience too much instability.
3. BI Rate has a significant positive effect on profitability (ROA) in Islamic Banking in Indonesia, it shows that rising interest rates will have an impact on banking operations in financing and channeling funds. The impact is a reduction in income or profit of Islamic banking in Indonesia.

REFERENCES

Alim, Syahirul. "Analisis Pengaruh Inflasi Dan Bi Rate Terhadap Return on Assets (Roa) Bank Syariah Di Indonesia." *Jurnal Ekonomi MODERNISASI*, 2014. https://doi.org/10.21067/jem.v10i3.785.

Dwijayanthy, Febrina, and Prima Naomi. "Analysis of Effect of Inflation, BI Rate, and Exchange Rate on Bank Profitability (Period 2003-2007)." *Karisma* 3, no. 2 (2009): 87–98.

Fathurrahman, Ayif, and Yuyun Setiawansi. "Analisis Determinan Dana Pihak Ketiga Bank Umum Syariah Di Indonesia." *JPS (Jurnal Perbankan Syariah)* 2, no. 2 (2021): 226–36. https://doi.org/10.46367/jps.v2i2.389.

Hadiani, Fatmi. "Analisis Faktor-Faktor Makro Ekonomi Yang Memengaruhi Dana Pihak Ketiga Pada Bank Umum Syariah Dan Unit Usaha Syariah Tahun 2011-2015." *Sigma-Mu* 10, no. 2 (2018): 49–61. https://doi.org/10.35313/sigmamu.v10i2.1229.

Hasyim, Fuad. *Statistika Terapan Untuk Bisnis Dan Keuangan*. *Lintang Pustaka Utama*. Vol. 1, 2021.

Hidayati, Amalia. "INDONESIA." *An - Nisbah* 01, no. 01 (2014): 73–97.

Ilyas, Rahmat. "Manajemen Permodalan Bank Syariah." *Bisnis* 5, no. 2 (2017):

323–38.
Kurniawati, Sandra, Zilal Hamzah, and Tri Kunawangsih. "Analisis Pengaruh CAR, LDR, DER, BI Rate Dan Inflasi Terhadap ROA Pada 10 Bank Besar Yang Ada Di Bursa Efek Indonesia." *Seminar Nasional Cendekiawan Ke 4* 2, no. 4 (2018): 1183–90.
Marimin, Agus, and Abdul Haris Romdhoni. "Perkembangan Bank Syariah Di Indonesia." *Jurnal Ilmiah Ekonomi Islam* 1, no. 02 (2017): 75–87. https://doi.org/10.29040/jiei.v1i02.30.
Meivinia, Lulu. "Pengaruh Likuiditas, Profitabilitas Dan Struktur Modal Terhadap Nilai Perusahaan Dengan Suku Bunga Sebagai Variabel Moderasi Pada Perusahaan Sektor Pertambangan Yang Terdaftar Di BEI." *Jurnal Muara Ilmu Ekonomi Dan Bisnis* 2, no. 2 (2018): 380–93.
Mufidhoh, U., I. Andriyanto, and H. Haerudin. "Analisis Pengaruh Inflasi, Suku Bunga, Dan Nilai Tukar Terhadap Kinerja Bank Syariah BUMN." *Journal of Islamic Banking and Finance* 1, no. 1 (2017): 71–90.
Mumtazah, Wardati, and Dina Fitrisia Septiarini. "Analisis Faktor-Faktor Yang Mempengaruhi Jumlah Dana Pihak Ketiga Pada Bank Umum Syariah Di Indonesia (Periode Triwulan I 2010-Triwulan I 2015)." *Jurnal Ekonomi Syariah Teori Dan Terapan* 3, no. 10 (2017): 800. https://doi.org/10.20473/vol3iss201610pp800-815.
Muttaqiena, Abida. "Analisis Pengaruh Pdb, Inflasi, Tingkat Bunga, Dan Nilai Tukar Terhadap Dana Pihak Ketiga Perbankan Syariah Di Indonesia 2008-2012." *Economics Development Analysis Journal* 2, no. 3 (2013): 175–86.
Nadzifah, Annafsun, and Jaka Sriyana. "Analisis Pengaruh Inflasi, Kurs, Birate, PDB Dan Kinerja Internal Bank Terhadap Profitabilitas Pada Perbankan Syariah Dan Konvensional." *Jurnal Manajemen Dan Bisnis Indonesia* 6, no. 1 (2020): 79–87. https://doi.org/10.32528/jmbi.v6i1.3537.
Prastowo, Puguh Roni, Rony Malavia, and Budi Wahono. "Analisis Pengaruh Inflasi, Suku Bunga Dan Nilai Tukar Terhadap Profitabilitas Perbankan." *E-Jurnal Riset Manajemen PRODI MANAJEMEN* 7, no. 16 (2018): 27–41. http://riset.unisma.ac.id/index.php/jrm/article/view/1324.
Prima, arzi, Fitrian Aprilianto, and Atut Frida. "Profitabilitas Bank Umum Syariah Di Indonesia." *Al-Uqud: Journal of Islamic Economics* 1, no. 95 (2022): 126–38.
Rafiuddin. "PENGARUH INFLASI DAN SUKU BUNGA TERHADAP RETURN ON ASSET BANK YANG LISTING PADA BEI Rafiuddin (Dosen Fakultas Ekonomi Unidayan Baubau)." *Fakultas Ekonomi Unidayan Baubau*, 2019, 213–19. www.idx.go.id.
Sartika, Dewi. "Dana Pihak Ketiga Dan Faktor-Faktor Yang Mempengaruhinya Pada Perbankan Syariah Di Indonesia." *Signifikan: Jurnal Ilmu Ekonomi* 2, no. 2 (2013): 163–71. https://doi.org/10.15408/sjie.v2i2.2426.
Utomo, Novianto. "Analisis Pengaruh Tingkat Inflasi Dan Suku Bunga Bi Terhadap Kinerja Keuangan Pt. Bank Muamalat , T," 2007, 1–18.

Widiasti, Yuni, and Syamsul Hadi. "Pengaruh Suku Bunga Deposito, Kurs, Dan Inflasi Terhadap Simpanan Dana Pihak Ketiga Pada Bank Umum Di Indonesia Tahun 2015 – 2019." *Journal of Financial Economics & Investment* 2, no. 2 (2022): 102–11. https://doi.org/10.22219/jofei.v2i2.19902.

Yundi, Nisa Friskana, and Heri Sudarsono. "Pengaruh Kinerja Keuangan Terhadap Return on Asset (ROA) Bank Syariah Di Indonesia." *Al-Amwal : Jurnal Ekonomi Dan Perbankan Syari'ah* 10, no. 1 (2018): 18. https://doi.org/10.24235/amwal.v10i1.2759.