INFLATION, INTEREST RATE, BI RATE, NPL AND LDR ON CREDIT DEMAND AND SUPPLY: SIMULTANE MODELING

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Abstract. *This research was conducted to identify factors that influence the demand and supply of credit during the Covid-19 pandemic. This research uses a credit demand and supply model estimated with Two Stage Least Square (TSLS). The independent variables used in this research are inflation, credit interest rates, BI Rate, Non-Performing Loans (NPL) and Loan To Deposit Ratio (LDR). Meanwhile, the dependent variable is total credit. In the credit demand equation, the inflation variable has a positive and insignificant influence on total credit, interest rates have a negative and significant influence on total credit, the BI Rate has a positive and significant influence on total credit. In the credit supply equation, the interest rate and NPL variables have a negative and significant influence on total credit, the BI Rate has a positive and insignificant influence on total credit, and the LDR has a positive and significant influence on total credit.*

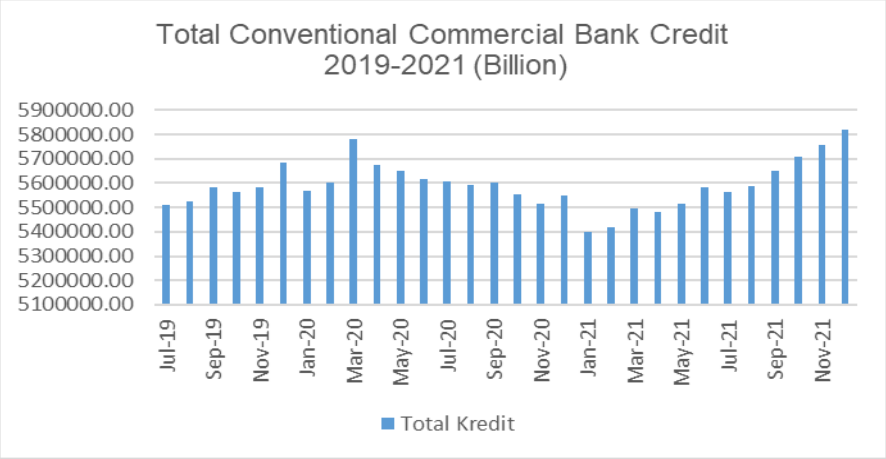
Keywords: *Demand and Supply of Credit; Time Series; Two Stage Least Square (TSLS)*

1. INTRODUCTION

The role of banks in contributing to national development is now increasingly growing. Banks are defined as financial institutions that accept deposits, provide loans or are closely related to money and the transfer of funds. The increasing development of banking in Indonesia makes this institution the most needed financial sector and has profitable job prospects.

The Covid-19 pandemic which has hit almost all countries has had a significant impact in various fields, including the economic sector. This condition has made it difficult for millions of people to take out loans and for banks to distribute credit offers.

Table 1.1 Total Conventional Commercial Bank Credit 2019-2021



Source: Otoritas Jasa Keuangan, 2019-2021

Table 1.1 shows that total conventional commercial bank credit decreased significantly in April 2020 with total credit of IDR 5,676,052 billion. This condition was caused by Covid-19 which entered Indonesia since March 2020. Total bank credit decreased until January 2021 amounting to IDR 5,397,123 billion and increased again in November 2021.

Factors that influence credit demand (debtors) and credit supply (creditors) are caused by internal factors and external factors. Inflation can be interpreted as a continuous increase in the prices of goods. Rising inflation rates are associated with overheating economic conditions (Overhead). Overhead means that economic conditions experience demand for products that exceeds the product supply capacity so that the price of goods tends to increase. The result of inflation is a decrease in people's purchasing power because in real terms their income level decreases, which causes demand for credit to decrease (Mukhlis, 2015).

The BI Rate raises the expectations of economic players in estimating macroeconomic conditions and the direction of future central bank policy interest rates. If the interest rate is higher due to adjustments to the BI Rate, it will reduce interest in making credit loans (Mishkin, 2008). Credit interest rates are determined by the high and low BI Rate interest rates. So if the BI Rate rises, credit interest rates will also rise, causing a decrease in demand for credit. From the supply side, when providing credit, banks will look at the conditions of credit allocation which have an impact on reducing credit supply capacity.

The credit interest rate is the price that must be paid by the debtor to the creditor. Credit interest rates are determined by the interaction between supply and demand. Credit interest rates can influence individual decisions regarding the choice of saving their money in the form of savings or spending more money without saving (Laksmono R et al., 2003).

Non Performing Loans (NPL) is an indicator used to measure non-performing loans at a bank. An increasing NPL indicates a problem with the bank, so to minimize existing risks, the bank will reduce its credit offer. It can be said that the lower the NPL, the credit supply will increase (Mishkin, 2008).

Loan To deposit Ratio (LDR) is a ratio to measure how far a bank uses depositors' money to provide loans to its customers (Pandia, 2012). LDR shows the bank's health level. The higher the LDR can provide an indication that the bank's liquidity capacity is decreasing. So that it has an impact on credit distribution (Cintiya & Riswan, 2022).

Based on the background above, this research will analyze Inflation, BI Rate, Interest Rates, Non-Performing Loans (NPL) and Loan To Deposit Ratio (LDR) on the demand and supply of Conventional Bank credit during the Covid-19 Pandemic.

2. LITERATURE REVIEW

2.1 Credit Demand Theory

Credit demand theory explains the nature and demand of consumers for goods and services. Credit demand also explains the relationship between quantity and price demanded and the formation of the demand curve (Sugiarto, 2002).

2.2 Credit Supply Theory

Banks have a role as intermediaries between parties who have excess funds and parties who need funds. For parties who need funds, the bank will channel these funds in the form of credit (Febrianto & Muid, 2013). This credit distribution activity can be interpreted as a credit offer.

Credit distribution has risks that can affect the health and sustainability of the bank's business. Financial liquidity, solvency and profitability are generally influenced by the success of parties in managing credit distributed to the public. Realizing that credit is the backbone for the business continuity of financial institutions, credit distribution must be carried out systematically so that problem loans can be avoided (Amelia et al., 2016)

2.3 Demand and Supply of Credit

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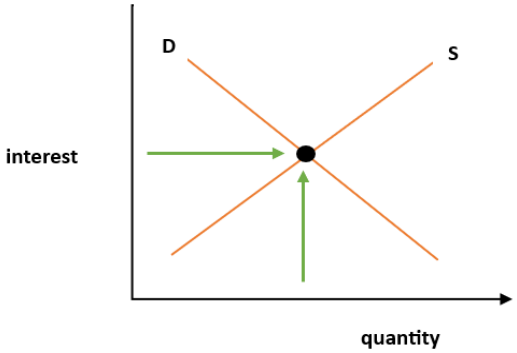

Figure 2.1 Demand and Supply Curve

Figure 2.1 explains the law of demand and supply of credit where there is a relationship between interest rates and the quantity offered. At any given point in time, the supply of credit brought to the market is fixed i.e. the supply curve (vertical line), while the demand curve always slopes downwards due to the law of diminishing marginal utility. When the balance point is reached, interest rates and demand will tend to be stable, even fixed or not change at all. Meanwhile, credit offers can no longer increase the interest rates borne by consumers. However, over long periods of time, credit offers can increase or decrease stocks with the aim of changing interest rates to their desired levels.

2.4 Theoretical Thinking Framework

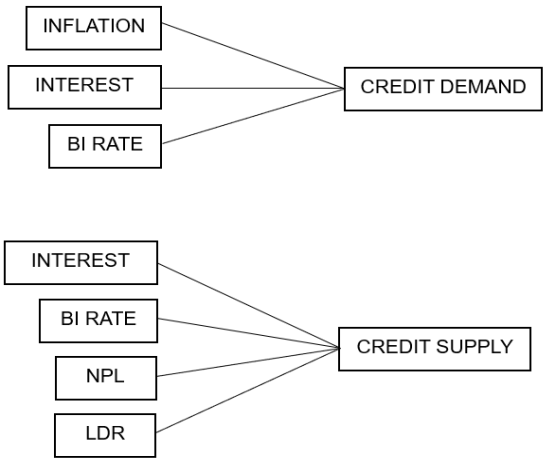

Figure 2.2 Theoretical Thinking Framework

3. RESEARCH METHODS

3.1 Type of Research

This research is classified as quantitative research whose data was obtained from the official websites of the Central Statistics Agency, Bank Indonesia and the Financial Services Authority. The type of data used is time series data for the 2019-2023 period.

3.2 Data Analysis Techniques

The method used to analyze the demand and supply of conventional bank credit during the Covid-19 pandemic is to use simultaneous equations. The simultaneous equation model used is the Two Stage Least Square (TSLS) method. The TSLS method was specifically designed for over-identified equations, although it can also be used for exactly identified equations (Gujarati & Porter, 2010).

3.3 Research Model

Credit Demand

$$CRED_t^D = \alpha_0 + \alpha_1 INFLATION_t + + \alpha_2 SB_t + \alpha_3 BIRATE_t + \varepsilon_t$$

Where :

CRED	: Total conventional commercial bank credit
D	: Demand Credit
α0	: Credit demand equation constant
α	: Regression coefficient of the equation (i=1,2,3,)
Inflation	: Inflation
SB	: Conventional Bank Credit Interest Rate
BI Rate	: Bank Indonesia Interest Rate

Credit Supply

$$CRED_t^S = \alpha_0 + \alpha_1 SB_t + \alpha_2 BIRATE_t + \alpha_3 NPL_t + \alpha_4 LDR_t + \varepsilon_t$$

Where:

CRED	: Total conventional commercial bank credit
S	: Credit Supply
α0	: Credit supply equation constant
α	: Equation regression coefficient (i=1,2,3,4)
SB	: Conventional Bank Credit Interest Rate
BI Rate	: Bank Indonesia Interest Rate
NPL	: Non Performing Loan
LDR	: Loan To Deposit Ratio

4. RESULTS AND DISCUSSION

Unit Root Test

The unit root test is used to determine whether the estimated data is stationary or not stationary. If the data is stationary, it can be estimated directly, whereas if the data is not stationary, then the data contains elements of trend. The method used is the unit root test in Philip Peron's test.

Table 4.1 Stationary Test Results

Variable	Level Probability	1st difference
Credit	0.9996	0.0000*
Inflation	0.1220	0.0000*
Interest Rate	0.6882	0.0001*
BI Rate	0.5212	0.0001*
NPL	0.9030	0.0000*
LDR	0.3186	0.0000*

From the stationarity test using Philip Peron, the results show that Total Credit Inflation, Interest Rates, NPL and LDR are stationary at First Difference.

Simultaneous Problem Identification Test

The Simultaneous Problem Identification Test aims to find out whether the equation model formed falls into the category of under identified, exactly identified or over identified with the following formula:

- Under identified: (K-k)<(m-1), can use the Indirect Least Square (ILS) method
- Exact identified: (K-k)=(m-1), can use the Two Stage Least Square (TSLS) method
- Over identified: (K-k)>(m-1), can use the Two Stage Least Square (TSLS) method

Table 4.2 Simultaneous Equation Identification Test

Equation	K-k	m-1	Description
Credit Demand	9 - 4 = 5	1	*Over Identified*
Credit Supply	9 - 5 = 4	1	*Over Identified*

Based on table 4.2, the suitable formula for identifying simultaneous equations is (K-k)>(m-1) in the Over Identified category. So the suitable method to use is Two Stage Least Square (TSLS).

Estimated Results

$KRED_t^D$ = 16.93704 +0.001486INFLATION -0.143214SB +0.042890BIRATE

$KRED_t^D$ = 17.38015 -0.139415SB +0.011871 BIRATE -0.121014NPL +4.46E-06LDR

Table 4.3 Results of the Balance Equation for Conventional Bank Credit Demand

Variabel	Coefficient	t-Statistic	Probability
INLATION	0.001486	0.4600599	0.6460
INTEREST RATE	-0.143214	-19.50437	0.0000
BI RATE	0.042890	10.76608	0.0000
R^2	0.911537	Durbin – Watson	F Table
F-Statistic	192.3445	0.420284	2,77

Based on Table 4.3, the credit demand balance equation model can be analyzed as follows:

1. Inflation has a positive and insignificant relationship (5% level) to credit demand. This is in accordance with the initial hypothesis that the greater the inflation, the lower the level of demand for bank credit. These results are not in line with the initial research hypothesis, but are in line with research conducted by (Sabar & Kuslin, 2018). The statement that supports the results of this research is Irving Fisher's theory, Keynes, which says that inflation occurs because people want to live beyond the limits of their economic capabilities so that people's demand for goods exceeds the number of goods available. In other words, people managed to get additional funds beyond the limits of their economic capacity so that this group of people could obtain goods in greater quantities than they should.
2. Credit interest rates have a negative and significant relationship to demand for conventional bank credit. These results are in line with the initial hypothesis of research and research conducted by (Polihu et al., 2023). The development of interest rates in the last three years has consistently decreased due to the Covid-19 pandemic, thus encouraging people to take out credit considering the small interest that will be paid. This is in accordance with the law of demand which is the basis of this research, namely when prices increase, the demand for goods or services decreases and vice versa, when prices decrease, a good or service will be in high demand.
3. BI Rate has a positive and significant influence on demand for conventional bank credit. This result is not in line with the initial hypothesis which stated that if the BI Rate rises, demand for credit will decrease. The results of this research are in line with research conducted by (Musta'da & Pramono, 2022) which states that if the BI rate rises, people's desire to save will increase, because banks also increase deposit interest rates.
4. The coefficient of determination obtained is 0.911537. This means that the independent variable is able to explain the dependent variable by 91.1537% and the remaining 8.8463% is explained by other variables outside the model. The F test is known from the estimation results of 192.3445 where the calculated F is greater than the Table F which is 2.77 with a significance level of 5%. It can be concluded that exogenous variables simultaneously have a significant influence on demand for conventional bank credit during the Covid-19 pandemic.

Table 4.4 Results of the Equilibrium Equation for Conventional Bank Credit Supply

Variable	**Coefficient**	**t-Statistic**	**Probability**
INTEREST RATE	-0.139415	-24.25590	0.0000
BI RATE	0.011871	1.638832	0.1041
NPL	-0.121014	-5.222557	0.0000
LDR	4.46E-06	5.161538	0.0000
R^2	0.950983	Durbin – Watson	F Table
F-Statistic	266.7633	0.406546	2.54

1. Interest rates have a negative and significant relationship (5% level) to credit offers. The results of this research are in accordance with the initial hypothesis and research conducted by (Ikram & Fakhruddin, 2017). Low interest rates encourage banks to distribute credit because the risk of default is low.
2. BI Rate has a positive and significant relationship to credit supply. The research results are not in line with the initial hypothesis and research conducted by (Kurnianingrum, 2015) which states that the BI Rate has a negative and significant relationship with credit supply. A decrease in the BI rate causes a decrease in interest rates. In accordance with the law of supply and demand, low interest rates can attract people's interest in applying for loans from banks so that banks will participate in expanding their business. A low BI rate indicates that the country's economic condition is stable so that credit distribution will increase. However, the results of this research are in line with research conducted by (Musta'da & Pramono, 2022) which states that if the BI rate rises, people's desire to save will increase, because banks also increase deposit interest rates.
3. NPL has a negative and significant relationship to credit supply. The results of this research are in accordance with the initial hypothesis and research conducted by (Andariyani, 2018). The large NPL is one of the reasons why it is difficult for banks to distribute credit. An increase in NPL at a bank indicates that there is a problem with credit repayment so that the bank takes a cautious attitude in providing credit (Mishkin, 2008).
4. LDR has a positive and significant relationship with credit offers. The results of this research are in accordance with the initial hypothesis and research conducted by (Citra Amelia & Murtiasih, 2017). The LDR ratio shows the bank's ability to channel Third Party Funds collected by the bank. The size of the credit provided by the bank is influenced by the funds received by the bank, so it will affect the size of the LDR ratio (Akhmad & Sulistyorini, 2020).
5. The coefficient of determination obtained is 0.950983. This means that the independent variable is able to explain the dependent variable by 95.0983% and the remaining 4.9017% is explained by other variables outside the model. The F test is known from the estimation results of 266.7633 where the calculated F is greater than the Table F which is 2.54 with a significance level of 5%. It can be concluded that exogenous variables simultaneously have a significant influence on conventional bank credit offers during the Covid-19 pandemic.

CONCLUSIONS

This research examines the variables Inflation, Interest Rate, BI Rate, NPL and LDR which influence the demand and supply of conventional bank credit. The research results show that partially inflation has a positive and insignificant influence on credit demand, credit interest rates have a significant negative influence on credit demand in accordance with theory, the BI Rate has a positive and significant influence on credit demand which is not in accordance with theory. Meanwhile, from the supply side, credit interest rates and NPLs have a negative and significant influence on credit supply, where this result is in accordance with theory. The BI Rate variable has a positive and significant influence on credit supply which is not in accordance with theory. LDR has a positive and significant influence on credit supply and is in accordance with theory.

REFERENCES

Akhmad, A., & Sulistyorini, E. (2020). Pengaruh Dpk, Npl, Car, Dan Ldr Terhadap Penyaluran Kredit(Studi Kasus Pada Bank Yang Terdaftar Di Indeks LQ45 Tahun 2014-2018). *Jurnal Penelitian Teori & Terapan Akuntansi*, 5(1), 85–98.

Amelia, N., Aimon, H., & Syofyan, E. (2016). Analisis Faktor-Faktor Yang Mempengaruhi Penawaran Dan Permintaan Kredit Modal Kerja Pada Bank Umum Di Sumatera Barat.

Andariyani, M. (2018). Analisis Faktor-Faktor Yang Mempengaruhi Penawaran Kredit Pada Bank Perkreditan Rakyat Di Sumatera (Studi Kasus Tahun 2013-2015). *Jurnal Benefita*, 3(2), 171. Https://Doi.Org/10.22216/Jbe.V3i1.1923

Cintiya, C., & Riswan, R. (2022). Pengaruh Kinerja Keuangan Terhadap Penyaluran Kredit. *Sibatik Journal: Jurnal Ilmiah Bidang Sosial, Ekonomi, Budaya, Teknologi, Dan Pendidikan,* 1(10), 1931–1938. Https://Doi.Org/10.54443/Sibatik.V1i10.282

Citra Amelia, K., & Murtiasih, S. (2017). Analisis Pengaruh Dpk, Ldr, Npl Dan Car Terhadap Jumlah Penyaluran Kredit Pada Pt. Bank Qnb Indonesia, Tbk Periode 2005-2014. In Jurnal Ekonomi Bisnis (Vol. 22, Issue 1)

Febrianto, D. F., & Muid, D. (2013). Analisis Pengaruh Dana Pihak Ketiga, Ldr, Npl, Car, Roa, Dan Bopo Terhadap Jumlah Penyaluran Kredit (Studi Pada Bank Umum Yang Terdaftar Di Bursa Efek Indonesia Periode Tahun 2009-2012). *Dipenogoro Journal Of Accounting*, 2(4), 1–11.

Gujarati, D., & Porter, D. (2010). *Basic Econometrics*

Ikram, A., & Fakhruddin. (2017). Hubungan Suku Bunga Kredit Konsumsi Dan Inflasi Terhadap Penawaran Kredit Konsumsi. *Jurnal Ilmiah Mahasiswa* (Jim), 2(4), 597–606.

Kurnianingrum, D. (2015). The Influence Of Bi Rate To The Distribution Of Working Capital Loans. In Binus Business Review (Vol. 6, Issue 3). Www.Bi.Go.Id

Laksmono R, D., Suhaedi, S., Kusmiarso, B., I, A., Pramono, B., Hutapea, E. G., & Pambudi, S. (2003). Suku Bunga Sebagai Salah Satu Indikator Ekspektasi Inflasi. Buletin Ekonomi Moneter Dan Perbankan, 2(4), 123–150. Https://Doi.Org/10.21098/Bemp.V2i4.283

Mishkin, F. S. (2008). *Ekonomi Uang, Perbankan, Dan Pasar Keuangan* (8th Ed.). Jakarta: Salemba Empa.

Mukhlis, I. (2015). *Ekonomi Keuangan Dan Perbankan: Teori Dan Aplikasi*. Jakarta : Penerbit Salemba

Musta'da, N., & Pramono, N. H. (2022). Non Performing Loan: Analisis Kredit Bermasalah Di Masa Pandemi Covid 19. *Journal Of Accounting And Digital Finance*, 2(1), 1–15. Https://Doi.Org/10.53088/Jadfi.V2i1.335

Pandia, F. (2012). Manajemen Dana Dan Kesehatan Bank. Rineka Cipta.

Polihu, H., Rotinsulu, T., & Mandeij, D. (2023). Analisis Pengaruh Suku Bunga Kredit Dan Inflasi Terhadap Permintaan Kredit Konsumsi Di Sulawesi Utara Tahun 2012 –2021. Jurnal Berkala Ilmiah Efisiensi, 23(8).

Sabar, W., & Kuslin, K. (2018). Menakar Dampak Suku Bunga, Nilai Tukar, Dan Inflasi Terhadap Permintaan Kredit Konsumsi.

Sugiarto. (2002). *Ekonomi Mikro : Sebuah Kajian Komprehensif*. Gramedia Pustaka Utama.