Non-Cash Payments and Inflation in Indonesia

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Abstract

This study aims to identify the effect of the Non-Cash Payment System as a core independent variable with the Money Supply and Gross Domestic Product as control variables on Inflation in Indonesia in the short term and long term period 2012:Q1-2023:Q4. The analytical method used in this study is Autoregressive Distributed Lag (ARDL). Based on the ARDL estimation results, in the long run, Electronic Money, Money Supply, and GDP has a positive and significant effect on inflation, while Transaction Volume has a negative and significant effect on Inflation. In the short run, Electronic Money, Money Supply, and GDP has a positive and significant effect on inflation, while Transaction Volume has a negative and significant effect on Inflation in Indonesia.

Key Words: *Inflation, Electronic Money Transaction Volume, Debit Card and Credit Card Transaction Volume, Money Supply, Gross Domestic Product.*

1. Introduction

Inflation is a problem in the economy, especially in developing countries such as Indonesia. Economists believe that inflation is one of the main macroeconomic problems in the short and long term. In Indonesia, inflation movements tend to increase from time to time, but at certain times inflation decrease Purwono et al., 2020). According to Hooper et al. (2020), inflation is a condition of price increases that occur generally and continuously. Inflation is a decline in the value of currency due to the large and rapid circulation of money, which ultimately causes the price of goods to increase (Anwar, 2023).

A cash and non-cash payment system allows for the control of inflation (Anwar et al., 2024). Bank Indonesia has made efforts to ensure that economic activity runs smoothly. An economy cannot ignore inflation as it significantly impacts the country's economy, slowing economic growth and increasing unemployment rates. Therefore, government policy often prioritizes controlling

inflation. Controlling inflation is essential, if fail to control inflation, long-term economic development will deteriorate (Girdzijauskas et al., 2022).

When the Industrial Revolution 4.0 era began, people's lifestyles experienced quite rapid changes (Sima et al., 2020). The changes start in everyday life, especially in economic and trade activities. As technology advances, so does the use of payment instruments to meet societal needs, leading to the launch of more effective economic mechanisms, particularly in transaction processing (Didu et al., 2022). According to Suhendra et al. (2022), the emergence of electronic money causes the amount of money in circulation to decrease, which will have an indirect effect on inflation. Since 2007, Indonesia has started to use electronic money, a development that is considered late compared to other countries such as Singapore, which began using electronic money for transactions in 2000. In order to increase people's sense of trust in e-money, which at that time sounded very foreign in Indonesia, the Bank Central of Indonesia approves, regulates, inaugurates, and validates matters related to the implementation, use, and transactions with e-money in Indonesia (Anwar et al., 2022).

The use of money continues to evolve. Electronic money, in the form of smart cards, demonstrates this development through the use of a chip within the card. We can also consider its use practical, as it allows for transaction activities simply by loading the chip with a specific amount of money (Kregel, 2001). Ahiabenu (2022) elucidates a payment system that aligns with economic principles, specifically the preference of economic actors for low-cost payment methods. Therefore, we invite the public to engage in non-cash transactions. Through the National Non-Cash Movement, central bank of Indonesiaand the government aim to decrease the public's reliance on cash for transactions. The National Non-Cash Movement is a program that aims to foster understanding and socialization through the practice of non-cash transactions, specifically focusing on electronic money, debit cards, and credit cards, to help users become accustomed to using these payment instruments. It is hoped that this movement will increase the volume of non-cash payment instruments used in Indonesia.

Research results of Gbanador (2023), Keister and Monnet (2022), Náñez Alonso (2021) demonstrate a positive correlation between the speed of money circulation and the use of electronic money, indicating that an increase in the use of electronic money will lead to an increase in money circulation. The emergence of electronic money significantly influences people's lifestyles, leading to increased consumption. Continuously increasing consumption will result in inflation rising (Anwar et al., 2023). The increasing use of electronic money can result in inflation. However, in reality, the increasing use of electronic money has actually led to a decrease in the inflation rate.

The aforementioned phenomenon indicates a consistent upward trend in non-cash payments over time (Maixé-Altés and Mourelle, 2023). This is due to the support of technological advances that are changing people's lifestyles, as well as innovations that continue to develop and produce various kinds of non-cash transactions (Suhendra and Anwar, 2021). In society, increasing transactions through non-cash payments can result in increased public consumption. This is because people feel it is easier to fulfil their needs. Increasing public consumption also cause public demand for goods and services to rise (Lapuente and Van de Walle, 2020).

An increase in demand for goods and services does not match the increase in supply, it can lead to an increase in the price level for these goods and services (del Rio-Chanona et al., 2020). As previously explained, the money supply can contribute to inflation. One can argue that controlling the money supply is a challenging task. This is because people's needs and demands for money can change at any time, and if there is an increase in demand, the amount of money circulating in society can become very large. On the other hand, the amount of money circulating in society will decrease if demand also decreases. The money supply plays an important role in driving the economy.

In rapidly developing economic conditions, high employment opportunities can lead to high incomes, which will subsequently result in expenditures that exceed the limits of the economy's capacity to produce goods and services. Excessive spending levels can result in inflation. The public's continued increase in spending might cause aggregate demand to rise. To meet increasing demand, companies will increase production, resulting in an increase in GDP as well. An increase in national production that exceeds the limit of full employment will cause the prices of goods and services to increase more rapidly.

2. Data and Research Method

The dependent variable in this research is inflation, as well as five independent variables that influence it: electronic money, payment using cards (cards), money supply, and Gross Domestic Product (GDP). Electronic money, cards, money supply, GDP, and inflation are the subjects of research conducted in Indonesia using quarterly time series data studied from 2012 (Q1) to 2023 (Q4). Economic analysis shows that there is a long-term relationship between the variables under consideration, as stipulated by the theory. This means that the relationship's properties will remain intact over time. In other words, the mean and variance are constant and independent of time. Therefore the appropriate method for this study is Autoregressive-Distributed Lag (ARDL).

The general model is:

$$Inflation_i = \beta_0 + \beta_1 EM_t + \beta_2 Cards_t + \beta_1 MS_t + \beta_1 GDP_t + \varepsilon_{it}$$
(1)

Long term equation:

$$Inflation_t = \beta_0 + \sum_{j=1}^{p} \beta_1 EM_{t-j} + \sum_{j=0}^{q} \beta_2 Cards_{t-j} + \sum_{j=0}^{q} \beta_3 MS_{t-j} + \sum_{j=0}^{q} \beta_4 GDP_{t-j} + \varepsilon_{it}$$
(2)

Short term equation:

$$\Delta Inflation_i = \theta(\beta_1 Inflation_t - \beta_0 - \beta_2 EM_t - \beta_3 Cards_t - \beta_4 MS_t - \beta_{5i} GDP_{it}) + \sum_{j=1}^{p} \lambda_1 Inflation_{t-j} + \sum_{j=0}^{q} \lambda_2 EM_{t-j} + \sum_{j=0}^{q} \lambda_3 Cards_{t-j} + \sum_{j=0}^{q} \lambda_4 MS_{t-j} + \sum_{j=0}^{q} \lambda_5 GDP_{t-j} + \varepsilon_{it}$$
(3)

Where Inflation is Inflation; EM is electronic money; Cards is the number payment using credit dan debit cards; MS is money supply, and GDP is gross domestic product.

3. Results and Discussion

The long-term and short-term ARDL estimation results demonstrate a positive relationship between the volume of electronic money transactions and inflation. The volume of electronic money transactions significantly influences inflation at the 99% confidence level. This means that in the long and short term, every increase in electronic money transactions will result in

an increase in the inflation rate. Gbanador (2023), Keister and Monnet (2022), Náñez Alonso (2021) have conducted research that supports the positive impact of electronic money transactions on inflation. Gbanador (2023) states that people's use of electronic money has a substitution effect. This can result in a decrease in currency demand and an increase in the money supply, which in turn will have an effect on prices rising. Because of the ease and practicality of electronic money transactions, people will indirectly increase their consumption of goods and services. Using electronic money eliminates the need for change, as the seller sets the nominal value for payment. The ease of transactions can increase public consumption, which in turn encourages money circulation. Keister and Monnet (2022) conducted research which suggests that cash transactions do not directly impact the inflation rate, but rather necessitate several stages. If people want to make transactions using electronic money, they must first fill out their electronic money card. This activity transforms cash into non-cash forms, thereby reducing the money supply in society. This will have an effect on increasing the money supply. After that, the increase in money supply will cause central bank interest rates to decrease, which can encourage a general increase in GDP accompanied by an increase in overall prices.

Table 4: Estimation of Autoregressive Distribution Lag

Variable	Long-Run Coefficients
EM	0.2437***
	(0.0127)
Cards	-1.2254**
	(0.1134)
MS	0.0019***
	(0.0003)
GDP	0.6209***
	(0.0294)
	Short-Run Coefficients
Error Corrections	-0.3413***
	(0.1035)
Δ EM	0.0421***
	(0.0132)
Δ Cards	-1.2008***
	(0.093)
Δ MS	0.0076***
	(0.0003)
Δ GDP	0.7168***
	(0.0963)
R^2	0.8457

This table reports the result of ARDL estimation with the dependent variable is inflation. Standard errors are in parentheses. The symbols *, **, *** denote statistical significance at the 10%, 5% and 1% level.

The long-term and short-term ARDL estimation results indicate a negative relationship between the volume of debit card and credit card transactions and inflation. This means that the volume of debit card and credit card transactions has a significant effect on inflation in the first and second lags, which means that the rate of debit and credit card use is in line with the rate of inflation. In the short term, every increase in debit card and credit card transactions will result in a decrease in the inflation rate. The results of this study are in line with research by Wong and Tang (2020) and Seiler (2020), whose results state that the use of card payments has a positive effect on inflation. Debit cards and credit cards are substitutes for currency. As the use of debit and credit cards increases, the circulation of money also increases, leading to an increase in economic activity and an increase in the prices of goods and services, which in turn leads to inflation. Moreover, nowadays, the availability of facilities provided by banks makes the use of debit cards multifunctional and can make it easier for people to make transactions, for example, purchases, payments, or transfers in the form of funds that can be done without having to go to the bank and queue. For this reason, there are more credit card users than electronic money users. Tightening credit is an effort to control the use of money so that its circulation is not too fast.

In the long- and short-term, the money supply has a positive relationship with inflation. This means that in the short term, every increase in money supply will result in an increase in the inflation rate in the long term and short term. The findings of this research align with previous studies of Joshi (2021) and Gharehgozli and Lee (2022) who demonstrate the positive impact of money supply in mitigating inflation. The results of the research are in line with quantity theory, namely that increasing money supply lead to increased inflation.

The long-term and short-term ARDL estimation results show that GDP has a positive relationship with inflation. During the first lag, GDP has a positive effect on inflation. This means that, in the short term, every increase in GDP will result in an increase in the inflation rate in the following quarter. The results of this study do not align with research (Darmawan, 2020), which states that GDP has no effect on inflation. However, the results of this study are in line with research by Tien (2021), and Ehigiamusoe et al. (2021) who state that GDP has an effect on inflation. An increase in national income leads to a rise in people's purchasing power, thereby boosting their consumption. Increasing public consumption will then lead to an increase in money supply, which will also be accompanied by rising inflation. This is in line with Keynesian theory, which states that increasing GDP in terms of expenditure can increase society's effective demand. If there is an increase in people's effective demand for commodities at the current price level, and the amount exceeds the maximum limit of goods that society can produce, then an inflationary gap arises and results in inflation (Nugroho, 2012).

4. Conclusion

The volume of electronic money transactions has a positive relationship with inflation and has a positive influence in the long and short term. The use of electronic money provides a substitution effect. This statement is in accordance with the quantity theory of money, which states that the money supply is directly proportional to inflation. This means that if the money supply increases, inflation will also increase. The volume of debit card and credit card transactions has a negative relationship with inflation. The money supply has a positive relationship with inflation in the short and long term. This statement is in line with the quantity theory of money, which states that the money supply is directly proportional

to inflation. In the long-term and short-term, GDP has a positive relationship with inflation. This is in line with Keynesian theory, which states that increasing GDP in terms of expenditure can increase society's effective demand. If there is an increase in society's effective demand for commodities at the current price level and the amount exceeds the maximum limit of goods that society can produce, then an inflationary gap arises, which results in inflation.

References

1. Ahiabenu, K. (2022). A comparative study of the design frameworks of the Ghanaian and Nigerian central banks' digital currencies (CBDC). *FinTech*, *1*(3), 235-249.

2. Anwar, C. J. (2023). Heterogeneity effect of central bank independence on inflation in developing countries. *Global Journal of Emerging Market Economies*, *15*(1), 38-52.

3. Anwar, C. J., Ayunda, V. T., Suhendra, I., Ginanjar, R. A. F., & Kholishoh, L. N. (2024). Estimating the effects of electronic money on the income velocity of money in Indonesia. *International Journal of Innovative Research and Scientific Studies*, *7*(2), 390-397.

4. Anwar, C. J., Suhendra, I., Ginanjar, R. A. F., Purwanda, E., & Kholishoh, L. N. (2022). Monetary Policy Efficiency, Financial Market Development and Financial Stability in Developing Countries. *International Journal of Economics & Management*, *16*(3).

5. Anwar, C. J., Suhendra, I., Purwanda, E., Salim, A., Rakhmawati, N. A., & Jie, F. (2023). Investigating the relationship between monetary policy, macro-prudential policy and credit risk in Indonesia banking industry. *Heliyon*, *9*(7).

6. del Rio-Chanona, R. M., Mealy, P., Pichler, A., Lafond, F., & Farmer, J. D. (2020). Supply and demand shocks in the COVID-19 pandemic: An industry and occupation perspective. *Oxford Review of Economic Policy*, *36*(Supplement_1), S94-S137.

7. Didu, S., Anwar, C. J., Suhendra, I., Chendrawan, T. S., & Kholishoh, L. N. (2022). The impact of foreign direct investment, employment rate, and population growth on the EG of developing countries. *International Journal of Economics and Finance Studies*, *14*(4), 202-218.

8. Ehigiamusoe, K. U., Guptan, V., & Narayanan, S. (2021). Rethinking the impact of GDP on financial development: Evidence from heterogeneous panels. *African Development Review*, *33*(1), 1-13.

9. Gbanador, M. A. (2023). The effect of cashless policy on economic growth in Nigeria: An autoregressive distributed lag approach. *Asian Journal of Economics, Business and Accounting*, *23*(6), 22-31.

10. Gharehgozli, O., & Lee, S. (2022). Money supply and inflation after COVID-19. *Economies*, *10*(5), 101.

11. Girdzijauskas, S., Streimikiene, D., Griesiene, I., Mikalauskiene, A., & Kyriakopoulos, G. L. (2022). New approach to inflation phenomena to ensure sustainable economic growth. *Sustainability*, *14*(1), 518.

12. Hooper, P., Mishkin, F. S., & Sufi, A. (2020). Prospects for inflation in a high pressure economy: Is the Phillips curve dead or is it just hibernating?. *Research in Economics*, *74*(1), 26-62.

13. Joshi, U. L. (2021). Effect of money supply on inflation in Nepal: empirical evidence from ARDL Bounds Test. *International Research Journal of MMC (IRJMMC)*, *2*(1), 84-98.

14. Keister, T., & Monnet, C. (2022). Central bank digital currency: Stability and information. *Journal of Economic Dynamics and Control*, *142*, 104501.

15. Kregel, J. (2021). The economic problem: from barter to commodity money to electronic money. *Levy Economics Institute, Working Papers Series*.

16. Lapuente, V., & Van de Walle, S. (2020). The effects of new public management on the quality of public services. *Governance*, *33*(3), 461-475.

17. Maixé-Altés, J. C., & Mourelle, E. (2023). Toward a Cashless Society. Cash and Non-Cash Payments in Spain, 1989-2014. *Panoeconomicus*, *70*(3), 455-487.

18. Náñez Alonso, S. L., Jorge-Vazquez, J., & Reier Forradellas, R. F. (2021). Central banks digital currency: Detection of optimal countries for the implementation of a CBDC and the implication for payment industry open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(1), 72.

19. Purwono, R., Yasin, M. Z., & Mubin, M. K. (2020). Explaining regional inflation programmes in Indonesia: Does inflation rate converge?. *Economic Change and Restructuring*, *53*, 571-590.

20. Seiler, P. (2020). Weighting bias and inflation in the time of COVID-19: evidence from Swiss transaction data. *Swiss Journal of Economics and Statistics*, *156*, 1-11.

21. Sima, V., Gheorghe, I. G., Subić, J., & Nancu, D. (2020). Influences of the industry 4.0 revolution on the human capital development and consumer behavior: A systematic review. *Sustainability*, *12*(10), 4035.

22. Suhendra, I., & Anwar, C. J. (2021). The Role of Central Bank Rate on Credit Gap in Indonesia: A Smooth Transition Regression Approach. *The Journal of Asian Finance, Economics, and Business*, *8*(1), 833-840.

23. Suhendra, I., Anwar, C. J., Istikomah, N., Purwanda, E., & Kholishoh, L. N. (2022). The short-run and long-run effects of central bank rate on exchange rate volatility in Indonesia. *International Journal of Innovative Research and Scientific Studies*, *5*(4), 343-353.

24. Tien, N. H. (2021). Relationship between inflation and economic growth in Vietnam. *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, *12*(14), 5134-5139.

25. Wong, Z. J. R., & Tang, T. C. (2020). Credit card usage and inflation: A case study of a small open economy. *Jurnal Ekonomi Malaysia*, *54*(1), 19-32.