

## Technological Advancement and Money Supply in Indonesia

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### Abstract

Technological advances in the field of non-cash payment systems, which are considered effective in their use by the public, have an impact on the increasing volume of non-cash payment transactions and the decrease in the demand for cash in the community. Where the demand for money is one of the important factors for central banks in controlling the money supply in order to maintain monetary stability in the short and long term. Therefore, this study aims to examine the influence of short-term and long-term dynamics of technological advances from non-cash payment system innovations which include Payment Instruments Using Cards (Credit and Debit), Electronic Money, and Bank Indonesia's National Clearing System on the Money Supply (M2) in Indonesia. Data was obtained from the websites of Bank Indonesia and the Central Statistics Agency in 2011-2022. The research method used is the Error Correction Model (ECM). With the results of the study showing that in the long term, the use of credit cards, debit cards, and SKNBI has a significant effect on the amount of money supply (M2) in Indonesia. And in the short term, SKNBI also has a significant effect on the money supply (M2) in Indonesia. Meanwhile, the use of electronic money does not have a significant effect on the amount of money supply (M2) in the long or short term.

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## 1. Introduction

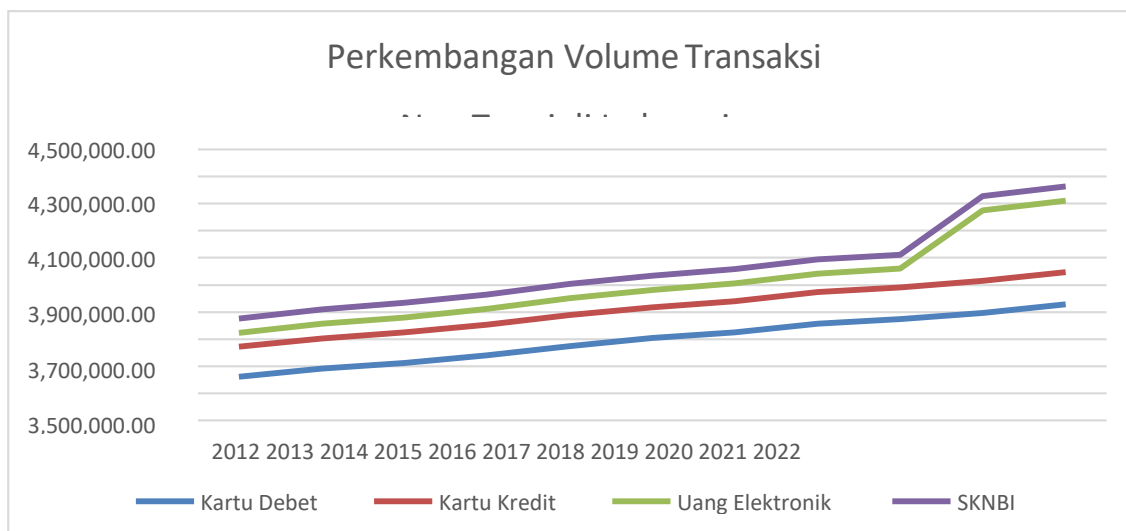
Today's technological advances, especially the internet, have a great influence on the development of the world economy. Technology and the internet have brought the world into a new era known as the *digital economy*. So various financial innovations have been created, especially in the payment system that encourages banks to carry out a number of new paperless-based financial system innovations, so that money is now not only found in the form of cash with paper and coins but has switched to non-cash, namely means of payment using cards and electronic money (*e-money*) stored in a server or chip. (Huljannah & Satria, 2021).

In the digital era, non-cash payment instruments have developed and are increasingly commonly used by the public. The non-cash payment system was initially in the form of Payment Instruments Using Cards (APMK), namely debit cards, and credit cards. APMK can streamline the payment system, and reduce the possibility of risk and ease of use and how to get it at the issuing bank. Then came a new financial innovation in the form of electronic money stored in server media / digital wallets and chips. Which creates a new payment system in the form of electronic fund transfers, tapcash and payments using QR code scans in digital media. In addition to providing convenience, electronic money has advantages in terms of speed in completing transactions. And equipped with various features to make it easier for people to meet their needs.

The various promotions and benefits obtained make the great interest of people who choose non-cash payment instruments in the transaction process one of the causes of the high transaction volume and reduced demand for cash in the community, plus banks as card issuing institutions carry out various promotions to attract public interest. This will affect the stability of the money circulation and its effectiveness monetary policy in maintaining financial stability in the short and long term. In accordance with the Central Bank's goal in maintaining monetary and financial stability, the smooth payment system is one of the prerequisites in achieving these main goals. Electronic money that is efficient in its use can reduce transaction costs, this will affect the reduction in demand for cash in the community due to the shift in payment methods using electronic money. Currently, payment mechanisms are required to always accommodate every need of the community in terms of fast, safe, and efficient movement of funds, so payment technology innovations are increasingly emerging very rapidly. People's needs for speed, reliability, and security in transactions are increasing along with the globalization of the world economy. Business actors certainly want business activities to continue to rotate and the speed of payments/transactions can support business activities. (Salsabila & Nasution, 2022)

Therefore, the Bank Indonesia National Clearing System (SKNBI) is an infrastructure used to process large-value transactions between banks that are practical, fast, efficient, safe and reliable. However, it takes more than 2-3 days because the bank must first check the balance of the sender's account. The administrative cost is relatively cheaper, which is around Rp.2,900 per delivery.

According to Pramono et al. (2006: 26), the additional income received by consumers from the use of electronic money (*e-money*) will encourage public consumption and demand for goods and services which in turn has the potential to encourage real sector activities. Nowadays, people are reluctant to carry large amounts of money in their wallets because in addition to being seen as unnecessary, they are not Safe is also considered impractical



**Figure 1. Development of Non-Cash Transaction Volume in Indonesia**

Based on data taken from Bank Indonesia, the graph of the development of non-cash payment transaction volume over the past 5 years shows that in Indonesia the popularity of the non-cash payment system is quite large. Especially in electronic money in 2020, the volume of electronic money transactions increased almost 2 times compared to 2019. This was due to the increasing spread of the coronavirus at that time, which made people avoid direct contact payments. This figure shows that every year the public's interest in using non-cash means of payment for transactions is increasing, so it can be seen that non-cash payments are an effective means of payment. This has an impact on reducing the use of cash in the community. Therefore, non-cash payments are said to affect the demand for cash, the stability of money circulation, and the speed of money turnover in society, which will affect the money supply.

Electronic money has different impacts on different money levels. Electronic money has a negative impact on cash in circulation. Instead, it has a positive impact on M1. Electronic money will also affect the central bank's controlling power. (Qin, 2017) Rapid developments in the financial sector have reduced the ability of central banks to control the amount or quantity of money supply. With the increasing expansion of financial transnationalization, innovation financial products and processes, as well as the symptoms of asset securitization, so the creation of money supply is increasingly occurring outside the monetary authority. This development causes the stability of the equation of money demand, multipliers, and velocity to be disrupted, even though all of these are prerequisites for effective control of the money supply. (Sarwono & Warjiyo, 1998).

While a single transaction cannot have a serious impact on national monetary policy, as more transactions are carried out with electronic payment systems, monetary policy statistics can become inaccurate. Monetary policymakers who develop complex econometric models to guide policy can miss out on a key part of invisible international transactions. If the policy is based on unreliable data, it can lead to inappropriate policies (Durgun & Timur, 2015).

The influence of non-cash payment system innovations on the money supply will disrupt the effectiveness of monetary policy in maintaining financial stability and economic growth. Makes this topic interesting to research. This study aims to analyze the influence of non-cash payment system innovations on the short-term and long-term dynamics of the money supply in Indonesia in order to facilitate monetary authorities in maintaining economic stability in Indonesia

## 2. Method

This type of research is quantitative research with the type of data used is secondary data in the form of *time series* based on each quarter. The variables of this study are APMK, Electronic Money, and SKNBI as variable X using transaction volume data obtained from the Bank Indonesia Website on the Statistics of the Indonesian Payment System and Financial Market Infrastructure (SPIP) which will be processed on a quarterly basis from 2012-2022 with units of thousands of transactions. and

the money supply variable as variable Y using data on the money supply (M2) obtained from the Central Statistics Agency (BPS) website which will be processed on a quarterly basis starting from 2012-2022 with a unit of billion rupiah. To analyze and determine the influence of short-term and long-term dynamics on the money supply in Indonesia, an econometric technique, namely *the error correction model* (ECM), is used. In estimating *the error correction model*, several analysis tests were carried out, including conducting a data stationarity test using the Augmented Dickey Fuller test or ADF Test, the engle-granger or augmented engle-granger (AEG) cointegration test, *the error correction model* (ECM) test and the classical assumption test.

### Stationarity Test

The Stationarity Test aims to test the data stationary problem by using a unit root test using *the Augmented Dicky Fuller* (ADF) test. Data testing was carried out by comparing the value of ADF Statistics with a *critical value* of 5%. This test was carried out to find out how much integration is stationary data. The basis for decision-making is as follows:

- 1) If the statistical ADF value > critical value % or prob value.  $ADF > \alpha$  (0.05) then the data is not stationary
- 2) If the ADF value is statistically < critical value % or prob value.  $ADF < \alpha$  (0.05) is the stationary date.

### Cointegration Test

The cointegration test was carried out to indicate the possibility of a long-term relationship by testing residual regression or *error correction term* (ECT) whether it was stationary cointegration or not. If the variables are cointegrated stationarily at the level level, there is a stable relationship in the long term. The basis for decision-making is as follows:

- 1) If the calculated value of ADF > Critical value (5%), and prob value <  $\alpha$  (0.05), then there is no cointegration between variables
- 2) If the calculated value of ADF < Critical value (5%), and prob value >  $\alpha$  (0.05), then there is cointegration between variables

### Uji Error Correction Model

*The Error Correction Model* (ECM) is the right model for non-stationary time series data. Non-stationary data often show an imbalance relationship in the short term, but there is a tendency for an imbalance relationship in the long term. In *time series* data, it is often not stationary, causing dubious regression results or known as stubborn regression. Straight regression is a situation in which regression results show that significant regression coefficients are modelically not interrelated. According to Engle-Granger, the ECM model can also explain if the two variables Y and X are not stationary but are integrated.

The formulation of the long-term and short-term correction error model can be expressed in the following equation Long-term estimation function:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + e$$

Description:

Y : Amount of Money Supply (JUB)

$B_0$  : Konstanta

$B_1, B_2, B_3, B_4$ : Coefisien Regresi  $X_1$  : Payment Instrument

Using Card (APMK)

$X_2$  : Electronic Money (EU)

$X_3$  : Bank Indonesia *Real Time Gross Settlement* (BI-RTGS)

$X_4$  : Bank Indonesia National Clearing System (SKNBI)

$e$  : Standard Error

Short-term estimation function

$$\Delta Y_t = \beta_0 + \beta_1 \Delta X_1 + \beta_2 \Delta X_2 + \beta_3 \Delta X_3 + \beta_4 \Delta X_4 + ECT$$

Description:

DY<sub>t</sub> : Variable Y which is in *difference* on the first level

ΔX : Variable X that is in *difference* on the first level

ECT : *Error Correction Term* (residual at lag 1)

## Result and Discussion

### Stationarity Test

Based on the results of the stationarity test, all non-stationary variables at the Level and Stationary levels at the 1st difference and 2nd difference levels are statistical ADF values < critical value % or prob values. ADF < α (0.05) then at the 1st and 2nd levels the data is said to be stationary (H1 accepted, H0 rejected). then this test can be continued using the *Error Correction Model*.

### Cointegration Test

Based on the cointegration test, the statistical ADF value is -3.199242 and *the critical value* is -2.931404. The results state that at the level level, the statistical ADF value < critical value (5%) or prob value. ADF < α (0.05) then the data is stationary or there is cointegration between variables (H1 is accepted, H0 is rejected). Thus residual ECT has been stationary at the level level. Therefore, the data used in this study are integrated and there is a long-term relationship. After a cointegration test was carried out and the results showed a long-term relationship. Next is to estimate the long-term equation.

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + e$$

$$M2 = 4940.708 + 0.705378 D + (0.255176) K + 0.008438 EU + 0.421976 SKNBI$$

**Table 1. Long-Term Equations**

<i>Variabel</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob</i>
C	4940,708	1122,603	4,401118	0,0001
D (DEBET)	0,705378	0,100147	7,043395	0,0000
D (KREDIT)	-0,255176	0,092502	-2,758585	0,0088
D (UE)	0,008438	0,015384	0,054848	0,5865
D (SKNBI)	0,421976	0,106588	3,958948	0,0003
			R Squared	0,972076
			F Statistic	339,4085

In table 1 of the Long-Term Equation, it is known that there are three variables that have a significant effect on the money supply, namely Debit, Credit, and SKNBI.

- 1) The debit coefficient is 0.705378 which means that if there is an increase in the debit card by 1 percent in the long term, the money supply will increase by 0.705378 percent.
- 2) The credit efficiency is -0.255176 which means that if there is an increase in credit cards of 1 percent in the long term, the money supply will decrease by 0.255176 percent
- 3) The SKNBI coefficient is 0.421976 which means that if there is an increase in SKNBI by 1 percent in the long term, the money supply will increase by 0.421976 percent

**Error Correction Model Test****Table 2. Uji Error Correction Model**

Variabel	Coefficient	Std. Error	t-Statistic	Prob
C	23,972000	2,256755	10,622330	0,0000
D (DEBET)	-0,036902	0,060923	-0,605717	0,5484
D (CREDIT)	0,011394	0,037630	0,302793	0,7637
D(EU)	0,001948	0,003212	0,606676	0,5478
D(SKNBI)	0,096750	0,030029	3,221839	0,0027
ECT (-1)	0,017843	0,046414	0,384419	0,7029
			R-Squared	0,335370
			F-Statistics	3,734007
			Prob (F-Statistic)	0,007761

In table 2 of the Short-Term Equation, it is known that the variable that has a significant effect on the money supply is SKNBI. The SKNBI coefficient is 0.096750 which means that if there is an increase in SKNBI by 1 percent in the short term, then the money supply will increase by 0.096750 percent

**Classical Assumption Test Normality Test****Table 3. Normality Test**

Mean	1.65E-15
Median	-1,205562
Maximum	26,83018
Minimum	-23,62973
Jarque-Bera	0,406423
Probability	0,816105

Based on the normality test in table 3, the *probability value* is 0.816105. The result states that the probability value is  $> \alpha$  (0.05) then the data is normally distributed between variables (H1 is accepted, H0 is rejected)

**Linearity Test****Table 4. Linearity Test**

	Value	df	Probability
t-statistic	0,484339	36	0,6311
F-statistic	0,234585	( 1, 36)	0,6311
Likelihood Ratio	0,279289	1	0,5972

Based on the linearity test in table 4, it can be seen that the probability value in F Statistic is 0.6311. The results stated that the prob. F Statistic  $> \alpha$  (0.05), then the data has linearity between variables (H1 accepted, H0 rejected)

**Multicollinearity Test****Table 5. Multicollinearity Test**

Variabel	Coefficient Variance	Uncentered VIF	Centered VIF
D (DEBET)	0,003712	3,577786	2,822509
D (CREDIT)	0,001416	2,349499	2,281898
D(EU)	1.03E-05	1,14271	1,093179
D(SKNBI)	0,000902	1,912661	1,850363
ECT (-1)	0,002154	1,316269	1,310193
C	5,092943	1,530349	ON

Based on the multicollinearity test in table 5, it can be seen that the *centered value of VIF* on each independent variable is below the number 10. The result states that the *Centered VIF value* is  $< 10$ , then the data does not have multicollinearity between variables (H0 is accepted, H1 is rejected)

**Heteroscedasticity Test**

**Table 6. Heteroscedasticity Test**

F-statistic	1,072494	Prob. F (5,37)	0,3913
Obs*R-Squared	5,443173	Prob. Chi-Square (5)	0,3642
Scaled explained SS	3,077006	Prob. Chi-Square (5)	0,6881

Based on the results of the heteroscedasticity test in table 8, the value of the prob can be determined. The Chi Square on the Obs\*R-Squared is 0.3642. The results stated that Prob. Chi-Square  $> \alpha$  (0.05), then there is no heteroscedasticity (H0 accepted, H1 rejected)

**Autocorrelation Test**

**Table 7. Autocorrelation Test**

F-statistic	0,843406	Prob. F (2,35)	0,4388
Obs*R-Squared	1,977084	Prob. Chi-Square (2)	0,3721

Based on the autocorrelation test, in the table 7, it can be known that the value of Prob.Chi-Square is 0.3721. The result states that the Prob.Chi-Square value is  $> \alpha$  (0.05) then there is no autocorrelation (H0 accepted, H1 rejected)

**Influence Tools Card Payments against Money Supply in Indonesia**

Based on the results of the study, Payment Instruments Using Cards (APMK) which includes debit cards and credit cards have a positive and significant effect on the long-term dynamics of the money supply in Indonesia. This can be seen from the long-term equation table which shows a probability number below 0.05 with a debit card coefficient of 0.705378 which means that if there is an increase in the debit card by 1 percent in the long term, the money supply will increase by 0.705378 percent. And the credit card coefficient is -0.255176 which means that if there is an increase in the debit card by 1 percent in the long term, the money supply will decrease by -0.255176 percent Payment Instruments Using Cards (APMK) has no effect on short-term dynamics because based on data on APMK transaction volume in Indonesia, the use of APMK in Indonesia has always increased steadily in the long term, namely for the last 11 years so that when the ECM test is carried out to indicate a short-term relationship with the money supply, APMK which includes debit cards and credit cards produces a probability above 0.05 which means that it has no effect to the short-term dynamics of the money supply in Indonesia.

This is in line with Irving Fisher's theory of money demand, namely the existence of money is essentially a flow concept. The existence of money or the demand for money is not affected by interest rates, but the amount of money will be determined by the speed of the money turnaround.

This research is in line with research (Yuli Wijaya et al., 2021) The higher the The use of non-cash transactions will increase the amount of money in the community. With this, it can suppress the use of cash-less transactions.

In fact, at this time of transactions for consumption and for other transaction purposes, people are starting to switch to using electronic transactions which are felt to be much more practical and efficient, they feel various conveniences such as the ease of making financial transactions almost all over the world, either sending or withdrawing money and making bill payments online without having to queue at the bank. The amount of transactions carried out through debit and credit cards is what causes the volume of electronic transactions to have a significant and positive effect on the money supply in Indonesia.

### **The Influence of Electronic Money on the Amount of Money Supply in Indonesia**

Based on the results of the research, electronic money has no effect on the short-term dynamics and long-term dynamics of the money supply in Indonesia. This can be seen in the table of the Long-term equation and ECM testing, the probability on the electronic money variable is above 0.05, which has no significant effect.

Electronic Money has no effect on short-term and long-term dynamics because based on transaction volume data, the use of Electronic Money in Indonesia has only experienced a trend or has only begun to be used by the public for the last 4 years, starting from 2019-2022. So that the volume of electronic money transactions has only increased significantly in the last 4 years. Meanwhile, in 2012-2018, there was still very little transaction volume generated from use of electronic money so that when data processing is carried out, electronic money produces a probability above 0.05 in the ECM test output and long-term equations which means that electronic money has no effect on the short-term and long-term dynamics of the money supply in Indonesia. This is not in line with research (Bambang Widjajanta, 2007) Non-cash transactions such as the use of cards, e-money or electronic transfers as non-cash payment systems will reduce the demand and need to meet costs in maintaining a certain amount of liquidity at the central bank and can reduce the need for demand for currency in the public. The increasing use of non-cash transactions has a significant negative effect on the amount of money in circulation. This means that the more non-cash transactions are used, the less money demand there is.

### **The Influence of SKNBI on the Money Supply in Indonesia**

Based on the results of the study, the Bank Indonesia National Clearing System (SKNBI) has a positive and significant effect on the short-term and long-term dynamics of the money supply in Indonesia. This can be seen from the table of the Long-Term equation which shows a probability number below 0.05 with a coefficient of 0.0421976, which means that if there is an increase in SKNBI by 1 percent in the long term, the money supply will increase by 0.0421976 percent. Meanwhile, the influence of short-term dynamics on the money supply can be seen from the ECM test table which shows a probability number below 0.05 with a coefficient of 0.096750 which means that if there is an increase in SKNBI by 1 percent in the short term, the money supply will increase by 0.096750 percent. SKNBI is one of the variables in non-cash payment instruments. so that in this transaction, it affects the demand for cash in the community. Because in its implementation, the bank uses checks, bilyet, current accounts with a large transaction value.

Irving Fisher asserted that the amount of money, the rate at which it is created, and the volume of products exchanged are the three variables that determine the value of a currency. When money is used in trading, there is a demand for it. The type of transaction process that dominates the community at a certain time determines the amount of money circulation and the volume of goods traded. In the theory of the quantity of money, Irving Fisher assumed that the existence of money was essentially a flow concept. The existence of money or the demand for money is not affected by interest rates, but the amount of money will be determined by the speed of the money turnaround. The potential for non-cash transactions in transaction instruments is increasingly in demand by the public in Indonesia. This increase is evidenced by a significant increase in the number and nominal of non-cash transactions from year to year. In addition to the ease and demand of the public to make efficient and safe transactions, non-cash transactions have an influence on the amount of money supply determined by Bank Indonesia. Of course, the use of non-cash transactions can increase or decrease the level of money circulating in the community. (Fatmawati & Yuliana, 2019).

So it can be concluded that:

- 1) The use of debit cards affects the long-term dynamics of the money supply in Indonesia. And it has no effect on the short-term dynamics in Indonesia.
- 2) The use of credit cards affects the long-term dynamics of the money supply in Indonesia. And it has no effect on the short-term dynamics in Indonesia.
- 3) The use of electronic money has no effect on the long-term dynamics and short-term dynamics of the money supply in Indonesia.

- 4) The use of sknbi affects the long-term dynamics and short-term dynamics of the money supply in Indonesia.

The results of this study are the same as the research from Afifah (2017) which shows that the results of research on the use of debit and credit cards in the long term affect the amount of money supply as well as the short term. Non-cash payments have increased significantly, followed by the effect of substitution and efficiency. Payments using cards encourage a decrease in the cash held by the community. While on the other hand, a lot of money enters the banking system. The use of debit and credit cards also cuts transaction fees and efficiency in payments

Siera (2006) The results of his research prove that the use of non-cash transactions in developed countries is able to replace cash payments with

#### 4. Conclusion

Based on the results of calculation and data analysis and discussion, the following conclusions can be drawn:

- 1) The use of debit cards affects the long-term dynamics of the money supply in Indonesia. And it has no effect on the short-term dynamics in Indonesia.
- 2) The use of credit cards affects the long-term dynamics of the money supply in Indonesia. And it has no effect on the short-term dynamics in Indonesia.
- 3) The use of electronic money has no effect on the long-term dynamics and short-term dynamics of the money supply in Indonesia.
- 4) The use of sknbi affects the long-term dynamics and utilizing electronic payments in transactions. However, cash payments are still a culture in Indonesia. The existence of non-cash transaction instruments only makes it easier for people to obtain cash and has not yet become a mainstay payment facility in transactions.
- 5) Research from Lasondy & Syarief (2015) says that the increase in debit ATMs, credit and e-money transactions will increase the money supply. Regardless of how much currency is displaced by non-cash transactions, the Central Bank will still control the existence of the money supply through short-term interest rates
- 6) To maintain the stability of the financial system, Bank Indonesia as the actor of the monetary authority sets monetary targets so that the stability of the Indonesian economy is maintained, namely through the money supply. The amount of money in circulation in the community needs to be supported by a payment system. Thus, non-cash payments are currently something that needs to be monitored so that it does not have a negative impact on monetary goals. (Fatmawati & Yuliana, 2019) short-term dynamics of the money supply in Indonesia.

#### Daftar Pustaka

- Ambarwati, A. D., Sara, I. M., & Aziz, I. S. A. (2021). The Effect of Money Supply (JUB), BI Rate and Inflation on Economic Growth in Indonesia for the 2009-2018 Period. *Warmadewa Economic Development Journal (WEDJ)*, 4(1), 21-27. <https://doi.org/10.22225/wedj.4.1.3144.21-27>
- Amrini, Y., Aimon, H., & Syofyan, E. (2015). *Analysis of the Influence of Monetary Policy on Inflation and the Economy in Indonesia*.
- Bambang Widjajanta, A. W. (2007). *Economics & Accounting: Honing Economic Skills*. Bandung: PT Grafindo Media Pratama.
- Durgun, Ö., & Timur, M. C. (2015). The Effects of Electronic Payments on Monetary Policies and Central Banks. *Procedia - Social and Behavioral Sciences*, 195, 680-685. <https://doi.org/10.1016/j.sbspro.2015.06.271>
- Fatmawati, M. N. R., & Yuliana, I. (2019). The Effect of Non-Cash Transactions on the Money Supply in Indonesia in 2015- 2018 With Inflation As a Variable Moderation. *Expansion: Journal of Economics, Finance, Banking And Accounting*, 11(2), 269-283. <https://doi.org/10.35313/ekspansi.v11i2.1608>
- Huljannah, M., & Satria, D. (2021). Technological Advancement and the Speed of Money Turnaround: An Indonesian Case Study. *Ecoscience: Scientific Journal of Economics and Development*, 10(1), 15. <https://doi.org/10.24036/ecosains.113136> 57.00
- Istanto, L., & Fauzie, S. (2014). *Analysis of the Impact of Non-Cash Payments on the Money Supply in Indonesia*.

- Kartika Sari, D., Iriani Sri Setiawati, R., Development Economics Study Program, A., Upn, F., Timur, J., & Faculty of Economics and Business, D. (2020). *Analysis of the Influence of Non-Cash Payment Transactions on the Money Supply in Indonesia*. 3(2), 361–376.
- Lintangsari, N. N., Hidayati, N., Purnamasari, Y., Carolina, H., & Febranto, W. (2018). *Analysis of the Influence of Non-Cash Payment Instruments on Financial System Stability in Indonesia*.
- Lukmanulhakim, M., Djambak, S., Yusuf, D. K., Department, M., Development, E., Economy, F., Sriwijaya, U., & Development, J. E. (2016). The effect of non-cash transactions on the speed of money in Indonesia. *Journal of Development Economics*, 14(1), 41–46. <https://doi.org/10.29259/jep.v14i1.8774>
- Ningsih, S., & Kristiyanti, L. (2018). *Analysis of the Influence of Money Supply, Interest Rates, and Exchange Rates on Inflation in Indonesia for the 2014-2016 Period*.
- Qin, R. (2017). *The Impact of Money Supply and Electronic Money: Empirical Evidence from Central Bank in China*.
- Rizqa Khairi, M., & Gunawan, E. (2019). *Analysis of the Use of Payment Instruments Using Cards (Apmk) and E-Money on Public Consumption in Banda Aceh*. [www.bi.go.id](http://www.bi.go.id)
- Salsabila, N., & Nasution, A. (2022). *Comparison of Effectiveness in the Payment System of the National Clearing System of Bank Indonesia (SKNBI) with Bank Indonesia Real Time Gross Settlement (BI-RTGS) at PT Bank SUMUT KCP Syariah Simpang Kayu Besar*.
- Sarwono, H. A., & Warjiyo, P. (n.d.). 5 *Searching for a New Paradigm of Monetary Management in a Flexible Exchange Rate System Searching for a New Paradigm of Monetary Management in a Flexible Exchange Rate System: A Thought for Its Application in Indonesia*.
- Sofyan, M. (2015). *The Impact of the E-Money Policy in Indonesia as a New Payment System Tool*.
- Yuli Wijaya, A., Mukhlis, I., & Seprillina, L. (2021). Analysis of the influence of E-money, electronic transaction volume and interest rates on the money supply in Indonesia before and after the COVID-19 pandemic. *Journal of Economics, Business and Education*, 1(2), 135–145. <https://doi.org/10.17977/um066v1i22021p135-145>