INTRODUCTION

Bank Indonesia is responsible for the rupiah currency circulation in sufficient amounts and denominations to avoid disruption to economic stability. Supervision of the money supply is designated to control the inflation rate to promote people's welfare. This supervision is carried out to maintain the financial system's stability, in which its instability is a trigger factor for the crisis (Ivanova, 2020). The development of money in circulation from 2010 to 2020 continues to increase.

The payment system is an important component in the economy to verify the completion of payment transactions carried out by the public. In ensuring the smoothness and security of the payment system, Bank Indonesia has conveyed several policies that focus on four main aspects, which are security, efficiency, expanding access to the payment system, and giving more concerns on consumer protection in payment transactions. As technology develops, payment systems continue to be updated. Innovations in the financial sector have altered the role of using cash as a means of payment to a non-cash payment system that is considered more efficient and economical. Non-cash payments cover various bases ranging from card-based transactions to network-based transactions referred to as e-money (Putri *et al*., 2022).

The non-cash payment system is defined as a form of information interchange that connects many organizations (financial institutions and governments) with users (individuals) in carrying out monetary exchanges through electronic media and internet network technology. Digital payments pr non-cash payments are crucial to the ongoing economic transformation, which is being driven and supported by major global technology companies (Mutzel, 2021). Bank Indonesia fully supports the people's utilization of non-cash payments by introducing the National Non-Cash Movement program in 2014. This program aims to increase the cashless society or reduce the use of cash by the public and increase the use of non-cash money. It has been proven that the GNNT program has a positive influence on non-cash utilization among people. Since its first introduction, the use of non-cash has continued to increase (Ramadhani & Oktora, 2019).

Amidst the COVID-19 pandemic which caused economic crisis in may countries (Babshetti, *et al* 2022), Bank Indonesia, as the payment system authority, encourages people to perform non-cash transactions either through digital banking, e-money, debit cards, credit cards, and Quick Response Indonesia Standard (QRIS). The impact of the COVID-19

pandemic on the economy can be seen from two perspectives, first, the supply side, which includes reduced labor supply due to COVID-19 infection, which ultimately causes low productivity and mobility restrictions (lockdown). Second, from the demand side, which involves a decrease in income due to layoffs, unemployment, and low levels of consumption and investment (Chudik *et al*., 2020). In addition, according to Asante dan Mills (2020), the socio-economic impact of COVID-19 can be seen from the rise in food prices due to social distancing policies. This price increase is not only limited to imported goods but also locally produced goods. As a result, many people are experiencing economic problems. Ito (2020), in his research, mentioned that the symptoms of the global financial crisis have grown since the COVID-19 pandemic, during this time, the country has led to massive expenditures to counteract the spread of Covid-19. Of course, this has an impact on the amount of money circulating in society.

As referred by Bara *et al.,* (2016), financial innovation can easily provide access to financial information, trade, and payment facilities, thereby supporting economic growth, especially supported by mobile banking, so that transactions become faster, easier, and more efficient. Meanwhile Anjum dan Chai (2020) stated that the non-cash payment system (e-payment) eases people to perform real-time transactions. Furthermore, safe and reliable e-payments can increase people's shopping activities in e-commerce. The increasing speed, reliability, and financial risk of payment systems can affect the money supply, necessitating supervision from the monetary authority (Lubis *et al.*, 2019). Bank Indonesia establishes the money supply as one of the important factors in determining the economic policy that will be taken to maintain financial system stability. Therefore, the level of money supply in society needs to be monitored by both the government and Bank Indonesia. (Fatmawati & Yuliana, 2019)

Interest rates also become one of the determining factors in the amount of money is circulating in society. Money supply monitoring by Bank Indonesia is carried out by determining interest rates. Interest rates will influence individual choices in realizing their wealth, whether in cash or for speculative purposes in securities to make a profit. It is based on Keynes' theory, which states that when interest rates rise, people will increase their savings in banks or speculate on securities to make a profit. So, it will impact reducing the amount of money circulating in society and vice versa (Mentari & Pangidoan, 2018). This study aims to analyze the influence of non-cash payments, interest rates, and the Covid-19 pandemic on money in circulation.

LITERATURE REVIEW

The payment system is a method for transferring a sum of money from one party to another. The payment system plays an important role in an economy by increasing the country's economic efficiency, a means of transmitting monetary policy, and maintaining financial and banking stability in a country (Subari & Ascarya, 2003). According to Bank Indonesia, two types of payment systems are available, namely, cash payment systems and non-cash payment systems. The difference between the two types of payment systems lies in the instrument used, cash payments use currency (banknotes and coins), while non-cash payments use cards (APMK), electric money (e-money), checks, and giro bills. Card-based payment tools consist of debit cards and credit cards, which utilize cards, while e-money involves the Internet network in its process. The means of payment using cards is referred to Bank Indonesia regulations, number 14/2/PBI/2012, concerning amendments to Bank Indonesia regulations in number 11/11/PBI/2009 on the implementation of payment instrument activities using cards as listed in article 1 number 3, It is explained that payment instruments using cards consist of credit cards and debit cards.

The development of transactions using non-cash payment instruments recently shifted the role of cash in economic activities. According to Mankiw (2008), three functions of money are identified which are value keeping, identified as the amount of money that is saved for tomorrow's needs. Second, as a unit of account, money is considered a measure of an item or commodity. Third, as a means of exchange, money is expended as a legal and generally accepted means of payment in carrying out transactions to purchase goods or services. The use of debit cards has a positive and significant influence in Indonesia on the money supply in both the long and short (Azhar et al., 2020). The use of debit cards in households causes a decrease in the stock of cash, high levels of debit card use are more likely to be owned by households with high incomes, have a lot of wealth, and are well-educated compared to households that do not use debit cards (Mercatanti dan Li, 2017). Ardizzi et al. (2018) studied the effect of innovation in electronic payment systems on the efficiency of bank operational costs using non-parametric estimation techniques. Electronic payment systems commendably reduce cost inefficiencies, while the use of debit card or credit card fails to reduce cost inefficiencies. This fact implies that the development of payment system innovation from traditional to virtual services can increase cost efficiency due to the use of electronic payments that are faster and easier. According to Wijaya et al. (2021), e-money and the volume

of electronic transactions have a positive and significant effect on the amount of money circulating in Indonesia. Non-cash payments are found to be easier, more practical, and faster, thereby accelerating the velocity of money, which then increases the amount of money circulating in society, as stated by Fatmawati dan Yuliana (2019).

Interest rates have a negative and significant effect on the money supply, and inflation has a negative and significant effect on the money supply has found by Mentari and Pangidoan (2018). The COVID-19 pandemic reduces the level of demand for cash because the spread of COVID-19 can be transmitted through the use of cash from one individual to another (Cevik, 2020). Online shopping transactions using electronic payments increased during the Covid-19 pandemic, this phenomenon impacts reducing demand for cash as well as reducing the amount of money in circulation. The results of research conducted by Pambudi and Raden (2021) demonstrated that the COVID-19 pandemic has led to an increase in non-cash payments due to the public's opinion that avoiding physical contact when using cash can reduce the spread of COVID-19, that electronic payments can affect the amount of money circulates in society. The transition from cash to electronic money results in improved production efficiency that intensifies the interest rate channel for monetary policy transmission and reduces money printing costs. The use of e-money lessens the demand for cash, but on the other hand, it challenges the central banks to perform the monitoring on money supply and its impact on potential operational targets of increasing the speed of money, interest rate elasticity of money demand, and monetary policy costs. In addition, increasing the use of innovative payment systems can increase the demand for electronic money and reduce the price elasticity of money demand (Tule dan Oduh, 2016).

From the literature review, while previous research discusses how non-cash payments can affect interest rates and monetary policy transmission, more research is needed to fully understand the mechanisms involved. Moreover the short-term effects of non-cash payments on money supply are explored, but more research is needed to understand the long-term implications. So, this research focused on research question in, first how do non-cash payments influence the effectiveness of monetary policy tools? Second, how does the increasing use of non-cash payments affect the overall stability and growth of the money supply over time? The Hypotheses can be conveyed in this research as follows:

1. It is assumed that non-cash payments have a positive and significant effect on the money supply.

2. It is assumed that interest rates have a positive and significant effect on the money supply.
3. It is assumed that the Covid-19 pandemic has had a positive and significant effect on the money supply.

RESEARCH METHODS

This research employs a quantitative approach. Monthly data, scattered from September 2018 to August 2021, are used. They comprise the money supply (M2), nominal debit card transactions, nominal credit card transactions, nominal e-money transactions, and interest rates (BI7DDR). The data sources are derived from the official website of Bank Indonesia, www.bi.go.id., and Statistics Indonesia, www.bps.go.id.

This research uses the Error Correction Model (ECM) test to explain the occurrence of relationship disparities and the non-stationarity of a variable in the long term and the short term. Model testing in ECM includes elements of Error Correction Term (ECT) in the short-term equation model; the ECM model is considered to be valid, which can be seen in the residual statistical test results from the first regression or the results of Error Correction Term (ECT). If the test results show that the ECT coefficient value is statistically significant or <5% and is negative, it can be said that the model specification is valid and correct.

Long-term ECM model equation:

$$LogM2_t = \beta_o + \beta_1 LogKD_t + \beta_2 LogKK_t + \beta_3 LogEM_t + \beta_4 SB_t + \beta_5 DUM_t + e_t$$

Short-term ECM model equation:

$$\Delta LogM2_t = \alpha_o + \alpha_1 \Delta LogKD_t + \alpha_2 \Delta LogKK_t + \alpha_3 \Delta LogEM_t + \alpha_4 \Delta SB_t + \alpha_5 \Delta DUM_t + ECT_t + e_t$$

Description:

M2 = Money Supply

β_o = Constant Value

$\beta_{1...} \beta_5$ = Long Run Coefficient

KD = Debit Card Valu

KK = Credit Card Value

EM = E-Money Value

SB = Interest Rate Value

DUM = Dummy (before covid-19 = 0 and during covid-19 valued as 1)

e_t = Error term/ residual in period of t

ECT = Error Correction Term (ECT)

RESEARCH RESULTS AND DISCUSSION

Stationarity Test

The stationary test is recognized as the first stage in carrying out the ECM test, which is used to identify the stationarity of a variable, both the dependent variable and the independent variable. This research uses the Phillips Perron (PP) stationary test using Eviews 9.0 software.

Table 1. Test of Integration Degree

Variabel	PP Value	Prob	Description
M2	-10.523	0.000	Significant
Debit Card	-15.271	0.000	Significant

Credit card	-6.429	0.000	Significant
E-Money	-5.252	0.0001	Significant
BI7DRR	-4.021	0.0038	Significant
Dummy	-5.831	0.000	Significant

Cointegration Test

The cointegration test is a test carried out after all the data is categorized as static. This test is carried out to identify whether all the variables have a long-term relationship. A variable is said to have cointegration if it has a long-term equilibrium relationship or cointegrated data. Data are said to be cointegrated if the value of the trace statistic is greater than the critical value and the value of the max eigen statistic is larger than the critical value.

Table 2. Johansen Cointegration Test

Eigen Value	Trace Statistic	Critical Value	Prob
0.88186	134.807	95.7537	0
Eigen Value	Max Eigen Statistic	Critical Value	Prob
0.88186	72.6202	40.0776	0

In Table 2 above, it can be seen that the value of the trace statistic 134.8071 is larger than the critical value 95.75366, the probability value is 0.0000 < 5 percent, and the max eigen statistic value is 72.62022, which is larger than the critical value of 40.07757 with the probability value is 0.0000 < 5 percent. Hence, it can be concluded that in the model, cointegration exists, or else, there is a long-term relationship among variables.

Long Term Analysis

ECT is statistically significant or < 5%, and the coefficient is negative. The first sequence of ECM tests is to carry out long-term equation regression and then continue with short-term equation regression. The following are the estimated results of the ECM test.

In Table 3, the long-term estimation results of this research indicate that the constant has a positive and significant influence on Y, with a coefficient value of 13.09208 and a probability of 0.0000 <5 percent significance level. The debit card variable has a positive and significant effect on the money supply, which can be shown by the coefficient value of 0.144166 and the probability value of 0.0015.

Table 3. Long-Term Estimation Results

Variable	Coeffi-cient	Std. Error	t-Statistic	Prob.
D(LogKD)	0.144	0.041	3.4996	0.0015
D(LogKK)	-0.037	0.035	-1.060	0.2978
D(LogEM)	0.030	0.009	3.377	0.002
D(SK)	-4.840	0.793	-6.103	0.000
D(Dum)	0.028	0.018	1.553	0.1308
C	13.092	0.663	19.742	0.000

In Table 3, the long-term estimation results of this research indicate that the constant has a positive and significant influence on Y, with a coefficient value of 13.09208 and a probability of 0.0000 <5 percent significance level. The debit card variable has a positive and

significant effect on the money supply, which can be shown by the coefficient value of 0.144166 and the probability value of 0.0015. This is following the hypothesis that an increase in the use of debit card transactions will be followed by an increase in JUB. These results support research conducted by Jayanovita (2022), who stated that the positive and significant influence originated by every transaction using a debit card can add savings that arise as quasi-money (savings deposit), which is a component of M2. It means that an increase in debit card transactions can increase the amount of money circulating in society, besides, using a debit card in every transaction can reduce the opportunity cost of holding cash so that it can reduce the cost of printing cash more efficiently. The results in this study are also supported by research conducted by Azhar et al. (2020), that the increase in debit card use is aligned with the increase in the amount of money circulating in society, assuming ceteris paribus.

The credit card variable has an insignificant effect on the amount of money in circulation; it can be disclosed by the coefficient value of -0.036737 and the probability value of 0.2978. This result is not issued by the hypothesis in this study. It might arise due to the utilization of credit cards that potentially creates risks and costs in the future. These costs can be caused by the interest rate that must be paid, as well as the amount of fees or fines that are imposed when payments are in arrears. As a result, people prefer to reduce the use of credit cards in transactions, especially during the COVID-19 pandemic, many people have experienced a decrease in income. So, the use of credit cards will only cause costs in the future. Therefore, the use of credit cards does not have a significant impact on the amount of money circulating in society, assuming ceteris paribus.

The e-money variable has a positive and significant effect on the amount of money in circulation, which can be shown by the coefficient value of 0.029635 and the probability value of 0.0020. This result is by the hypothesis in this research. This follows the hypothesis that an increase in e-money utilization causes an increase in JUB. In line with research conducted by Wijaya et al. (2021), the positive and significant influence is caused by the term float in e-money, which refers to an amount of money or funds recorded in e-money that has not been or has been used in transactions, but has not been billed by the merchant. Float funds in e-money can be categorized as liquid money, meaning they can be used at any time. Apart from that, this float can be equated with cash or demand deposits so that when there is an increase in e-money, it will also increase the amount of money circulating in society.

The interest rate variable (BI7DRR) has a negative and significant effect on the money

supply; it can be presented by the coefficient value of -4.839871 and the probability value of 0.0000. It confirms the hypothesis and supports research conducted by Harahap and Hafizh (2020) on the negative and significant influence caused by people's preferences for interest rates. When there is an increase in interest rates, it will encourage people to save money in banks in the hope of getting a higher rate of return than investing in the real sector. So this will reduce the amount of money circulating in society, and vice versa, when interest rates fall, the amount of money circulating in society will also decrease. The same results were also demonstrated by Aprileven (2015), in his research suggested that high interest rates will reduce people's consumption levels, resulting in a decrease in the amount of money circulating in society.

The dummy variable (impact of Covid-19) does not have a significant effect on the money supply; this can be shown from the coefficient value of 0.028365 and the probability value of 0.1308. This result does not comply with the hypothesis in this study. The ECM estimation results suggest that in the long term, the impact of COVID-19 has an insignificant effect on the money supply, with a coefficient value of 0.028365 and a probability value of 0.1308, which is higher than the 10% significance level. It can be concluded that the COVID-19 pandemic gives no changes to JUB since the shock of the COVID-19 pandemic does not occur continuously, with the government's efforts to distribute vaccinations evenly to the community, provide assistance incentives for economic recovery and implement the new normal. This government policy is quite effective in recovering the national economy, with the new normal, people can normally perform activities outside the home, and the economy can run normally, as previously.

In Table 4, it can be seen that the debit card variable has a positive and significant effect on the money supply, this can be shown by the coefficient value of 0.066331 and the probability value of 0.0117. The ECM estimation results show that in the short term, debit cards have a positive and significant effect on the money supply, with a coefficient value of 0.066331 and a probability value of 0.0117, which is lower than the 1% significance level.

Table 4. Short-Term Estimation Results

Variable	Coeffi-cient	Std. Error	t-Stat	Prob.
D(LogKD)	0.066	0.025	2.698	0.0117
D(LogKK)	0.029	0.0215	1.394	0.1743
D(LogEM)	-0.009	0.022	-0.423	0.6756
D(SK)	-0.718	1.71	-0.42	0.6775
D(Dum)	0.041	0.012	3.3543	0.0023
ECT (-1)	-0.61	0.179	-3.407	0.002
C	0.006	0.003	2.034	0.0515

This means that every 1% increase in debit card transactions will increase JUB by 0.066331%. It is in line with the hypothesis that

an increase in the use of debit card transactions will cause an increase in JUB. These results support research conducted by Arthur and Pudjihardjo (2014) that the positive and significant influence caused by the use of debit cards with savings as the underlying has caused a shift in the function of money in savings, which initially could not be withdrawn at any time to become a type of savings that can be withdrawn at any time. Savings on debit cards include type M1 in the demand deposit category, which also includes M2 coverage. So, if there is an increase in debit card transactions, it will also increase the amount of money in circulation. Not only that, but the use of debit cards can also increase the acceleration of money circulation, which is caused by the ease of transactions, and automatically, it has an impact on increasing JUB in society.

The credit card variable has an insignificant effect on the amount of money in circulation, which can be shown by the coefficient value of 0.029370 and the probability value of 0.1743. These results do not follow the hypothesis in this study. The ECM estimation results signify that short-term credit cards have an insignificant effect on the money supply, with a coefficient value of 0.029370 and a probability value of 0.1743, which is higher than the 10% significance level. It can be concluded that changes to the credit card towards JUB are permanent or have no effect. It is due to the requirements for applying for credit in Indonesia that are still considered very strict, so it is quite difficult for people to use credit cards for transactions. As a result, only a small percentage of people can access and use credit cards to carry out transactions, so the use of credit cards has an insignificant impact on the amount of money circulating in society.

The e-money variable does not have a significant effect on the amount of money in circulation; this can be shown by the coefficient value of -0.009171 and the probability value of 0.6756. This result does not follow the hypothesis in this study. Even though the use of e-money transactions continues to increase from year to year, this increase cannot provide significant changes to JUB since e-money can only be used for small nominal or retail transactions, so people prefer to use cash. Not only that, e-money can only be used for transactions at merchants who use e-money readers issued by the e-money provider. People as consumers or buyers must have many types of e-money to be able to carry out purchase transactions because not all merchants provide e-money readers that support all types of e-money. The lack of people's knowledge and understanding regarding e-money means that cash transactions are still more popular than e-money.

The interest rate variable (BI7DRR) does not have a significant effect on the money

supply; this can be shown by the coefficient value of -0.718418 and the probability value of 0.6775. This result does not follow the hypothesis in this study. The dummy variable has a positive and significant effect on the money supply; this can be shown by the coefficient value of 0.040705 and the probability value of 0.0023. This result does not follow the hypothesis in this study. This could be because money, in the narrow sense, is influenced by demand deposits and currency, in this case, demand deposits are more influenced by the increase in minimum statutory reserves. Currency is influenced by seasonal factors such as religious holidays, an increase in the Small and Medium Enterprises (UKM) sector, and the level of public consumption. Meanwhile, interest rates have more influence on quasi-money. According to Fadhli et al. (2021), during the COVID-19 pandemic, people's consumption levels or purchasing power experienced a drastic decline due to people that experienced a contraction in income due to layoffs, a decrease in business profits, and a decrease in income. It was recorded that in 2019, the growth rate of public consumption was 5.18 percent, then decreased in 2020 to -5.51 percent. These results support research conducted by Maria et al. (2017) that in the short term, the interest rate variable in the research period is unable to explain changes in the money supply.

CONCLUSIONS AND SUGGESTIONS

These research findings that debit cards and e-money (in the long term) can be effective tools for influencing the money supply, while credit cards and the BI7DRR interest rate (in the short term) have limited impact. The COVID-19 pandemic had a temporary positive effect on the money supply. It is expected that the government and related parties can take proper policies in monitoring the money supply so that it does not disrupt economic stability. The government and society are expected to further improve and support the National Cashless Movement program, which has been issued by Bank Indonesia. It aims to encourage people to intensify the use of non-cash in their transactions, considering the various advantages of non-cash payments and minimizing the risks of using cash. It is expected also that further research will add other factors or independent variables that influence the amount of money circulating in Indonesia.

The contribution of this research suggests to the government and society to further improve and support the National Cashless Movement program, which has been issued by Bank Indonesia. This aims to encourage people to increase the use of non-cash in their transactions, considering the various advantages of non-cash payments and minimizing the risks of using cash.

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