

## The Impact of a Cashless Payment System on Inflation

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Article Info	Abstract
<p><b>Article history:</b> Received May 6, 2022 Revised December 1, 2022 Accepted December 15, 2022 Available online December 31, 2022</p> <p><b>Keywords:</b> Credit Card, Debit Card, E-Money, Inflation, and Interest Rate</p> <p>JEL Classification; E31 &amp; E44</p> <p>Copyright (c) 2022 Aprilianto, Muslikhati This is an open-access article under the CC - BY NC SA license</p> 	<p><i>The rise of transactions without using money or what is commonly referred to as cashless transactions. Cashless transactions have several advantages, namely, functional, effortless, and quick. In addition, cashless transactions get an impact on monetary policy in Indonesia. The convenience obtained when conducting cashless transactions results in the acceleration of the velocity of money. Although the number of cash transactions in the community has decreased, the rate of money creates a high intensity with the use of cashless transactions. If the power of money circulation is high, it is feared that it will cause inflationary effects. This study aims to determine the impact of the cashless payment system on inflation. A quantitative approach was used in this study with secondary data which in the source obtained through documentation techniques obtained from Bank Indonesia (BI) and the Central Statistics Agency (BPS). from January 2009 until December 2020. The analysis technique uses multiple linear regression analysis. The results showed that the electronic-money variables had a significant negative effect, the debit card variables had a significant positive impact, the credit card variables had an insignificant negative effect, and the interest rate variables had a significant positive effect</i></p>

### INTRODUCTION

The rapid development of technology has significantly impacted people's lifestyles. The impact of technology is one of them in the financial or monetary sectors. Technology and economic activity in money and time will develop in more sophisticated forms (Juhro & Iyke, 2019). The more critical the role of money in trade and the economy, the more modern a country will be (Anggraini, 2016).

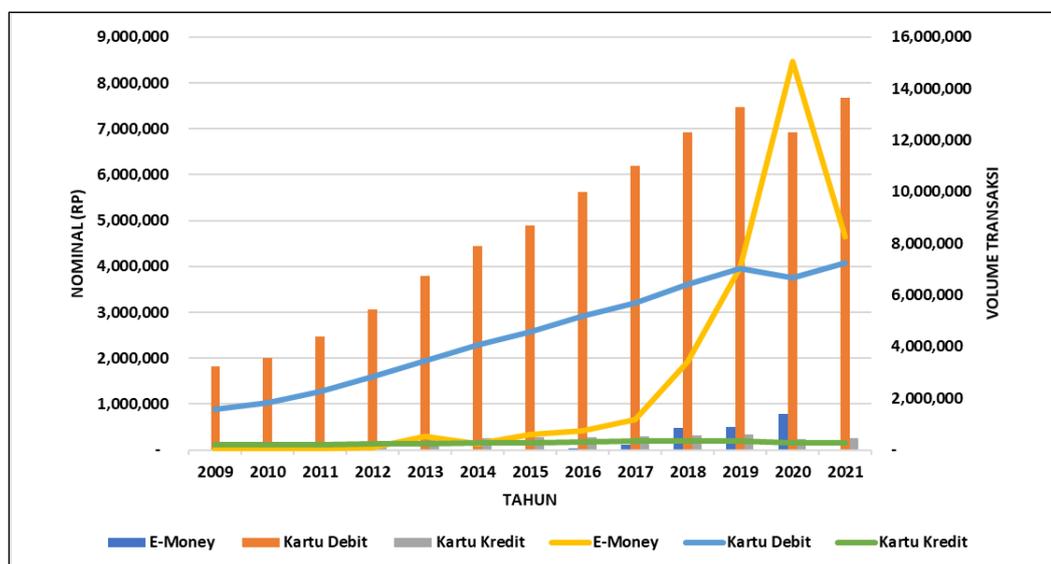
As Andrieu (2001) stated, we are transitioning from paper-based money to electronic money, including credit and debit cards, electronic checks, and online and offline digital wallets. Advanced technology has replaced the role of cash with cashless transactions, such as debit cards, credit cards, and electronic money in the form of cards (chip-based) and digital wallets (e-wallet). The existence of cash transaction problems and inconveniences, such as requiring to queue at a bank or ATM to withdraw cash or limited banking services, are reasons for some users to switch to non-cash transactions (Ong & Chong, 2022).

Following the development of technology, the choice of payment instruments is also proliferating (Dahlberg et al., 2008). Consumers then use a digital wallet in every transaction (Simatele & Mbedzi, 2021). The idea of a cashless economy emerged long before discussing the feasibility of cashless

instruments (Bátiz-Lazo & Efthymiou, 2016). This topic has become a common concern and a fascinating research topic. Countries such as Sweden, the Netherlands, Finland, and the United Kingdom show the potential to make their countries cash-free in the next few years. A cashless economy will positively affect society (Kumari & Khanna, 2017; Abbas, 2017). This development is due to financial transparency and reduced transaction costs (Raya & Vargas, 2022). Furthermore, non-cash cash can improve the economy (Omodero, 2021).

Based on data published by Bank Indonesia from 2009-2019, the use of APMK and electronic money continued to increase in terms of nominal (Rupiah) and transaction volume. This phenomenon can be seen in graph one below.

**Graphic 1: Nominal Value and Transaction Volume E-Money, Debit Card, and Credit Card**



Source: Bank Indonesia (processed Data, 2021)

The data in graph 1 shows that from 2009 to 2021, the use of non-cash payment instruments increased yearly. The increasing use of non-cash payment instruments indicates that the public has accepted e-money for each transaction. Reasonably rapid growth is shown by e-money transactions, in which 2015-2021 showed very significant developments.

This phenomenon is supported by a study conducted by Fujiki & Tanaka (2014), which tried to examine the function of household currency demand in Japan that depended on adopting electronic money. The results show that the demand for currency increases along with the adoption of electronic money. Payment innovations in Canada, such as credit cards and electronic money cards, have reduced the use of cash. Electronic money cards are mainly used for low-value transactions, under 10 dollars, while credit cards are primarily used for medium-value transactions, ranging from 10 to 40 dollars (Fung *et al.*, 2014).

Andrieu (2001) also stated that paper money would lose its footing in the coming year because the new instrument in the form of electronic money will be more widely accepted for various transactions. Technological

developments, particularly in the cellular communications sector, will offer new opportunities to upgrade existing e-money payment instruments to better suit the needs of consumers and sellers in an increasingly integrated economic environment.

Cashless transactions are currently increasingly popular with the public. Besides being more practical, easy, and fast, cashless transactions have a multiplier effect on monetary policy in Indonesia. Cashless transactions also affect public consumption, impacting the community's money supply.

The ease of doing cashless has the impact of accelerating the velocity of money. The money rate is the average number of times per year (turnover) that one unit of currency is used to purchase the total goods and services produced in the economy (Miskhin, 2016). The circulation of money continues to cause high intensity, even though the number of cash transactions in the community has decreased. However, it is feared that the increased power of money circulation could lead to a new impact, namely inflation.

The existence of cashless transactions will also encourage people to withhold cash transactions so that people tend to keep their money in their accounts—the more people who keep their money in their performances. The multiplier effect caused a more significant number of public funds in the form of non-cash in bank accounts; This will impact the accumulation of liquidity so that banks are obliged to channel them back to the public in the form of loans. The provisions of the minimum statutory reserve requirement (GWM) and the application of interest rates will impact the multiplier effect of money laundering and have an impact on the money supply.

Research conducted by Geanakoplos & Dubey (2010) states that the widespread use of credit cards increases trade efficiency and the velocity of money. It causes inflation without any monetary intervention. Meanwhile, research by Wahyuningsih & Sasongko (2021) and Nainggolan & Garnia (2020) also shows a positive and significant relationship between electronic money and inflation. Fatmawati & Yuliana (2019) also show that cashless transactions have a positive and meaningful relationship with the money supply. Inflation can strengthen the ties of non-cash transactions to the money supply. This statement is also reinforced by Afrizal (2017), showing that the money supply influences inflation in Indonesia.

Specifically, Istanto S & Fauzie (2014) research states that credit card transaction volume, debit transaction value, and e-money transaction value positively affect M1. Meanwhile, by substituting M1 for M2, the result is that the importance and value of ATM/Debit transactions positively affect M2.

The quantity theory of money by Irving Fisher explains a relationship between the money supply and changes in the value of money (inflation). Fisher stated that inflation occurs because the money supply, money growth, and monetary policy transmission are direct (Natsir, 2014). This theory is the basic theory of studying the monetary transmission channel of the money channel (monetarist channel).

Based on the theory put forward by Keynes that the interest rate will determine people's preferences in choosing the level of saving (saving). The interest rate or BI Rate is one of the instruments used by the monetary authority

to influence inflation through the money supply. Where is the tendency of society that when interest rates rise, people will tend to save in the hope of getting a higher return (Perlambang, 2017).

The research gap in this study can be seen in that several previous studies tried to examine the causes of inflation in terms of using transaction instruments with one of the payment instruments or partially. Meanwhile, in this study, we attempted to determine by including all payment instruments, namely electronic money, debit cards, credit cards, and interest rates, as control variables.

Based on the law, Bank Indonesia has the mandate to achieve and maintain the stability of the Rupiah value. The stability of the value of the Rupiah in question is the stability of the currency's value against goods and services. The first aspect is the development of the inflation rate and the strength of the money of other countries. The second is the development of the Rupiah's value against other countries currencies.

One indicator of sustainable economic growth is low and stable inflation, which will benefit the community's welfare. High and uncontrolled inflation impact will result in poor socio-economic conditions in the community; therefore, inflation control is crucial. Based on the description previously explained, this study aims to determine the impact of the cashless payment system on inflation. This study's proxies for cashless payments are electronic money, debit cards, and credit cards.

## RESEARCH METHODS

The approach used in this research is quantitative; This is a politicization method because it is based on the philosophy of positivism. This study uses the type of data, namely secondary data. Where the data sources needed in this study were obtained through documentation techniques. The necessary Data for this study is the type of secondary data obtained from other related parties. Bank Central (BI) and the Central Statistics Agency (BPS), from January 2009 to December 2020. The analytical technique used in this study uses multiple linear regression analysis.

This equation model is stochastic. The stochastic equation model is an equation model that includes error terms or confounding variables in addition to the independent variables and dependent variables in the model. Here is the equation model:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$$

Where : Y: Inflation;  $X_1$ : Electronic Money;  $X_2$ : Debit Card;  $X_3$ : Credit Card;  $X_4$ : BI Rate;  $\beta_0$ : Constant;  $\beta_{1234}$ : Regression Coefficient;  $\epsilon$ : error.

The classical assumption test is a requirement that must be met in the regression model using the ordinary least squares (OLS) estimation method. The classical assumption test itself has several stages, including:

1. The normality Test is a test to measure whether the data obtained has a standard or abnormal distribution so that the selection of statistics can be made correctly (Riyanto & Hatmawan, 2020).

2. The multicollinearity test, this test aims to test whether, in the regression model, there is a high or perfect correlation between independent variables (Ajija *et al.*, 2011).
3. The Autocorrelation test correlates the error in observation with other observation errors. Autocorrelation can occur in cross-sectional Data, but it is more common in time-series data. In time-series data, the occurrence of autocorrelation means a correlation between errors in one period and another (Karnadi, 2017).
4. The heteroscedasticity test aims to test whether, in the regression model, there is an inequality of variance from the residuals of one observation to another. It is called heteroscedasticity if the conflict from one compliance to another is different (Wiedermann *et al.*, 2017).

Hypothesis testing is a branch of inferential statistics that aims to test the truth of the inclusion of a hypothesis statistically so that conclusions can be drawn. The test's purpose is to establish a basis and collect various data and facts that can be used as reasons for accepting or rejecting the truth of the inclusion or assumptions made. Hypothesis test, several steps are needed, such as a partial regression test (t-test), simultaneous regression test (F-test), and the coefficient of determination ( $R_2$ ).

## RESULT AND DISCUSSION

### Classical Assumption Test

The classical assumption test is a test in econometric rules to keep the ordinary least square (OLS) in the regression model to produce the best estimator. The nature of this test is the Best Linear Unbiased Estimator (BLUE), meaning that the regression model is not problematic.

### Multicollinearity Test

In the multicollinearity test in table 1, the following results were found:

**Table 1. Multicollinearity Test**

Variable	VIF	1/VIF
X <sub>1</sub>	6.51	0.153507
X <sub>3</sub>	5.76	0.173617
X <sub>4</sub>	1.39	0.718134
Fdx2	1.09	0.920527
MEAN VIF	3.69	

Based on the results of the multicollinearity test shown in table 1, the correlation coefficient between the independent variables is below 0.10 or <0.10. It can be interpreted that the model is free from multicollinearity problems, so  $H_0$  is accepted.

### Autocorrelation Test

In the autocorrelation test in table 2, the following results were found:

**Table 2. Autocorrelation Results – Durbin Watson (DW-Test)**

Value of DL:	1.6380	4-16380	2.362
Value of DW:	1.7950	4-17950	2.205

Table 2 shows autocorrelation test results – Durbin Watson (DW Test). The results presented in table 2 show that the value of Durbin Watson Stas (d) is 1.971162. The value lies between dU and (4-dU). It can be interpreted that the model is free from autocorrelation problems, so  $H_0$  is accepted.

**Normality test**

In the normality test in table 3, the following results were found:

**Table 3. Normality Test Results – Normality Test**

Variable	Obs	Pr (Skewness)	Pr (Kurtosis)	Adj chi2(2)	Prob>chi2
res	132	0.5241	0.8051	0.47	0.7897

Based on the Normality test results shown in Table 3, Prob Chi2 is 0.7897. This value is more significant than (5%) or  $0.7897 > 0.05$ . It can be interpreted that the error term is normally distributed, then  $H_0$  is rejected.

**Heteroscedasticity Test**

A heteroscedasticity test was conducted to determine the inequality of residual variance from one observation to another in a regression model (Gujarati & Porter, 2013).

**Table 4. Heteroscedasticity Test**

Chi2(1)	0.36
Prob > chi2	0.5490

This study's p-value is 0.5490, where  $> 0.05$ . The regression model is homoscedastic or free from heteroscedasticity symptoms.

**F-test**

In the F test in table 4, the following results were found:

**Table 5. Probability Value F**

Significance	Probability F
5% / 0,05	0.000

In this study, the probability value of F is 0.000. The probability F-value of 0.000 is less than (5%), or  $0.000 < 0.05$ . Thus, it can be said that the overall variables of E-Money, Debit Cards, Credit Cards, and BI Rate as independent variables have a simultaneous or simultaneous effect on the inflation variable as the dependent variable in this study.

**T-test**

In the T-test in table 5, the following results were found:

**Table 6. Value of T . Test Results**

Variable X	Probability
Log_E-MONEY	0,000
Log_Debit Card	0.010
Log_Credit Card	0.261
BI RATE	0.000

Referring to the data in table 5 can be described as follows:

1. Based on the data processing, the E-Money variable's probability is 0.000. This value means that individually the E-Money variable as the independent variable (X) affects the inflation variable as the dependent variable (Y) because the probability value of the E-Money variable is  $0.000 > (10\% / 0.1)$ .
2. Based on the data processing carried out, the probability of the Debit Card variable is 0.010. This value means that individually the Debit Card variable as the independent variable (X) affects the inflation variable as the dependent variable (Y) because the probability value of the Debit Card variable is  $0.010 = (10\% / 0.1)$ .
3. Based on the data processing carried out, the probability of the Credit Card variable is 0.261. This value means that individually the Credit Card variable as the independent variable (X) does not affect the inflation variable as the dependent variable (Y) because the probability value of the Credit Card variable is  $0.261 > (10\% / 0.1)$ .
4. Based on the data processing carried out, the probability of the BI Rate variable is 0.000. This value means that individually the BI Rate variable as the independent variable (X) affects the inflation variable as the dependent variable (Y) because the probability value of the BI Rate variable is  $0.000 > (10\% / 0.1)$ .

#### Coefficient of Determination

**Table 7. Test Results (Coefficient of Determination)**

Description	Coefficient Value
R-Squared	50% or 0.5059
Adjusted R-Squared	0.4903

The data processing results carried out in this study resulted in an R-Squared value of 0.5059; This means that the variable nominal value of E-Money, Debit Card, Credit Card, and BI Rate transactions can explain the inflation variable as the dependent variable (Y) of 51%. Other variables outside the model explain the remaining 49%.

### Multiple Linear Regression Result Test

The approach used is the OLS (Ordinary Least Square) approach. After testing the data using Stata software, The following are the results of multiple linear regression in this study:

**Table 8. Multiple Linear Regression Result Test**

y	Coef.	Std. Err	t	P>t	Beta
X1	-.0162653	.0041355	-3.93	0.000	-.6683068
X2	.0748814	.0284544	2.63	0.10	.8787886
X3	-.0472082	.0418476	-1.13	0.261	-.3351679
X4	.9598405	.1252597	7.66	0.000	.5645174
_cons	-.2836152	.2494526	-1.14	0.258	.
Number of Obs					132
F (4,127)					32.51
Prob > F					0.0000
R Squared					0.5059
Adj R-squared					0.4903
Root MSE					.0127

After testing the data using Stata software, the following model is generated:

$$\text{Inflation} = -0.2836152 - 0.0162653 (\text{Log\_E-Money}) + 0.748814 (\text{Log\_Debit Card}) - 0.0472002 (\text{Log\_Credit Card}) + 0.9598505 (\text{Interest Rate})$$

The equation of the panel data model above is described as follows:

- E-Money Regression Coefficient**  
The regression coefficient value of E-Money ( $\beta_1$ ) is -0.0162653, meaning that the inflation rate will decrease by -0.0162653% for every one trillion rupiah increase in E-Money.
- Debit Card Regression Coefficient**  
The Debit Card regression coefficient value ( $\beta_2$ ) is 0.0748814, meaning that for every one trillion rupiah increase in Debit Cards, the inflation rate will increase by 0.0748814%.
- Credit Card Regression Coefficient**  
Credit Card coefficient value ( $\beta_3$ ) -0.0472002, meaning that for every one trillion rupiah increase in E-Money, the inflation rate will decrease by -0.0472002%.
- BI Rate Regression Coefficient**  
The regression coefficient value of the BI Rate ( $\beta_4$ ) is 0.9598405, meaning that an increase of one trillion rupiahs in the BI Rate will increase the inflation rate by 0.9598405%.

### Discussion

#### The Relationship of E-Money to Inflation

E-Money is an application or card-based payment tool applicable in the community. E-money requires the user to top up the card or e-money application before making a transaction. Top-up transactions can be done through Mobile Banking, tellers, or ATMs. Every e-money transaction,

incidentally, can affect inflation. If there are more and more users of e-money transactions, the money in circulation will automatically increase and impact inflation.

Using e-money in transactions requires users to fill out a card or e-money application by Top Up first. So, making a Top Up transaction will affect the money supply. This transaction is based on the transfer of currency values from cash to non-cash. The existence of e-money will make it easier for the monetary authority to control the money supply through several instruments or policies implemented to control inflation. This research supported by [Arifin & Oktavilia \(2020\)](#) that E-money influences inflation in both the long and short term. The results of the study by [Mahatir et al. \(2020\)](#) and [Ramadhani & Nugroho \(2019\)](#) also state that electronic money will increase the money supply, causing inflation.

### **Relationship of Debit/ATM Cards to Inflation**

Access Debit/ATM card products have the same characteristics as credit cards. Debit/ATM cards have many uses, including transferring funds between accounts, withdrawing cash, and making payments. The bank issues this product for its customers to facilitate transactions today. Using debit/ATM cards for transactions cannot affect inflation directly but can affect JUB in the community (M). Applications with debit/ATM cards are made by deducting the balance from the owner or customer who uses the debit/ATM card itself. So that expenses and income can be regulated according to the needs of each customer; if the customer can optimize the use of debit/ATM cards, of course, this will reduce the amount of cash circulated by the Central Bank.

The number of debit card users is still far from that of credit card users, which refers to the tendency of Indonesian people to use debit/ATM cards in their daily activities. Debit card/ATM users tend to have easier control over overspending and the amount of money.

A cashless payment system also affects people's debit cards or ATM consumption. Currently, many merchants or sellers use cashless payment instruments such as EDC (Electronic Data Capture) tools, QRIS, or the Indonesian Standard Quick Response Code. This research is supported by [Fatmawati & Yuliana \(2019\)](#), [Anggraini \(2016\)](#), and [Wong et al. \(2020\)](#) that debit cards have a positive and significant effect on inflation.

### **Relationship of Credit Cards to Inflation**

A credit card is one kind of product access in banking. Many people are starting to use credit cards in their daily activities in the current condition. However, most Indonesians tend to use debit/ATM cards because of the ease of requirements.

In this study, credit card has no significant adverse effect. It can be understood that credit cards are still not as much as debit/ATM cards. Most Indonesians use debit/ATM cards because of the ease of requirements.

The bank provides a limit for credit card user customers, which serves to control the money supply. With this, the banking sector can control the money supply, and inflation is also hoped to be held. Besides that, the interest expense that credit card users bear affects the community, so they do not use credit cards excessively.

These results supported research by [Geanakoplos & Dubey \(2010\)](#), which explains that the widespread use of credit cards provides benefits, can increase the velocity of money, and cause inflation. [Titalessy \(2020\)](#) also explains that credit card transactions have no significant effect on inflation. Furthermore, [J. R. Wong & Tang \(2020\)](#) research explains that credit cards positively affect inflation.

### **Interest Rate Relationship to Inflation**

Interest rates are one of the instruments of monetary policy in Indonesia, where the BI Rate fluctuation can cause future inflation. Inflation can affect supply and demand (supply shocks and administered prices). Both are beyond Bank Indonesia's control, so this explanation can be used to reinforce that the BI Rate is the interest rate for monetary policy in Indonesia based on its effect on inflation.

Furthermore, the causal relationship with the direction of inflation for the interest rate can be interpreted that past inflation rates will affect the current inflation rate or current inflation will affect future interest rates. Regarding the transmission of changes in interest rates, it can be understood that past inflation will affect expectations of future inflation, so that it will affect the degree of change in the current BI rate.

High-interest rates will become unattractive for economic actors and investors if inflation rises and is high. This condition will impact the absorption of credit and be slightly hampered, causing a contraction of economic growth. In addition, the low credit absorption by the real sector can open up opportunities for excess liquidity in the banking sector, where third-party capital accumulates without being absorbed by the market. Therefore, it is crucial to keep inflation stable and low. Low and stable inflation will open up opportunities to increase the absorption rate of credit through lower interest rates. Under these conditions, solid credit absorption is hoped to be effective, thereby increasing economic growth. This research was supported by [Asari et al. \(2011\)](#) and [Neiss & Nelson \(2003\)](#), who explained that the Interest Rate affects inflation. The research results by [Wulan & Nurfaiza \(2014\)](#) also show the same results, where interest rates significantly influence the inflation rate.

### **CONCLUSION**

Based on the analysis and results of research that has been carried out on "The impact of the Cashless Payment System on Inflation," the following results were obtained: The Electronic-Money variable in this study had a significant adverse effect on the Inflation Variable, the Debit Card Variable in this study had a significantly positive impact on the Variable Inflation, the Credit Card Variable in this study had a significant adverse effect on the Inflation Variable, the BI Rate Variable in this study had a significant positive impact on the Inflation Variable

This study has limitations in terms of the use of variables. In this study, the author relates electronic money, debit cards, credit cards, and the BI Rate's influence on inflation. It should be realized that this variable is one of the components that make up the money supply or money supply, so further research can include the money supply variable as an intervening variable.

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