

The Effect of the Integration of Non-Cash Payment Systems on Inflation and Financial Stability of the Money Supply (M1) as an Intervening Variabel

Laila Rahmawati¹,
Magister of Management Information System,
Gunadarma University, Jakarta, Indonesia,

Caecilia Widi Pratiwi²,
Magister of Management Information System,
Gunadarma University², Jakarta, Indonesia,

Abstract:- Inflation is one of the macroeconomic variables, where the rate of inflation that occurs in a country indicates economic development in that country. The money supply is one of the factors that cause inflation. Nevertheless, the money supply these days is due to the innovation of non-cash payment systems. The study aimed to find out and test the effect of non-cash payment systems on inflation and the amount of money as intervention variables. The research was conducted on monthly reports of non-cash payment systems, inflation, and money supply at Bank Indonesia in 2016-2020. Sample selection in the study used *non-probability sampling*. Methods using descriptive analysis methods. Data analysis is done with AMOS using analysis tests. The results in this study are nominally generated by credit cards, ATMDDB and *e-money* affect the money supply. In the same time the money supply does not effect on inflation. *E-money*, ATMDDB do not effect on inflation. Credit cards affect inflation. ATMDDB, and E-money affect inflation mediated or intervening by the money supply. But not with a credit card.

Keywords:- Non-Cash Payment System, APMK, Money Supply, Inflation.

I. INTRODUCTION

According to the development of payment systems innovate from year to year due to of advances in information technology. This is in line with the advancement of the digitalization system of financial services and payment transaction instruments. Payment system innovations in manual and conventional systems must first bring physical money and join the queue at the bank payment counter, then innovate to the payment system with instruments. Non-cash use Card Payment Instruments (APMK) such as ATM and Debit cards and credit cards. Currently, the transformation with the latest innovation is the digitization of payment systems with electronic money *models (e-electronic)*.

This study showed that non-cash transactions had a positive and significant effect on the money supply. This means that the higher the use of non-cash transactions will increase the money supply in the community. The pressure of the use of public funds without funds by Bank Indonesia, it has not directly impacted on the money supply in the community. it is because the use of non-cash transactions is

only done for cash withdrawals afterall, there are still many ordinary people who oppose the use of non-cash transaction facilities and there are still many shops or merchants who use cash payments.

In this study, the researchers were interested in using cash payment systems as independent variables and money supply as interrelated variables to see how central banks maintain financial stability by balancing the money supply to avoid inflation.

II. MATERIALS AND METODHS

A. Irving Fisher's Theory

The theory of demand for money or better known as the quantity theory of money initiated by the classical figure, Irving Fischer, was formulated as follows:

$$M.V = P.T$$

With M as money supply, V as *the velocity of money* or speed of movement of money, P is price, and T as the number of transactions that occur in the economy. This theory it is explains that the change in the money supply would be proportional to the change in price if V and T were assumed to be constant.

B. Keynes's theory

Keynes's money theory is derived from the Cambridge theory, but Keynes proposed something completely different from classical monetary theory. This distinction is in the emphasis by Keynes on another function of money, namely as a store of value and not just as a medium of exchange. This theory came to be known as the liquidity preference theory [4].

According to Keynes, there are three purposes of society to hold money, namely:

➤ Purpose of transaction

Keynes still accepted Cambridges opinion that people held money to fulfill and conduct transactions and that national income levels and interest rates influenced the demand for money from the public for this purpose.

➤ *Purpose just in case*

Keynes also distinguished the demand for money to make irregular payments or those that were outside the regular transaction plan, for example, for emergency payments such as accidents, illnesses, and other unexpected payments.

➤ *Purpose of speculation*

The motive of holding money for the purpose of speculation is primarily to get the "profit" that can be gained if the money holder predicts what will happen.

C. *Cambridge Theory (Marshall-Pigou)*

Cambridge's theory crowns on the function of money as *the mean of exchange*. Therefore, classical theory saw the need for money (the demand for money) from society as the need for liquid tools for transaction purposes.

D. *Financial Stability*

Monetary policy is a policy that regulates the supply of money in a country in achieving specific goals. In addition, monetary policy is a policy that aims to achieve internal balance, external balance and achieve macroeconomic goals themselves in the form of maintaining economic stabilization of a country. In Indonesia, monetary policy is the main guideline in regulating and controlling the value of the rupiah. Maintaining rupiah exchange rate stability, among others, maintains the rupiah against the price of goods and services with indications of inflation and maintains the stability of the rupiah exchange rate against foreign currencies.

E. *Inflation*

According to Bank Indonesia, inflation is interpreted as an increase in goods and services in general and continuously within a certain period. Deflation is the opposite of inflation, a general and continuous decline in the price of goods.

Low and stable inflation is a prerequisite for sustainable economic growth that ultimately benefits people's well-being. The importance of controlling inflation is based on the consideration that high and unstable inflation negatively impacts the socioeconomic conditions of society. First, high inflation will cause people's real incomes to continue to fall so that people's living standards fall and eventually make everyone, especially the poor, poorer. Second, unstable inflation will create *uncertainty* for economic actors in making decisions.

F. *Money Supply*

Money supply in the narrow sense (M1) is defined as money coupled with currency in added *demand deposits*. [4]
 $M1 = C + DD$

Where:

M1 = Money supply in a narrow sense
 C = Currency
 DD = Demand Deposits

According to the Indonesian monetary system, the money supply in the broadest sense (M2) is often called financial liquidity. M2 is defined as M1 plus term deposits and savings balances belonging to the public in banking because the development of M2 can also affect the development of prices, production, and economic conditions in general.

$$M2 = M1 + TD + SD$$

Where:

TD = term deposit

SD = savings deposit

The generally accepted definition of M2 for all countries does not exist, as the ordinary things of each country need to be considered. In Indonesia, the M2 measure includes all term deposits and savings balances in rupiah to banks with small deposits but excludes term deposits and savings balances in foreign currencies.

G. *Payment Systems and Instruments*

➤ *Non-Cash Payment System*

Some innovations in non-cash payment systems are card-based electronic payment systems, namely APMK and electronic money. APMK is a payment system instrument that is generally card-based, among others: Automatic Teller Machine (A.T.M) card, credit card, debit card, and other types of cards that can be used as a means of payment such as *smartcards*, *e-wallets*, as well as several other payment tools that can be fill with cards.

From some of the above understandings, *Financial Technology* (Fintech) is a service that provides financial products by using and utilizing emerging information technology.

The size of the APMK tool is as follows.

- Atm and debit transaction value is the value and face of cash withdrawal transactions, expenses, intrabank funds transfer, and funds transfers between banks conducted using ATM cards or debit cards in the research period.
- Credit card transaction value is the value and face of withdrawal transactions and cash expenditures made using credit cards during the research period.
- In this study, the variables used as indicators of *e-money* use are:
- The value of *e-money* transactions is the value and face of expenditure transactions carried out using electronic money during the research period.

III. RESEARCH METHODS

A. *Research Object*

The objects used in the study were the characteristics studied, namely non-cash payment systems, among others: volume and nominal credit cards, ATM debits, and *e-money*. The study is conduct on a monthly report for 2016-2020. The data sample between 2016-2020 is record as many as 60 data.

B. Measurement of Research Variables

➤ **Inflation (Y2)**

Inflation is an event that indicates a general rise in price levels and continues. From the definition, three criteria need to be consider to see the occurrence of inflation, namely price increases, in general, and occurs continuously in a specific period. If the price increase occurs a moment later, it falls again; it cannot be say to be experiencing inflation. So that inflation can be interpreted by the increase in price levels that occur continuously, affecting individuals, entrepreneurs, and governments. The index is use to measure how high inflation is with cpi. The average price of goods and services is use as consumption by households. Monthly C.P.I measures inflation changes for the period 2016-2020. The calculation of inflation can be seen in the formula [7]:

$$Inflasi = \frac{IHK\ t - IHK\ t-1}{IHK\ t-1} \dots$$

Keterangan |

IHK t = IHK periode t

IHK t-1 = IHK periode t-1

Fig 1. Formula of Inflation

➤ **Money Supply Liquidity (Y1)**

The currency in circulation has been issued and circulated by the Central Bank. Currencies are of two types, namely coins and banknotes. Thus the currency in circulation is the same as the money. In contrast, money supply is all types of money in the economy, namely the amount of currency in circulation coupled with giral money in commercial banks. Money is divided into two understandings, namely in a narrow and broad sense.

In the narrow sense (M1), money supply is defined as money coupled with giral money (*currency plus current account*). This variable was taken between 2016-2020, using units of trillion rupiah.

C. Non-Cash Payment System

The use of this technology is carried out in transactions and relationships between the community and banks such as *e-money* and ATM, where the use of these two fintech instruments provides convenience, effectiveness, and efficiency in conducting financial activities the community. On the other hand, transaction or savings activities through *e-money* and ATMs have a high level of security, and fintech also increases the mobility of community transactions (Rusdianasari, 2018). [8]

➤ **APMK**

The increasing use of non-cash payment systems such as APMK (ATM cards, debit cards, credit cards) and electronic money has impacted the money demand function where the demand for money is one of the critical factors for the central bank in determining its monetary policy. It happens because this type of payment card users have become an alternative transaction tool other than money.

The definition of *e-money* issued by the Bank for International Settlement (BIS) is a stored or prepaid value product owned by a person, in which a certain amount of value for money has been stored in electronic media used as a means of transaction.

Variables are taken between 2016-2020, using transaction units.

- ATM/Debit transaction value (X1)
- Credit Card Transaction Value (X2)
- Electronic Money (E-money) (X3)

➤ **Data Analysis Techniques**

The data analysis technique used in this study was a pathway analysis test using AMOS version 26.

IV. RESULTS AND DISCUSSIONS

➤ **Development of Models Based on Theory**

The development model in this study consists of three types of variables used, and intervention variables, namely the money supply. APMK and *e-money* are Independent variables (Exogenous), and Inflation are dependent (endogenous) variables.

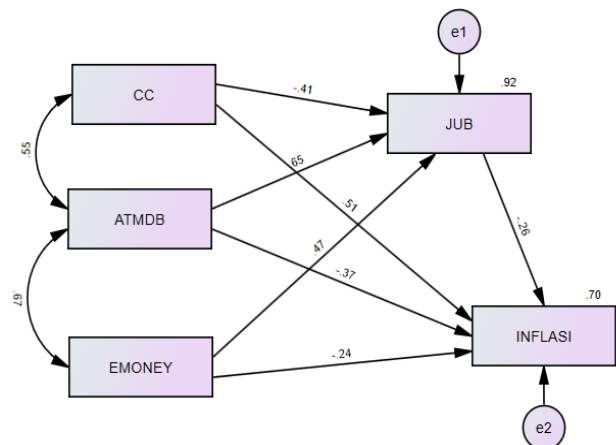


Fig 2. Flowchart Variables
Source: data processed in AMOS v.26.

Based on the path diagram formed, the following path equations can be formed:

$$JUB = -0.41\ CC + 0.65\ ATMDB + 0.47\ EMONEY + 0.92$$

$$INFLATION = 0.65\ CC + 0.37\ ATMDB - 0.24\ EMONEY - 0.26\ JUB$$

$$INFLATION = - 0.26\ JUB + 0.70$$

➤ Normality Test

Variable	min	max	skew	c.r.	kurtosis	c.r.
EMONEY	.39	22.14	.63	2.00	-1.20	-1.89
ATMDB	412.72	730.94	.04	.13	-.39	-.62
CC	15.09	32.83	-.59	-1.86	.21	.33
JUB	1035.55	1855.63	.31	.97	-.41	-.65
INFLASI	1.32	4.45	-.70	-2.20	.44	.69
Multivariate					1.92	.89

Table 1. Result Normality Test

Based on the results of test data from table 1 of the normality test above that the normality test value can be seen from the multivariate c.r (critical ratio), where the data can be said to be the normal distribution if it is at the significance level of 0.01 if the value of c.r multivariate, slope (skewness) or tapering (kurtosis) is in the range of values between ± 2.58. The table above shows that there is no univariate value below ± 2.58. Indicates that the data is being distributed normally.

➤ Outliners Test

Based on the output results, it can be seen that the data does not have extreme value, so the data is not an outlier and can be done to the next stage.

➤ Residual Value Test

	par_1	par_2	par_3	par_4	par_5	par_6	par_7	par_8	par_9	par_10	par_11	par_12	par_13	par_14
par_1	1.00													
par_2	-.74	1.00												
par_3	.60	-.80	1.00											
par_4	.00	.00	.00	1.00										
par_5	.00	.00	.00	-.70	1.00									
par_6	.00	.00	.00	-.76	.16	1.00								
par_7	.00	.00	.00	.70	-.19	-.88	1.00							
par_8	.00	.00	.00	.00	.00	.00	.00	1.00						
par_9	.00	.00	.00	.00	.00	.00	.00	.00	1.00					
par_10	.00	.00	.00	.00	.00	.00	.00	.00	.84	1.00				
par_11	.00	.00	.00	.00	.00	.00	.00	.72	.55	.36	1.00			
par_12	.00	.00	.00	.00	.00	.00	.89	.00	.00	.52	.00	1.00		
par_13	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.00	
par_14	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.00

Table 2. Residual Value Test

No residual value exceeds the value of 2.58 so, there is no need to modify the research model. Based on the remaining output of Covariances above, there is no number that exceeds +2.58 so the model matches and does not need to modify the model.

➤ Fit Goodness Test

Tabel 4.15 Evaluasi Kriteria Goodness of Fit

Goodness of Fit	Cut off Values	Hasil Estimasi	Keterangan
Chi-square	< 2.70554	1.71	Fit
Probability	≥ 0.05	1.9	Fit
CMIN/DF	≤ 2.00	1.71	Fit
RMSEA	≤ 0.08	0.11	Marginal
GFI	≥ 0.90	0.99	Fit
AGFI	≥ 0.80 - 0.90	0.83	Fit
TLI	≥ 0.95	0.98	Fit
CFI	≥ 0.95	1.00	Fit

Sumber : Data diolah di AMOS v.26, 2021

Table 3. Fit Goodness Test

From the table above, it can be concluded that all models have significant value in this study and are good enough to relate from one indicator to another.

➤ Hypothesis Test

- H1: Credit Card Transactions Affect the Money Supply
- H2: ATM + Db transactions affect the Money Supply
- H3: e-money transactions affect the money supply
- H4: Money Supply Affects Inflation
- H5: Credit Card Transactions Affect Inflation
- H6: ATM + Db transactions affect inflation
- H7: E-money transactions affect inflation

➤ Hypotheses affect indirectly:

- H8: Credit Card Transactions Affect Inflation through Money Supply
- H9: ATMDB transactions affect inflation through money supply
- H10: E-money transactions affect inflation through Money Supply

V. DISCUSSION

➤ Hypothesis Test

Tabel 4.16 Regression Weights

		Estimate	S.E.	C.R.	PLabel	
JUB	<--- CC	-22.05	2.92	-7.56	***	par_1
JUB	<--- ATMDB	1.79	.20	8.85	***	par_2
JUB	<--- EMONEY	13.56	1.78	7.62	***	par_3
INFLASI	<--- JUB	.00	.00	-1.01	.31	par_4
INFLASI	<--- EMONEY	-.02	.02	-1.41	.16	par_5
INFLASI	<--- ATMDB	.00	.00	-1.70	.09	par_6
INFLASI	<--- CC	.10	.03	3.42	***	par_7

Sumber : Data diolah di AMOS v.26, 2021

Table 4. Regression Weights

Tabel 4.17
Hasil Uji Hipotesis

Pengaruh Langsung	Koefisien Jalur	Std. Error	P-Value	Hasil Hipotesis	R-square (Koefisien Determinasi)
Kartu Kredit terhadap Jumlah Uang Beredar	-22.05	2.92	***	Ha diterima	0.92
ATMDB terhadap Jumlah Uang Beredar	1.79	0.20	***	Ha diterima	
E-money terhadap Jumlah Uang Beredar	13.56	1.78	***	Ha diterima	0.7
Jumlah Uang Beredar terhadap Inflasi	0.00	0.00	0.31	Ho diterima	
E-money terhadap Inflasi	-0.02	0.02	0.16	Ho diterima	
ATMDB terhadap Inflasi	0.00	0.00	0.09	Ho diterima	
Kartu kredit terhadap Inflasi	0.10	0.03	***	Ha diterima	

Sumber : Data diolah di AMOS v.26, 2021

Table 5. Interpretation of Results

➤ *Interpretation of results*

Credit cards nominally generated the results in this study on the money supply, due to the increasing number of nominal uses of credit cards, such as the data tested. This will increase the money supply in the community.

It is also supported by data and graphs of spending consumption and cash withdrawals via credit cards with trillions of units. In this case, the shopping transaction is much larger. This means that the money in circulation is less than the use of cash where people can now meet all their consumption needs and is increasingly facilitated and practical with various payment offers using non-cash and will affect the money supply.

The nominal generated by ATMDB has a significant positive effect on the money supply. This will impact the money supply because the higher the nominal non-cash withdrawal transaction used by the community, this will interfere with the policy --Monetary in the speed of money turnover. High consumption with cash transactions makes money in circulation more and more.

The nominal generated by e-money has a significant positive effect on the money supply. With a result of 0,000. In this case, because e-money is very liquid equivalent to cash. If e-money increases, then the circulation of money will decrease. The higher the nominal transaction used, the more proportional directly to the money supply. This is supported by the data below. It can be seen that nominal transactions using e-money always increase every year (data presented in trillions). This is due to ease, practicality, and safe. Moreover, it can also be seen from the side of banks or e-money issuing companies that are increasing.

The money supply does not effect on inflation. It also shows that the speed of the money supply is accelerating with evolving systems, transactions, and nominal non-cash payments such as credit card shopping through cash. Alternatively, in the form of loans and ATMDB can still be controlled by bank Indonesia as a monetary bank so that there is no long-term or sustainable price increase that can cause inflation.

Negative e-money does not effect on inflation. This means that e-money does not have a different effect than the theory. In this case, the ease of transactions and the turnover of money in e-money does not affect inflation because higher usage and nominal use of e-money transactions do not cause the money supply to be disrupted. This is due to the increasing number of merchants or innovations that can be accessed by the public using e-money.

ATMDB (money debit) does not effect on inflation. This could be because the turnaround in debit money speed does not trigger factors that cause inflation such as prices to rise, or the public can control the level of consumption by financial theory with the motive of keeping money in circulation and prices are getting higher is not consumptive, so this lowers demand. Debit or leave money savings. So that the amount of money in circulation will be controlled so as not to cause inflation.

The nominal generated by credit cards has a significant positive effect on inflation. With a result of 0,000. The money supply supports this as mediation for increased nominal use of transactions. The use of credit cards on cash or credit withdrawals will affect the amount of money in circulation. In this case, it has been explained how Bank Indonesia as a monetary bank can set the policy of the loan fund so that the money supply can be channeled properly. Because the amount of money in circulation is increasingly stable will suppress high inflation.

ATMDB and e-money CC affect inflation mediated or interfered with by the money supply. But not with a credit card. This is measured by comparing the magnitude of the standard direct effect with the standard indirect effect. If the amount of money in circulation that comes from depositing money into e-money but is not adjusted to the transaction used/spent will cause imbalance so that the turnover of money that occurs cannot rotate properly, then there will be inflation.

In this case, ATMDB transactions also indirectly influence inflation through the amount of money in circulation. Because since it is grown innovation of non-cash payments makes the community less and less to transactions using cash. If this continues to be done and the government does not make loanable funds on public money in the bank, then

This will cause inflation. Credit cards do not directly affect the amount of transactions used in both cash and credit can be channeled properly. So that the loanable fund policy run by the government to control inflation can be applied so that the amount of money supply in the community does not affect inflation.

VI. CONCLUSIONS

Based on the results of the process and analysis of data in AMOS v.26, hypothesis testing and discussion of this study can be concluded as follows:

- The results in this study are nominally generated by credit cards, ATMDB, and e-money affect the money supply.
- While the money supply does not effect on inflation. E-money, ATMDB do not effect on inflation. Credit cards affect inflation.
- ATMDB and E-money affect inflation mediated or intervening by the money supply. But not with a credit card.

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