

## Non cash payment and demand for real money in Indonesia

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### ABSTRACT

Non-cash payments in Indonesia are currently developing rapidly. The development of the form of money from just paper money and coins into an electronic money is predicted to have an effect on real money demand, not only in Indonesia. The use of electronic money in Indonesia itself continues to increase especially supported by technological developments. The purpose of this study was to analyse the effect of non-cash payments on real money demand in Indonesia. The method used is Error Correction Model (ECM) using secondary data from 2010 to 2015. The independent variable is the amount of money circulated by Bank Indonesia, and the independent variables used are the value of debit / ATM card transactions, credit cards, and e-money. The results indicate that in the long run credit cards have a significant negative effect on cash circulation in the community, while debit cards have a significant positive effect and affect cash. While in the short term, credit cards and e-money are not significant for cash, and only debit cards only have a significant effect on cash.

### ABSTRAK

Pembayaran non tunai di Indonesia saat ini berkembang cukup pesat. Adanya perkembangan bentuk uang dari hanya sekedar uang kertas dan koin kemudian bertambah menjadi uang elektronik diprediksi akan memberikan pengaruh pada permintaan uang riil, tidak terkecuali di Indonesia. Penggunaan uang elektronik di Indonesia sendiri terus meningkat apalagi didukung oleh perkembangan teknologi. Tujuan penelitian ini adalah menganalisis pengaruh pembayaran non tunai terhadap permintaan uang riil di Indonesia. Metode yang digunakan adalah Error Correction Model (ECM) dengan menggunakan data sekunder tahun 2010 hingga 2015. Variabel bebas yang digunakan jumlah jumlah uang yang diedarkan oleh Bank Indonesia, dan variabel bebas yang digunakan adalah nilai transaksi kartu debit / ATM, kartu kredit, dan e-money. Hasil penelitian ini menunjukkan bahwa dalam jangka panjang kartu kredit berpengaruh negatif signifikan terhadap sirkulasi uang tunai di masyarakat, sedangkan kartu debit berpengaruh positif signifikan dan mempengaruhi kas. Sementara dalam jangka pendek, kartu kredit dan e-money tidak signifikan terhadap uang tunai, dan hanya kartu debit yang hanya berpengaruh signifikan terhadap uang tunai.

### 1. INTRODUCTION

Money has an important role in everyday life. Every economic activity always involves financial transactions in the process. Money is used as a means of payment to measure the value of services or goods in economic activities. In the past, payment transactions were in fiat money only, consisting of banknotes and coins. However, today the payment system options have developed to include non-cash

payment systems. The payment method is no longer exclusive to using money physically but now includes the electronic option (electronic payment).

Non-cash payment is done without using the money as a means of payment, but by way of transfer between banks or intra banks through the internal networks of the banks themselves. The development of information technology, which is followed by the increasingly high level

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of bank competition, encourages the banking sector to be more innovative in providing various non-cash payment alternative services in the form of transfers and payments using an electronic card which is safe, fast, efficient and global. Card-Based Payment Instruments (CBPI) consist of ATM cards, ATM / debit cards, and credit cards connected to the customer's account network which is used as the means of payment.

Some countries have discovered and used electronic payment products known as Electronic Money (e-money), which is different in character from CBPI. In addition, payments made using e-money do not require authorization and direct linkage with customer accounts in the bank. This can happen because e-money is a stored value product in which a certain amount of funds has been stored in the used payment instrument (Pramono, Yanuarti, & Ourusitawati, 2006).

*Kompas* daily newspaper dated August 14, 2014, stated that Indonesia is a country that is still in the early stages in the application of non-cash payments. In Indonesia 31% of IDR 7,500 trillion of transactions are paid by non-cash methods, the remainder is still paid in cash. This figure is far behind when compared to other ASEAN countries where the use of non-cash payments already exceeds 50% of total cash payments. On 14 August 2014, Bank Indonesia officially launched the Non-Cash National Movement (GNNT). The movement aims to raise awareness among the public, business people, and government agencies to use non-cash payment instruments, thereby gradually creating a less cash-based society in the transactions of economic activities.

Bank Indonesia recognizes the importance of non-cash payment transactions in the economy. The larger the non-cash payment portion used, the cost to print and circulate new money will decrease as allegedly cash demand will decrease as the use of non-cash payments in the community increases. Non-cash payment transactions have a positive impact on society and government. In addition to being more secure and convenient, non-cash transactions are also faster, so business turnover can also be faster and eventually the economy will be more efficient. Non-cash transactions are also more transparent and accountable because every transaction will be recorded and tracked.

Card-Based Payment Instrument (CBPI) which consists of ATM / debit cards and credit cards and payment instruments in the form of

stored value called e-money, are widely used by people who are part of the electronic payment system. The use of these means of payment provides enormous benefits to the economy. Humphrey, Vale and Kim (2001), disclosed that substituting cash with CBPI influenced the central bank's earnings on the creation of new money (seigniorage) (Humphrey, Kim, & Vale, 2001). In the broader scope, this means that payments have a large role to play in providing facilities in an effort to realize the development of a sound banking system. With an increase in CBPI the banks can more easily manage their liquidity and increase the turnover of transactions both amongst banks and between banks and their customers.

If linked to the money demand theory of the opportunity cost of holding money, the lost cost when holding cash rather than non-cash is the loss of profit in the form of discounts, interest, and other benefits of non-cash payments. As economic actors in allocating the form of wealth (money) will certainly consider the advantages and disadvantages. The advantage of holding money in the form of non-cash will make the economic actors hold money in the form of non-cash and change the behaviour of people in terms of transactions. This trend will reduce the need for cash to the extent that it will ultimately reduce the amount of cash circulated by Bank Indonesia (Putri, 2014).

## 2. THEORETICAL FRAMEWORK AND HYPOTHESES

### Classical Economic Theory

The classical theory is actually the theory of demand and supply of money and the interaction between the two. The relationship of the two variables is described by their theoretical conception of money demand. Changes in money supply interact with money demand and then determine the value of money.

### *Crude quantity theory by David Ricardo*

Ricardo solves the money value problem by observing the straight relationship between the amount of money and the price of goods. He has come to the conclusion that the amount of money and the value of money have an inverse relationship. If the opinion is related to the price, Ricardo's opinion above can be stated that, if the amount of money doubles, then the price will double and vice versa.

$$M = k \times p \quad \text{or} \quad P = \frac{1}{k} \times M$$

where  $M$  = the money supply;  $P$  = price level;  $k$  = constant proportional factor. In other words, Ricardo's theory states that the amount of money is proportional to the price level or the price level is proportional to the amount of money, by the formula:

$$P = (k)M$$

Therefore, if  $M$  (money supply) rises twice, then the price will rise twice as well. Therefore, to stabilize the price level requires only the stabilization of the money supply (Ambarini, 2015).

### **Theory of transaction equation by Irving Fisher**

In every transaction, there are always buyers and sellers. The amount of money paid by the buyer must equal the money the seller receives. This applies also to the entire economy, within a given period the value of the goods or services purchased must equal the value of the goods being sold. The value of the goods being sold is equal to the transaction volume ( $T$ ) multiplied by the average price of the goods ( $P$ ). On the contrary, the value of the transacted goods must be equal to the volume of money in society ( $M$ ) multiplied by the number of times the average money exchanges from one hand to another, or the average turnover of money in that period.

Fisher assumes that money demand arises from the use of money in the transaction process. The amount of  $Vt$  is determined by the nature of the transaction process that prevails in the community within a period. As a refinement of the previous theory, Irving Fisher states that there are three factors which determine the value of money: the money supply ( $M$ ), the velocity of money ( $V$ ), the amount of goods traded or the volume of traded goods ( $T$ ).

Fisher's formula, Transaction Equation is:

$$MV = PT \quad \text{or} \quad P = \frac{MV}{T}$$

### **Cambridge equation of exchange by Cambridge**

Cambridge's approach was born as an alternative to the quantity theory of money that relates it to nominal income. This approach emphasizes the importance of money demand in describing the influence of money supply on the price level. In addition to analyse institutional money demand, the Cambridge economist is more focused on analysing how individuals hold money than on market equilibrium. The level of public welfare affects the demand for money. Money in this approach

not only serves as a means of exchange, but as a store of value. Economists like A.C. Pigou and Alfred Marshall formulated this approach through the equation:

$$M^d = k \times PY$$

where  $M^d$  = money demand;  $P$  = price level;  $Y$  = income level; and  $k$  = Constanta.

### **Keynesian Theory**

John Maynard Keynes undertook a much more in-depth study of money demand theory with different analytical perspectives. If an economist from a classical school analyses money demand by assuming money is functioning neutrally. Keynes emphasized the magnitude of the effect of interest rates. Keynes formulated three motives of money demand, namely transaction motives, precautionary motives, and speculative motives. The explanation of the three motives is as follows:

1. The transactions motive.
2. The precautionary motive.
3. The Speculative motive (Liquidity Preference).

### **Post-Keynesian Theory**

#### **Baumol-Tobin's Inventory Approaches**

William Baumol and James Tobin developed the same model of money demand separately, indicating that the amount of money held for the purpose of transactions is sensitive to the interest rate. In developing their model, they considered that an individual will receive a payment once in a period and spend in that same period. In that model, money earning zero-interest income will be held because it is utilized to make transactions.

Accordingly, the higher the interest rate, the smaller the amount of cash held. It means that the velocity will rise along with the increase in interest rates. As interest rates increase, people try to minimize the amount of money held for the purpose of transactions, since the opportunity cost of holding money increases (Mishkin 2008).

### **Modern Quantity Theory (Friedman)**

This theory had been developed by Milton Friedman in 1956 shown by his famous article entitled "The Quantity Theory of Money: A Restatement". Friedman simply states that the demand for money must be influenced by the same factors that also affect the demand for an asset. Demand asset theory suggests that demand for money should be a function of the resources available to individuals (their

wealth) and the estimated rate of return from assets relative to the expected rate of return on money.

Since demand for assets has a positive relationship with welfare, money demand, hence, is also related to Friedman’s concept. This is in contrast with the concept of income that we understand, that our income has a smaller liquidity, because the movement of income is only a transit to be channelled to other parties.

**The Relationship between Non-Cash Payments and Cash Payments**

The function of public money demand is defined as a factor connecting the monetary and the real sector. Consequently, the behaviour of public money demand, related to the increasing use of non-cash payment media, is increasingly important to observe. From several theories already mentioned, the Baumol-Tobin theory becomes an appropriate method to calculate the impact of using non-cash payment media, e.g., by accommodating variable transaction costs into interest rates. However, considering with non-cash payments, the public can save their money in form of demand and savings deposits without facing trade-offs, e.g., obtaining returns without having to be charged transaction fees in liquidation (the liquidity level is very high).

The public will prefer to keep their money in non-cash form if the interest rate offered is high in expectation of a high return on the opportunity cost. Conversely, if interest rates offered by commercial banks are low, people will prefer to hold cash instead of being kept in non-cash form (deposit).

**3. RESEARCH METHOD**

The approach used in this research is a descriptive quantitative approach using time series data. The dependent variable is the amount of cash circulated by Bank Indonesia (outside of existing cash in commercial banks), while the independent variables are transaction value of debit/ ATM cards, credit cards and e-money.

This research used Error Correction Model. The data used is monthly time series data with the sample time 2010: 1 to 2015: 12. The author the “Eviews 6” software to process data and statistical tests to analyse the data. The dependent variable used in this study is the amount of cash circulated by Bank Indonesia outside commercial banks. The independent

variables in this research are the transaction values of debit / ATM cards, credit cards, and e-money.

The main use of the ECM method in Econometrics is to overcome the problem of time series data which is not stationary and experiencing a *spurious regression problem*, provided that there is a cointegration relationship between variables tested. This technique can be used to analyse the long-term and short-term relationship between the dependent variable and independent variables with analytical techniques to correct the short-term imbalance to the balance of the long-term (speed of adjustment). In addition, the results of the analysis are expected to be in accordance with the theories and assumptions developed.

The long-term model in this research is as follows:

$$h \beta_0 + \beta_1 h UKD_{1t} + \beta_2 h K_{2t} + \beta_3 h EMoney_{3t} + u_t$$

The short-term model in this research is as follows:

$$\Delta h UYD_t = \beta_0 + \beta_1 \Delta h UKD + \beta_2 \Delta h K_{2t} + \beta_3 h \Delta EMoney_{3t} + u_{t-1}$$

where UYD = cash amount (real money) issued by BI outside commercial banks; KD = value of ATM / debit card transactions; KK = value of credit card transactions; E-money = value of e-money transactions;  $\beta_0$  = log a (intercept);  $\beta_0, \beta_4$  = regression coefficient;  $u$  = confounding variable representing all other variables that affect Y but not included in the model; and t = year of observation.

**4. RESULTS AND DISCUSSION**

Augmented Dickey-Fuller test results in the table above show that credit card and e-money variables are not stationary at the level.

**Table 1**  
**Level of Stationarity Test Results**

Var	ADF	Critical Value		
		1%	5%	10%
UYD	-3.69	-3.54	-2.910	-2.593
KK	-0.24	-3.54	-2.910	-2.593
KD	-4.48	-3.54	-2.910	-2.593
EMONEY	-1.27	-3.54	-2.910	-2.593

Source: E-Views 6 calculation results

Yet, the UYD and debit card variables are stationary. The existence of non-stationary variables at the level, it is necessary to test the stationary at the first difference level. Table 2 shows the results of the stationary test at the first difference level.

**Table 2**  
**Level of Stationarity Test Results**

Var	ADF	Critical Value		
		1%	5%	10%
UYD	-11.47	-3.53	-2.903	-2.589
KK	-6.63	-3.54	-2.911	-2.593
KD	-7.83	-4.11	-2.486	-3.171
EMONEY	-8.81	-3.53	-2.904	-2.589

Source: E-Views 6 calculation results

Based on Table 3, it shows that the absolute statistics value of ADF has a greater value than its critical value.

**Table 3**  
**Cointegration Test Results**

ADF	Critical Value		
	1%	5%	10%
-6.45	-3.53	-2.903	-2.588

Source: E-Views 6 calculation results

For that reason, the residual does not contain the root of the unit, so the residual is stationary at the level. Residual stationary at the level indicates that there is cointegration between variables

**Table 4**  
**Long Term Estimation Result**

Var Dept:	Coeff.	St. Error	t-stat	Prob.
InUYD				
InKK	-0.20	0.98	-2.06	0.04*
InKD	0.78	0.08	9.45	0.00**
InEMONEY	0.01	0.02	0.29	0.77
C	-2.67	0.38	-6.99	0.00**
R <sup>2</sup>	0.97	F.stat		771.79
Adj. R <sup>2</sup>	0.97	Prob(F)		0.00**
		DW-stat		1.476

Source: Processed Data

The results of the long-term estimation through ECM method shown in Table 4 there is one variable that does not significantly affect the cash, e.g., the variable value of e-money transactions.

Variable values of credit card and debit/ATM card transactions have a significant effect on cash. A one percent increase in the value of credit card transactions will reduce the amount of cash by 0.203838 percent. A one percent increase in the value of debtor ATM card transactions will increase the amount of cash circulating in the community by 0.784338 percent, assuming other things are considered constant (ceteris paribus).

**Table 5**  
**ECM Estimation Result**

Var Dept:	Coeff.	St. Error	t-stat	Prob.
DlnUYD				
D(lnKK)	-0.12	0.07	-1.63	0.108
D(lnKD)	0.55	0.08	6.40	0.00**
D(ln EMON-EY)	-0.00	0.02	-0.21	0.835
RES(-1)	-0.71	0.11	-6.42	0.00**
C	-0.00	0.00	0.88	0.38
R <sup>2</sup>	0.599	F.stat		24.69
Adj. R <sup>2</sup>	0.57	Prob(F)		0.00**
		DW-stat		1.94

Source: Processed Data

The value of transactions via credit cards and debit/ATM cards in the long run turned out to significantly affect the amount of cash in the Indonesian society. A negative correlation is indicated by credit card variables, which means that credit card use can reduce the amount of cash in Indonesia in the long run, while the debit/ATM card variable has a positive correlation to cash in Indonesia. Debit/ATM card transactions actually give the impact of an increase in cash in the community in the long run. This is because debit / ATM cards are mostly used as a means to withdraw cash from ATM machines. The e-money variable did not significantly affect the cash circulating in the community in the long term.

The results of the short-run equation estimation shown in Table 5 show that only one variable significantly influenced cash during the study period, e.g., the variable value of the debit / ATM transactions. While the variable value of credit card transactions and e-money did not significantly affect the amount of cash circulating in Indonesia. Debit / ATM card variables had a positive correlation to cash, which means that in the short term a one percent increase in debit / ATM card transactions can increase cash by 0.557211 percent, assuming other things are considered constant (ceteris paribus). Credit card and e-money variables had a negative but insignificant correlation sign in influencing the amount of cash in Indonesia during the study period. The residual value of ECT (t-1) has a probability value of 0.001 or less than  $\alpha = 1\%$ , with a t-count value of -6.421212, the residual coefficient value is negative, then there is an adjustment to the instability that occurs in the short term. This means the ECM model

used is valid. In other words, there has been a short-term, long-term balance adjustment between credit cards, debit / ATM cards, and e-money variables to cash in the community. The residual coefficient value of -0.710589 shows that the disequilibrium of the previous period was corrected in the current period with 0.710589 percent.

Increased domestic economic activity, especially household consumption, led to an increase in the need for cash (real money). The behaviour and preferences of Indonesians who still choose to hold money in cash, leads to an increase in the need for cash in the community (Bank Indonesia 2013). This is especially true in areas that are still unaffordable for technology. In remote areas, for example, it would be difficult to gain access to non-cash payment systems. The lack of technology and human resources in rural areas make cash to remain the primary choice for the community. The use of cash in Indonesia is still needed for low-price transactions, such as for the payment of parking, public transportation, shopping in traditional markets, and others.

The use of real money has problems in terms of efficiency. This can happen because the cost of procurement and management (cash handling) is fairly expensive, not to mention taking into account inefficiency at the time of payment. Meanwhile, when making large transactions it also invites risks such as theft, robbery and counterfeiting money. Recognizing the many inconveniences of using cash, BI took the initiative and will continue to encourage the building of a society that is accustomed to using non-cash payment instruments or (Less Cash Society). Bank Indonesia has mobilized the public interest toward reducing the use of cash by holding the GNNT (National Non-Cash Movement) program that was held in 2014.

Debit / ATM card variables have a positive correlation and significantly affect cash in the community, both in the short and long term. This is in line with the results of research conducted by Amromim and Chakravorti (2007) conducted in OECD countries (Amromin & Chakravorti, 2007). Although debit cards are experiencing rapid growth, the use of cash remains significant in these countries, indicating that non-cash electronic payers have not been able to reduce the benefits of holding the cash.

Credit card variables have a significant impact on the use of cash in the long term and

are not significant in the short term. The value of credit card transactions showed an upward trend but fluctuated during the study period. This is because the use of credit cards today is not because of the need but has become part of the urban lifestyle. Modern lifestyle encourages the use of credit cards for consumptive things. The e-money variable is also insignificant both in the long run and short term in influencing the amount of cash in the community. This is because the value of transactions via e-money is still too small when compared with the amount of cash circulating in the community, so it does not really affect the position of cash.

Overall APMK (debit / ATM, credit cards), and e-money variables have not been able to replace the role of cash in Indonesian society. The amount of cash circulating in the community is increasing from year to year. The use of non-cash payments by Indonesian society for transactions is still complementary to the use of cash. If people do not have enough cash to cover their needs, then the new community turns to non-cash payments.

## 5. CONCLUSION, IMPLICATION, SUGGESTION, AND LIMITATIONS

After the process and the results of the analysis, this research can be concluded as follows:

1. Credit card variables are negatively significant in influencing the circulation of cash in the community in the long run. Debit / ATM card variables have a positive and significant correlation to cash, while the electronic money variable is not statistically significant in influencing cash in the long term.
2. Credit cards and e-money variables are not significant to cash in the short term. The debit / ATM card variable is the only variable that has a significant effect on cash in the short term, but the coefficient value is positively correlated to the cash circulation in the community during the study period.

Based on the above conclusions, the suggestions to be submitted from this study are as follows:

1. The banks and other financial institutions are expected to further establish relationships or cooperation with third parties to increase the non-cash payment in retail or large businesses in Indonesia. Such relations or cooperation should also be applied to traditional markets, large stores, as well as small shops.

2. It is expected that the government, bank or non-bank as the organizer, further increases the promotion about the use of non-cash payment instruments (debit / ATM and credit cards).
3. The issuer of the non-cash payment instrument is expected to provide more incentives to the public so that people prefer to use them rather than cash. The public will choose to use non-cash payments if it is considered more profitable than paying in cash.

The limitation of this study is that in order to analyse real money demand the research should also involve other aspects beyond the use of non-cash payment systems, such as interest rates, exchange rates, and macroeconomic variables.

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