Analysis of the Effect of Non-Cash Payments on Cash Distribution in Indonesia, Period 2010-2015

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Bank Indonesia recognises 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 that 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. This research aims to determine the effect of non-cash payments which contains nominal value transactions of debit/ATM card, credit card, and e-money on demand of currency cash in Indonesia during 2010-2015. This research used time series data and Error Correction Model (ECM) as an estimation tool. This study result showed that the variable debit/ATM card and credit card have a significant effect on cash in the long term, meanwhile e-money has no significant effect on cash in the long term. In the short term, the estimation result showed that the debit/ATM card has a positive significant effect on currency cash, while credit card and e-money do not have a significant effect on cash.

Key words: *Influence, Non-Cash Payment, Cash Distribution, Indonesia.*

Introduction

Money has a big role in everyday life. Every economic activity always involves financial transactions in the process. Money is used as a means of payment to measure services or goods in economic activities. In the past, payment transactions were in fiat money only, consisting of banknotes and coins. But now the payment system is very developed to be a

non-cash payment system, and the payment method is no longer using money physically but electronically (electronic payment) (Becker, Klüter, Niessen-Ruenzi, & Weber, 2019).

The non-cash payment system is done by not using the money as a means of payment, but by way of transfer between banks or intra-banks through the internal network of the bank itself. The development of information technology, which is followed by the increasingly high level of bank competition, encourages the banking sector to be more innovative in providing various non-cash payment alternative services in the form of transfer and payment systems using an electronic card payment which is safe, fast, efficient and global. Card-Based Payment Instruments (CBPI), consists of ATM cards, ATM/debit cards, and credit cards, and are connected to the customer's account network using the means of payment (Selfira, Abdillah, Harahap, & Muda, 2019).

Some countries have discovered and used electronic payment products known as Electronic Money (e-money), which is different in character from CBPI. Payments made using e-money do not require authorisation 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 have been stored in the used payment instrument (Pramono, Yanuarti, Purusitawati, & Emmy, 2006).

Kompas daily newspaper dated August 14, 2014 states that Indonesia is a country that is still in the early stages in the application of non-cash payments. In Indonesia 31% of Rp 7,500 trillion of transactions are paid non-cash, 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 public awareness, business people, and government agencies to use non-cash payment instruments, thereby gradually creating less cash society in the transactions of economic activities.

Non-Cash Payments

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Card-Based Payment Instrument (CBPI) which consists of ATM/debit card and credit card and payment instrument in the form of stored value called e-money, is widely used by people who are part of the electronic payment system. The use of this means of payment provides enormous benefits to the economy. Humphrey, Kim, & Vale, (2001), disclosed substituted cash by CBPI, influenced the central bank's earnings on the creation of new money (seigniorage). In the broader scope, this means of payment has a big role in providing facilities in an effort to realise the development of a sound banking system, because the bank can more easily manage it's liquidity and increase the turnover of transactions both between banks and between banks with 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), they 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 will reduce the need for cash that will ultimately reduce the amount of cash circulated by Bank Indonesia (Putri, 2015).

Theoretical Basis

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 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 the goods. He has come to the conclusion that the amount of money with the value of money has an inverse relationship. If the opinion is related to the price, Ricardo's opinion above can be stated that, if the amount of money doubled, then the price will double and vice versa (Glasner, 2000).

$$M = k \times p \; atau \; P = \frac{1}{k} \times M \qquad (1)$$

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:

$$P = f(M) \qquad\qquad (2)$$

So if M (money supply) rises twice, then the price will rise twice as well. Therefore, to stabilise the price level requires only the stabilisation 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 sold. The value of the goods sold is equal to the transaction volume (T) multiplied by the average price of the goods (P). On the other hand 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 the other, or the average turnover of money in that period (Fisher, 2006).

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 determines 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, 2006). Fisher's formula, Transaction Equation is:

$$MV = PT \ atau \ P = \frac{MV}{T} \qquad\qquad (3)$$

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 emphasises the importance of money demand in describing the influence of money supply in the price level. In addition to analysing institutional money demand, the Cambridge economist is more in analysing how individuals hold money than market equilibrium (Krueger, 1983). 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:

$$M^d = k \times PY \qquad\qquad (4)$$

Where Md = money demand, P = price level, Y = income level, and k = constant.

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 the money demand he/she is assuming money is functioning neutrally. Keynes emphasised the magnitude of the effect of interest rates. Keynes formulated three motives of money demand, namely transaction motives, precautionary, and speculative motives. The explanation of the three motives is as follows: The transactions motive; The precautionary motive; and The Speculative motive (Liquidity Preference) (Keynes, Moggridge, & Johnson, 1971).

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 the transaction is sensitive to the interest rate. In developing their model, they consider an individual to receive a payment once in a period and spend in that period. In their model, money that earns zero interest income is held only because it is used to make transactions (Romer, 1986).

The conclusions of the Baumol - Tobin analysis can be stated as follows: when interest rates increase, the amount of cash held for transactions will fall, which means acceleration will rise along with the increase in interest rates. In other words, the transaction component of the demand for money is negatively related to the interest rate. The basic idea in the Baumol - Tobin analysis is that there is an opportunity cost of holding money that interest can be earned on other assets. There is also an advantage to holding money by avoiding transaction costs. As interest rates increase, people try to minimise the amount of money held for the purpose of the transaction, since the opportunity cost of holding money increases (Mishkin, 2008).

Modern Quantity Theory (Friedman)

In 1956, Milton Friedman developed a theory of demand for money in his famous article, "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. Like Keynes, Friedman admits that people want to hold a certain amount of real money balances. For this reason, Friedman declares the following money demand formula (Mishkin, 2008).

$$\frac{M^d}{P} = f(Y_p, r_b - r_m, r_e - r_m, \pi^e - r_m) \qquad (5)$$
$$\qquad\quad + \qquad - \qquad - \qquad\quad -$$

Where M^d = demand for real balances; Y_p = Friedman's size for wealth; r_m = approximate rate of return on money, r_b = estimated return on bond; r_e = approximate rate of return on shares; π^e = estimated inflation rate. The sign under the equation indicates whether the above request is positive (+) or negative (-) with each of the directly related variables above it.

Because demand for assets is positively related to welfare, money demand is related to Friedman's welfare concept of permanent income. This is in contrast to the concept of income that we understand, that our income has a smaller liquidity, because the movement of income is only transit to be channelled to other parties.

The Relationship between Non-Cash Payments and Cash Payments

The public money demand function is a factor that connects the monetary sector and the real sector. Therefore, the behaviour of public money demand, related to the increasing use of non-cash payment media, is increasingly important to be observed. From several theories already mentioned, the Inventory Model theory of Baumol-Tobin is judged appropriate for use in calculating the impact of the use of non-cash payment media, i.e. by accommodating variable transaction costs in addition to interest rates. However, adjustments need to be made, considering that with non-cash payments the public can save their money in the form of demand and saving deposit without facing trade-offs, i.e. obtaining returns without having to be charged transaction fees in liquidation (the liquidity level is very high) (Romer, 1986).
The public will prefer to keep the money in non-cash if the interest rate offered is high, so people expect a high return on the opportunity cost. Conversely, if interest rates offered by commercial banks are low, people will prefer to hold cash in cash instead of being kept in non-cash (Maiti, Hemachandra, & Sharma, 2019).

Research Methodology

The research approach used in this research is descriptive quantitative approach. The data used in this research is *time series* data. This time series data approach will explain the dependent variable relationship that is the amount of cash that is circulated by Bank Indonesia (outside of existing cash in commercial bank) with the independent variable that is

the transaction value of debit card/ATM, credit card, e-money (Wasiaturrahma, Wahyuningtyas, & Ajija, 2019).

This research uses Error Correction Model. The type of data used in this study is secondary data sourced from Bank Indonesia. The data used is monthly time series data with sample time 2010: 1 to 2015: 12. The author uses the software "Eviews 6" 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 variable in this research is the transaction value of debit card/ATM, credit card, and e-money (Wasiaturrahma et al., 2019).

The quantitative method of Error Correction Model (ECM) used in this study was introduced by Sargan and popularised by Engel and Granger (1987). 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 the variables tested. Using this technique the following can be analysed : 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 built (Matemilola, Bany-Ariffin, & Muhtar, 2015).

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

$$lnUYD_t = \beta_0 + \beta_1 lnUKD_{1t} + \beta_2 lnKK_{2t} + \beta_3 lnEMoney_{3t} + u_t \quad (6)$$

The short term model in this research is as follows:

$$\Delta lnUYD_t = \beta_0 + \beta_1 \Delta lnUKD_{1t} + \beta_2 \Delta lnKK_{2t} + \beta_3 ln\Delta EMoney_{3t} + u_{t-1} \quad (7)$$

Where UYD = cash amount (real money) issued by BI outside commercial banks; KD = value of ATM/debit card transaction; KK = value of credit card transaction; E-money = value of e-money transaction; β_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; t = year of observation.

Result and Discussion

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

The results of the Augmented Dickey-Fuller test in the table above show that the credit card and e-money variables are not stationary at the level because the absolute value of the ADF statistic is greater than the critical value. Whereas the variable UYD and debit cards are stationary at the level. The existence of variables that are not stationary at the level of level, it is necessary to do a stationarity test at the first difference level. The following table shows the results of the stationarity test at the first difference level.

Augmented (Guilkey & Schmidt, 1989) test results in the table above show that credit card and e-money variables are not stationary at the level because the absolute value of the ADF statistic is greater than the critical value. While the UYD and debit card variables are stationary at the level. With the existence of non-stationary variables at the level, it is necessary to test stationarity at the first difference level. The following table 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

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

Based on Table 3 above, this shows that the absolute statistic value of ADF has greater value than it's critical value at the significance level of 1%, 5%, and 10%. Thus 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 between variables there is cointegration. That is, between variables there is a long-term relationship.

Table 4: Long Term Estimation Result

Var Dept: lnUYD	Coeff.	St. Error	t-stat	Prob.
lnKK	-0.20	0.98	-2.06	0.04*
lnKD	0.78	0.08	9.45	0.00**
lnEMONEY	0.01	0.02	0.29	0.77
C	-2.67	0.38	-6.99	0.00**
R^2	0.97	**F.stat**		771.79
Adj. R^2	0.97	**Prob(F)**		0.00**
		DW-stat		1.476

Table 5: ECM Estimation Result

Var Dept: DlnUYD	Coeff.	St. Error	t-stat	Prob.
D(lnKK)	-0.12	0.07	-1.63	0.108
D(lnKD)	0.55	0.08	6.40	0.00**
D(ln EMONEY)	-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^2	0.599	**F.stat**		24.69
Adj. R^2	0.57	**Prob(F)**		0.00**
		DW-stat		1.94

The results of the long-term estimation through ECM method as shown in Table 4 are that there is one variable that does not significantly affect the cash, i.e. the variable value of e-money transactions. Variable values of credit card and debit/ATM 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 debit card/ATM transactions will increase the amount of cash circulating in the community by 0.784338 percent, assuming other things are considered constant (ceteris paribus).

The value of transactions via credit card and debit card/ATM in the long run turned out to significantly affect the amount of cash in Indonesian society. 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 the increase in cash in the community in the long run. This is caused by the use of debit card / ATM which is mostly used as a means to take or withdraw cash from the ATM. 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 influences cash during the study period, i.e. the variable value of the debit/ATM transaction. While the variable value of credit card transactions and e-money does not significantly affect the amount of cash circulating in Indonesia. The debit/ATM card variables have a positive correlation to cash, which means that in the short term a one percent increase in debit/ATM transactions can increase cash by 0.557211 percent, assuming other things are considered constant (ceteris paribus). Credit card and e-money variables have a negative but insignificant correlation sign in influencing 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 card, debit/ATM, 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 of 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 (Wasiaturrahma et al., 2019). This is especially true in areas that are still cannot afford technology. In remote areas, for example, it would be difficult to gain access to non-cash payment systems; lack of technology and human resources making cash is still 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, this also invites risks such as theft, robbery and counterfeiting money. Recognising the many inconveniences of using cash, BI took the initiative and will continue to encourage to build a society that is accustomed to using non-cash payment instruments or (Less Cash Society). Bank Indonesia has mobilised the public interest to reduce the use of

cash by holding the GNNT (National Non-Cash Movement) program that was held in 2014 (Wasiaturrahma et al., 2019).

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 (Amromin & Chakravorti, 2007) conducted in OECD countries. 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 cash. Credit card variables have a significant effect on 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. 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 from 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 (Davis, Korenok, & Lightle, 2019).

Overall APMK (debit/ATM, credit card), and e-money variables have not been able to replace the role of cash in Indonesian society. This is seen from the amount of cash circulating in the community, which 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 buy their needs, then the new community turns to non-cash payments (Usman, 2017).

Conclusion

This study result showed that variable debit/ATM card and credit card have a significant effect on cash in the long term, meanwhile e-money has no significant effect on cash in the long term. In the short term, the estimation result showed that debit/ATM card has a positive significant effect on currency cash, meanwhile credit card and e-money have not significant effect on cash.

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