EFFECT OF ELECTRONIC MONEY ON EFFECTIVENESS OF MONETARY POLICY IN NIGERIA

UZAH, Cheta Kingsley
Department of Banking and Finance
Faculty of Management Sciences
uzahckingsley@yahoo.com

ODOZI, Victoria Chinwe
Department of Office and Information Management
Faculty of Management Sciences
Rivers State University

ABSTRACT

This study examined the effect of electronic money on the effectiveness of monetary policy in Nigeria. The study adopted a descriptive research design. Time series data were collected from Central banks of Nigeria statistical bulletin. Monetary policy effectiveness was modeled as a function of electronic fund transfer, automated teller machine, mobile payment and point of sale. Ordinary least squares method was adopted as data analysis technique. The study found that electronic money has positive and statistically significant effect on effectiveness of monetary policy in Nigeria; and that 71.2% of total variation in effectiveness of monetary policy in Nigeria were explained by electronic money. The study concludes that electronic money has positive and significant effect on effectiveness of monetary policy in Nigeria; and recommends that policy makers and the central bank should encourage the adoption and frequent use of e-money, if they intend to witness monetary policy effectiveness

Keywords: Automated teller machine, electronic fund transfer, electronic money, monetary policy

INTRODUCTION

Monetary policy is a cornerstone macroeconomic policy (Binder et al., 2017) used canvassed by economists and adopted my policy-makers to achieve economic stability (Castells, 2017; Mishkin, 2007). Monetary policy impact national economy at the macro level. The state intervenes through monetary policy, which is planned in the central bank, and play effective roles in controlling cash balance of commercial banks and other financial institutions, especially in view of the spread of electronic money (e-money) and increase in its use in the digital economy (Rogoff, 2017).

E-money is an important breakthrough in technological advancement. It was invented as an e-payment method. E-money is based on the protocol developed by Digi Cash, and called E-Cash, which was introduced in the Netherlands in 1994, and by the end of 1995, Mark twain Bank began issuing electronic currency in dollars (Zine El-Din, 2003). Economists have their own disagreements about e-money as a term.

E-payment technologies have contributed to the introduction of new payment systems that are intended to ease accessibility and reliability of e-transactions (Rogoff, 2017). The emergence of e-money has affected the role of central banks as a bank of banks. This role is declining. However, some central banks continue to play the role of the last lender, but the need for this lender may decline in a world where information is transmitted immediately in almost every activities and institutions (Binder et al., 2017). The use of e-money promotes growth of e-commerce. The challenge for e-commerce players is to build an e-payment mechanism that is secure and convenient. E-customers still need offline payments for e-commerce transactions and 26 per cent still rely on automated teller machine transfer payments (Castells, 2017).

Numerous studies on e-money and its relevance have been conducted by academics in developing and developed countries. For instance, Rahmiati et al. (2019) analyzed the strength of e-money use, using the TAM model and trust variable. Khatimah et al. (2017) examined if e-money is affected by social influence and habit. Deny (2019) explored variables affecting Go-Pay adoption and found social influence, hedonic motivation, price value, and habit as key determinants of use of Go-Pay. Using the UTAUT model, Susanto et al. (2020) found that performance expectation and social effects did not influence the use of e-money. Apart from these studies being foreign, they failed to examine the influence of e-money on effectiveness of monetary policy. Therefore, this study examined the effect of e-money on the effectiveness of monetary policy in Nigeria.

LITERATURE REVIEW

Theoretical Foundation
This study is rooted in theory of innovation (Schumpeter, 1934) and innovation diffusion theory (Rogers, 2003). Theory of innovation provides (1934) chances to make profits could be created by independent entrepreneurs. Schumpeter (1934) argue that this was particularly observed from independent inventors. Consequently, due to abnormal profits, new groups of imitators would join and lower the profits as a result of the innovation. However, Schumpeter (1934) idealized that before equilibrium could be reached, another innovation would have be made to prompt another business cycle. Thus, at any point in time, something new being created. The central theme of this theory is that entrepreneurship has a role in searching for new opportunities and creating utility in the economy. Theory of innovation differentiated between invention and innovation. Schumpeter (1934) view invention as the seeking of new dimensions that are potentially adopted by entrepreneurs while innovations basically are seen as the forces leading to growths in a self-propagating system. Innovation is sought by daring individuals who are zealous to take risks. Schumpeter (1934) puts it that innovations are always happening in the industry and for this reason, institutions needs to be cognizant of them.

Innovation diffusion theory (IDT) on the other hand seeks to explain the flow of innovation within a social system. Rogers (2003) states that various factors lead to diffusion of innovation from one point to another. For instance if there is a relative advantage of the innovation when compared to the already existing tools, the innovation will be regarded as an improvement and may be adopted. Also, the compatibility of the innovation is crucial with respect to already existing tools and practices in that those are that are compatible are easily adopted. Innovations are also weighed on ease of use, if they can be put on trial before being adopted in full and if their inputs and outputs can be measured with ease. It is important to note that ease of use is viewed as subjective since expertise is not uniform across peoples. Lundblad and Jennifer (2003) notes that diffusions across units in a social system may not be probable due to the differences in operations. This theory is crucial to this study since it explains how innovation diffuse from one segment of an economy to another or from one social unit to another.

Concept of E-money
E-money is the most effective way of consummating transactions in a cashless society. E-money refers to monetary value stored electronically on devices such as a chip-card or a hard drive in a server, represented by a claim on the issuer, which is issued on receipt of funds for the purpose of paying for transactions, and which is accepted by parties other than the issuer (Fung et al., 2014). Based on the recording mode of money in electronic form, e-money can be categorized as card-based or chip-based or software-based (Geva & Kianieff, 2002; Allen & Overy, 2005). Card-based e-money is an electronic purse. This type of e-money is an electronic payment where the electronic value stored is in a card or chip (integrated circuit) and the working system of transferring funds is by inserting or swiping the card into a card reader (Kreltszheim, 1999). Merlonghi (2010) argues that e-money has changed traditional financial transactions.

The effect of e-money on money demand is reflected in the speed of money circulation and currency substitution. From the perspective of monetary velocity, the influence of e-money on monetary velocity is complex. E-money can accelerate the velocity of money circulation by influencing the central bank's monetary control or monetary policy transmission mechanism (Castells, 2017). However, Merlonghi (2010) opine that e-money has substitution acceleration and substitution transformation effects that lead to long-term downward trend in the overall speed of currency circulation. E-money in this study, is decomposed into electronic fund transfer (EFT), automated teller machine (ATM), mobile payment and point of sale (POS).

EFTS is an application of advanced computer and communication technology in effecting payment. It is a communication network which allows faster movement of information from one location to another without any personal contact. Bank deposit balances can be transferred to any area by electronic impulses. This system reduces the use of cheques. With this system, the need for currency reduces and minimizes the production and destruction costs in the use of coin, notes and cheques. With this system, the problem of dud cheque risk on the part of both banks and customer is eliminated since the adequacy of a customer's account balances are made known to the payee prior to the transaction.

ATM is the most commonly used innovation in banking. ATM is device that identifies clients after they have inserted a plastic card with a magnetic stripe or a plastic smart card with a chip, that contains a unique card number and some security data, such as cessation date and personal identification number (PIN), join computer terminals accounting records and the cash vault in one unit, allowing clients to go into bank's record keeping system with a plastic card containing a PIN or by punching a special code number into the computer terminal linked to the bank's computerized records 24 hours a day. Once entrance is attained, it grants a lot of retail banking services to clients. ATMs are originally established to work as cash dispensing devices. However, advancement in technology have made ATMs capable of offering a variety of banking services, including cash transfers, checking account balance, making deposit and printing account statement. Today, banks are using ATM and other innovative technologies to achieve efficiency and build brand reputation.

POS is an online arrangement that enables clients transfer funds directly from their bank accounts to a merchant's accounts after making purchases. POS employ a debit card to start an electronic fund transfer process (Chorafas, 1988). POS improves banking efficiency resulting and serves as an alternative to bookkeeping duties in handling cheques and cash withdrawals for purchases. Also, the system remained operational even after regular banking hours; therefore, the bank continues to achieve efficiency even after normal banking hours. It also saves clients time and energy in travelling to branches or ATMs for cash withdrawals which can be exploited into other productive activities.

Monetary policy
Monetary policy refers to the combination of measures designed to regulate the value, supply and cost of money in an economy, to match the level of economic activities. It can also be described as the process of controlling the direction and movement of monetary policy and credit facilities in pursuance of price stability and economic growth in an economy (CBN 1992). In theory, monetary policy manipulates money supply and rate of interest to achieve monetary policy goals. Monetary policy defines logical relationship between instruments used to effect outcomes regarding how Central Banks apply monetary tools to instigate credit availability and interest rate, thereby enhance economic activities.

The Central Bank of Nigeria (2011) defined monetary policy as the specific actions taken to regulate the value, supply and cost of money in the economy with a view to achieving predetermined macroeconomic goals. Thus, to achieve predetermined macroeconomic goals, the CBN embark on monetary controls. In doing this, it classifies money into narrow money (M1) and broad money (M2). M1 is made up of currency in circulation with the non-bank public; and demand deposits (current accounts in the banks). This category of money represents money used for daily transactions and short-term monetary needs.

The primary goal of monetary policy is to ensure that money supply is at a level consistent with economic growth rate. Central banks contribute to stabilizing macroeconomic environment of the country by pursuing price stability. Christopher et al. (2006) argue that investors generally believe that monetary policy and macroeconomic events have a large influence on the unpredictability of stock price, which further implies that macroeconomic variables could exert shocks on share returns and then, influence investment decisions (CBN, 1992).

Impact of E-Money on Monetary Policy
Research on the influence of e-money on effectiveness of monetary policy mainly embodies two aspects: transmission process of e-money on monetary policy and controllability of monetary policy. From the perspective of transmission process of monetary policy, starting with the influence of monetary demand, Qin (2017) shows that monetary demand not only increases the use of electronic money, but also affects monetary policy. The influence of e-money on base currency, show that e-money affects the total amount of base currency, and also affect monetary policy (Qin, 2017). Prior studies show that e-money influence performance of financial institutions and impact economic growth.

Akhisar et al. (2015) reported that innovations in payment technology affect profitability of financial institutions. Similarly, Tunay et al. (2015) observed that advanced e-banking practices in European countries illustrate better performance of the strongest banks. In a study conducted in China, Yao et al. (2018) revealed that third party transfer increases money turnover and positively affect financial sector earning growth; and that innovation in payment technology contribute to industry synergy. Dong et al. (2020) show that improvement in e-finance benefits security, and development of banks, hence, contrarily affects their liquidity.

Relatedly, it has been shown that investment in IT increases profitability for banks (Vikram & Gayathri, 2018); that POS and ATM transaction and mobile payment significantly relates to profitability (Kamboh & Lighari, 2016); and that payments system technology affects banks profitability (Zu et al., 2019). Also, Ngwa (2020) revealed that mobile money transfer, domestic transfer fund and electronic point terminal have positive impact on return on assets. The positive influence of e-money on banks' performance is also reported by Vekya (2017), Muisyo et al. (2014), Cherotich et al. (2015) and Frank and Binaebi (2019). In addition, the studies of Orji et al. (2018), Nwakoby et al., (2020) and Akwam and Yua (2021) showed that ATM, POS, mobile payment and EFT have positive and significant effect on the banks' performance.

Furthermore, Muotolu and Nwadialor (2019), Malhotra and Singh (2010), Monyoncho (2015), Terfa (2015), Bakang (2015), Nyambariga (2013), Ngungi (2013), Chindudzi et al. (2020), Wadesango and Magaya (2020), Takon et al. (2019), Vekya (2017), Alubisia et al. (2018) and Rayhan et al. (2012) in studies conducted in Kenya, India, Cambodia, Ghana, Zimbabwe, and other developed and developing economies show that ATM, POS, internet payment, NEFT and NIP as proxies of cashless policy, impact bank performance.

METHODOLOGY

This research which sets out to investigate the effect of e-money on the effectiveness of monetary policy is a quasi-experimental research approach which is concerned with objective measurement and analysis in order to establish the effect of the independent variables over the dependent variable. Data as used in the study include: Central Bank of Nigeria (CBN) Publications, the federal office of statistics. The formulation of the model that will be used in this study is based on theories, an empirical studies, and conceptual analysis of the relationship between Central Bank lending guidelines and the activities of deposit money banks.

MPE   =   f (EFT, ATM, MP, POS)   1
From the above stated model, we adopt the models below in this study
MPE $= \beta_0 + \beta_1 EFT + \beta_2 ATM + \beta_3 MP + \beta_4 POS + Et$

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Where:
MPE = Effectiveness of Monetary policy
EFT = Electronic fund transfer
ATM = Automated Teller machine
MP   = Mobile Payment
POS = Point of sale
Et   = Error Term
β_0 = Regression Intercept
$\beta_{1-\beta_4}$ = Coefficient of the Independent variables to the dependent variable

The method of data analysis adopted, is multiple regressions using ordinary least square method. This quantitative technique was used to test the hypotheses formulated with E-view at 5% level of significance. In order to undertake the statistical evaluation of our analytical model, so as to determine the reliability of results obtained, coefficient of correlation (r) of the regression, coefficient of determination (r^2), student T-test and F-test where employed.

Coefficient of Determination (r^2) Test measured the explanatory power of e-money on effectiveness of monetary policy. To determine the proportion of economic growth in our model, we used the coefficient of determination. The coefficient of determination varies between 0.0 and 1.0. A coefficient of determination says 0.20 means that 20% of changes in the dependent variable is explained by the independent variable(s). F-Test was used to measures the extent to which, the statistic of the coefficient of determination is statistically significant. F-test was done using the F-statistic estimate.

Student T-test was used to measures the individual statistical significance of the estimated independent variables at 5% level of significance. Durbin Watson Statistics was used to measure the colinearity and autocorrelation between the variables in the time series. It is expected that a ratio of close to 2.00 is not auto correlated while ratio above 2.00 assumed the presence of autocorrelation. Regression coefficient was used to measures the extent to which the predictor variables affect the dependent variable in the study; while probability ratio was used to measures the extent to which the predictor variables explain change in the dependent.

Prior Expectation of the Result
The a-priori expectation of the variables proposes that an increase in the explanatory variables lead to increase in the dependent variables effectiveness of monetary policy). Therefore it can be mathematical stated as follows: $a_1, a_2, a_3, a_4, a_5 < 0$.

DATA ANALYSIS AND INTERPRETASTION OF RESULTS

Table 1: Regression Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EFT	2.408395	0.741571	3.247695	0.0058
ATM	1.791803	0.579230	3.093420	0.0079
MP	1.078767	0.409148	2.636615	0.0195
POS	0.657033	0.261413	2.513389	0.0248
C	1.310931	1.027954	1.275282	0.0230
R-squared	0.712266	Mean dependent var		-0.874167
Adjusted R-squared	0.655866	S.D. dependent var		12.70267
S.E. of regression	4.822568	Akaike info criterion		6.278827
Sum squared resid	325.6003	Schwarz criterion		6.769683
Log likelihood	-65.34593	Hannan-Quinn criter.		6.409051
F-statistic	6.174886	Durbin-Watson stat		2.309358
Prob(F-statistic)	0.000006			

Source: E-view output (2022)

The outputs of the estimated e-money and effectiveness of monetary policy shows a stepwise regression analysis. The regressand is effectiveness of monetary policy (MPE) and 10 observations were used in the analysis. The number of included regressors is 4 at a time and such regressors were available. The selection method was Stepwise forwards and the stopping criterion probability value was 0.5 forwards and 0.5 backwards.

EFT shows positive coefficient (2.408395), which is statistically significant at 5%. The results imply that EFT impact effectiveness of monetary policy by about 2.4%. ATM shows positive coefficient (1.791803), which is statistically significant at 5%. The results imply that ATM impact effectiveness of monetary policy by about 1.8%. Mobile payment shows positive coefficient (1.078767), which is statistically significant at 5%. The results imply that Mobile payment impacts effectiveness of monetary policy by about 1.1% while POS shows positive coefficient (0.657033), which is statistically significant at 5%. The results imply that POS impacted on effectiveness of monetary policy by about 0.6%

The constant (c) is positively signed and statistically significant, which shows that a continuum of electronic money has a place in contributing positively to the effectiveness of monetary policy in Nigeria. Further, the R^2 statistic of 0.712266 implies that the model accounts for 71.2% of total variation in the effectiveness of monetary policy; and that the model is jointly significant at 5% level, as shown by both the F-statistic and the probability of F-statistic values of 6.174886 and 0.000006 respectively. The DW-statistics of 2.309358 suggests the absence of serial correlation in the dataset used in estimating the model, by implication the past error term in the series does not influence the present error term. This entrenches confidence in applying the results of the model, especially, in policy formulation.

DISCUSSION OF FINDINGS

This study examined the effect of e-money on effectiveness of monetary policy in Nigeria. The results of data analyses show that 71.2% of total variation in effectiveness of monetary policy; in Nigeria were explained by the independent variables and that the model is jointly significant at 5% level, as shown by both the F-statistic and the probability of F-statistic values of 6.174886 and 0.000006 respectively, the DW-statistics of 2.309358 suggested the absence of serial correlation in the dataset used in estimating the model, by implication the past error term in the series does not influence the present error term.

The study found that EFT, ATM, mobile payment and POS which are adopted as proxies of e-money have positive and statistically significant impact on effectiveness of monetary policy in Nigeria. The findings validate the report that third party transfer increases money turnover and positively affect financial sector growth (Dong et al., 2020); that improved Internet finance benefits security and development of banks, hence, affects their liquidity (Vikram & Gayathri, 2018); that investment in IT increases profitability for banks (Kamboh & Lighari, 2016) and that POS and ATM transactions and Mobile payment are positively significantly related profitability (Yao et al., 2018). This findings also align with the report of of Zu et al. (2019) that ATM affects banks profitability positively, while POS and internet payments affect profitability negatively.

CONCLUSION AND RECOMMENDATIONS

This study examined the effect of e-money on monetary policy effectiveness in Nigeria. The results of the statistical analyses show that e-money has a positive and statistically significant effect on effectiveness of monetary policy in Nigeria. This is based on the results that EFT, ATM, mobile money and POS affect effectiveness of monetary policy in Nigeria. Put differently, the results of the analyses suggests that e-money contributes positively to the effectiveness of monetary policy in Nigeria; and accounts for 71.2% of total variation in monetary policy effectiveness in Nigeria. In lieu of the results of the statistical analyses and the discussion of findings presented, the study concludes that e-money predicts monetary policy effectiveness or that e-money can be relied upon to inform monetary policy effectiveness in

Nigeria. The study thus recommends that policy makers and the central bank should encourage the adoption and frequent use of e-money, if they intend to cause monetary policy effectiveness.

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