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Olajide, Victor C.

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Cashless banking in Nigeria and its implications

By

OLAJIDE Victor Chukwujike

**Graduate student, University of Lagos, Faculty of Social Science, Department of
Economics.**

Email: olajidechukwujike@gmail.com

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Abstract

Electronic money has ushered in the cashless banking framework across different countries of the world and this is made possible by the advances in information technology and invention that began in Japan and later the West. However this new introduction into the various economies of the world is not without reaction both favorable and unfavorable. This paper seeks to point out the implications, in a developing economy like Nigeria, of a cashless banking which still permits some cash in the economy that is home to both the formal and informal sector. Theoretical findings supports the view of some economists concerning the need for regulatory agencies to be very wary the possibly retarding effect of the introduction of such a sophisticated payment system, particularly in developing economies like Nigeria, with the coexistence of the formal and informal sectors, that may not be able to muster the wherewithal to bear the burden of electronic payments and hence the cashless banking paradigm.

JEL Classification: E40, E42

1. Introduction

Money has evolved several times to where it is today and this is not unconnected to the different challenges that beset the different economies that existed and greeted the different monetary inventions of the time. What we know today as monetary system started as the barter economy where commodities were exchanged for commodities and this led to the creation of markets, specialization and other attendant consequences but the very attribute of the barter system that made it wither away was what constituted the essence of the system – exchange of commodities for commodities (Boughton and Wicker, 1975). However consequently, other monetary forms like the commodity money, the gold standard, fractional reserve backed money and much later the fiat or legal tender, money substitutes and near monies, which where the product of the trial and error process of finding an adequate monetary form that would encapsulate most of the benefits in exchange and reduce the costs of transactions, were introduced (Boughton and Wicker, 1975; Autrement, 2007). However there is literature substantiating the emergence of a cashless economy, where paper money (which happens to be legal tender in many an economy) is replaced with electronic money which is facilitated with the advances in technology – as witnessed in the invention of the internet, the development of electronic account systems and the increasing sophistication in major industries all around the world – and hence paper money becomes functionally deficit as its functions would be reduced potentially and drastically, although not completely in the true sense, to just a mere unit of account!

In the Nigerian monetary system, the Central Bank of Nigeria, which shall hereafter be referred to as the CBN, is pursuing the so called cashless monetary system that would see the co-

existence of cash and electronic money (that is, for given thresholds) and according to the policy document of the CBN policy on retail cash collection and lodgment maintains some of the implications of the cashless banking framework include, but not restricted to: reduction in cash transaction costs to both the banks and the customer, the expansion in vault cash and by implication an expansion in the credit creation process and expansion in the involvement of the informal sector in the banking process (CBN, 2011). These implications follow directly from the surface of the policy but there is the need for a deeper and microeconomic analysis of the introduction of the cashless banking or cashless economic paradigm and its attendant implications as far as the attainment of macroeconomic objectives are concerned.

The objective of this study is set in the direction of the latter statement as this study is interested in the determination of the implications of the introduction of the cashless economic paradigm in a developing country and more specifically we seek to investigate, on a theoretical plane, how the introduction of the cashless economy impacts on macroeconomic fundamentals and economic agent behavioral pattern. In the next section of this study we shall present literature on the issue of the evolution of money and the current phase of the cashless economy which most economies are gravitating towards globally and consequently we shall present a micro-economic framework for considering the case of a cashless economy in a developing economy. With the development of this framework we shall consider also the status quo and make a comparative study of two states – that is, the cash based economy and the cashless economy – and hence certain propositions on the basis of our theoretical findings shall be presented to explain the implications of the introduction of the cash less economic paradigm. We shall conclude this study with suggestions for further research in this area and a proposal of measures that would make our monetary system a growth sustaining one.

2. Literature review

Electronic money and hence the introduction of the cashless economy is one that has been discussed in literature as found in the Wicksell's, (1898, 1935) pure credit economy where 'monetary policy [is conceived] without money' (Boianovsky and Trautwein, 2004). These studies considered the case of the cashless economy and the connection between the flows of investor demand as measured by movements in the demand deposits and the real sector and this is further witnessed in Woodford, (1997); Goodfriend and King, (1997) and Berg et al, (2006) who suggest that money does not really matter in the determination of price movements and hence inflation and therefore the economy can do without cash as the money base is not relevant for manipulations in the price level while the quantity theorists claim otherwise. Away from the monetary policy implications of the introduction of a cashless economy, some authors have investigated the introduction of electronic money with a view to ascertaining its implications for transactions, regulations, costs to banking and non bank public (Good, 1997; Godschalk and Krueger, 2000; Palley, 2001; Rogers, 2004). However most of these studies were centered on the comparatively more advanced countries of the world which were the likely candidates for the so called e-revolution given the standard of living, the peculiarity of their monetary policy issues and the technological sophistication. With the development of sophisticated forms of money also develops sophisticated forms of financial crimes both at the public and private sectors (Woda, 2006; National Drug intelligence centre, 2008; financial action task force, 2010).

Literature on e-money and cashless banking is one that is quite scanty in less developed countries as and this is may not be unconnected to the heavy presence of the informal sector in

most dual developing economies and the poor banking culture in the same. Hence against this backdrop there is the need to investigate the introduction of e-money in developing countries – like their developed counterparts – and the likely consequence of once again adopting a sophisticated financial model that makes the rounds in developed countries.

3. Modeling cashless banking in a developing economy

Less developed countries or in a more euphemistic description ‘developing countries’, are plagued with the feature of the existence of a dual economy which is an economic situation where there is an existence of the formal sector with its technological advances and the informal sector with its crude solutions to modern day problems as noted in Nafziger, (2006), however, these different sections of the economy are serviced by the very same financial system which has undergone reforms in line with the realities of the global financial system, as noted in Nigeria, the case being studied here. Therefore there is the need to discover the implications of the introduction of the financial innovation – e - money – in an economic system that is composite of the informal and formal sectors.

In our theory we consider a hypothetical economy that is composite of three economic agents and these are the regulatory agency (the central bank), the commercial banks (or deposit money banks) and the non bank public which is further divided into firms (investors) and households (consumers) which in turn can be sub-classified into either formal sector players of informal sector players. I commence with the system of equations specified in Boughton and Wicker, (1975) explaining the equilibrium in the financial sector assuming:

- i. There is central bank that holds reserve deposits of commercial banks and fixed the reserve requirements for demand deposits and time deposits.
- ii. Commercial banks create money from demand deposits and the hold excess reserves
- iii. Time deposits, excess reserves and currency in circulation are assumed to be endogenous in the system
- iv. Money supply is defined as M1 which the sum of currency in circulation and demand deposits. However later on we shall add to this quantity, near money assets of the formal sector

And hence the system of equations is given as:

$$R^d = R^s \quad (i)$$

$$R^d = q_d \cdot D + q_t T + ER^d \text{ where } 0 < q_d < 1 \text{ and } 0 < q_t < 1 \quad (ii)$$

$$R^s = B - K_p \quad (iii)$$

$$T^d = T_0 + t \cdot i \quad \text{where } t < 0 \quad (iv)$$

$$ER^d = ER_0 + er \cdot i \quad \text{where } er < 0 \quad (v)$$

$$M^s = D^s + K_p \quad (vi)$$

$$K_p^d = K_{p0} + k \cdot i \quad \text{where } k < 0 \quad (vii)$$

These equations show the money creation process sourced from the monetary base available for the commercial banks to create credit with the use of the demand deposits. However with the introduction of e-money which coexists with cash, we have a fraction of the quasi-money defined by the central bank of Nigeria statistical bulletin, (2010) as time deposits and other near

monies) T is trapped within the commercial banks as a limit is imposed to debar the non-bank public from engaging in voluminous cash transactions via their time deposit accounts and hence we introduce the variable, which we assume for policy purposes to be variable, $(1-\alpha) T$ as the limit in the time deposit equation (iv) and also i capture the presence two kinds of non bankers and these are those that belong to the formal sector which we assume respond to changes in the interest rate and tend to hold their monies in the form of near money assets and the informal banker whose time deposit accounts are more or less safe deposits to finance day to day transactions and as a result is a function of their income share in the total income and hence the equations (iv) and (vi) becomes:

$$T^d = (1 - \alpha) T_0 + t_1 \cdot i + t_2 \cdot Y \quad \text{where } t < 0; 0 < \alpha < 1 \text{ and } t_2 > 0 \quad (vii)$$

$$M^s = D^s + K_p + A \quad (vi).$$

At this juncture we introduce the electronic money into the system and since a portion of deposit money remains in the banks as a result of the use of electronic means of payments while the other, which is below the threshold stipulated by the regulatory authority, the central bank, is used in the credit creation process and it should be noted that the increase in the cash in banks as a result of the substitution of demand deposits for electronic money there would also be an expansion in the credit creation process via more deposit creation and hence the equation becomes (ii):

$$R^d = \beta q_d \cdot D + (1 - \beta) q_d \cdot D^e + q_t T + ER^d \quad \text{where } 0 < q_d, q_t, q_e < 1 \text{ and } 0 < \beta < 1 \quad (viii)$$

Hence given the new system of equations that now incorporates the introduction of electronic money we have;

$$R^d = R^s \quad (i)$$

$$R^d = \beta q_d \cdot D + (1 - \beta)q_d \cdot D^e + q_t T + ER^d \text{ where } 0 < q_d, q_t, q_e < 1 \text{ and } 0 < \beta < 1 \text{ (viii)}$$

$$R^s = B - K_p \quad (iii)$$

$$T^d = (1 - \alpha) T_0 + t_1 \cdot i + t_2 \cdot Y \quad \text{where } t < 0; 0 < \alpha < 1 \text{ and } t_2 > 0 \quad (vii)$$

$$ER^d = ER_0 + er \cdot i \quad \text{where } er < 0 \quad (v)$$

$$M^s = D^s + K_p + A \quad (vi)$$

$$K_p^d = K_{p0} + k \cdot i \quad \text{where } k < 0 \quad (vii).$$

where:

R^d : is the demand for reserves; R^s : is supply of reserves;

D : is the volume of demand deposits; D^e : refers to electronic money deposits

T : is the volume of time deposits; ER^d : is excess reserves holdings;

B : is base money; K_p : is currency held by the public; i : is interest rate;

Y : is income share of informal sector; M^s : is supply of money; A : is near money

assets of members of the formal sector

$\alpha, \beta, q_d, q_t, K_{p0}, k, T_0, t_1$ and t_2 are all constant defined in the system above.

On solving the amended version of the system of equations are introduced by Boughton and Wicker, (1975), to obtain the money supply multiplier we have;

$$M^s = \frac{1}{q_d \cdot \beta} \cdot B_n - \frac{(1 - q_d \cdot \beta)k + q_t t_1 + er}{q_d} \cdot i - \frac{q_t t_2}{q_d} \cdot Y \quad (ix)$$

where $B_n = B - K_{op}(1 - q_d \beta) - (D^e + A\beta)q_d - (1 - \alpha)T_0 q_t - ER_0$

and this is the net monetary base.

On comparing the above solution in equation (ix) to the solution that was obtained in Boughton and Wicker, (1975) as shown below;

$$M^{*s} = \frac{1}{q_d} \cdot B_n^* - \frac{q_t t_1 + er}{q_d} \cdot i \quad (x)$$

where $B_n^* = B - K_{op}(1 - q_d) - T_0 q_t - ER_0$

We find that the introduction of the electronic money has profound impact on the monetary base, changes the impacts of the interest rate on money supply and introduces the impact of income shares of the informal sector on the money supply. We shall consider these two equations in drawing the necessary deductions for the money creation process and we shall also augment the impact assessment with other likely impacts of the introduction of electronic money as noted in recent literature in the next section.

4. A priori deductions from the model of the pseudo cashless economy

The theoretical findings made above can be further analyzed for the implications of the introduction of electronic money into the financial system. These implications are classified into the three sections and these are the impact of electronic money introduction on the monetary

base, on the connection between money supply and interest rates and the impact of informal income – and its ability to raise the volume of time deposits – on the level of money supply.

4.1 Electronic money and the net monetary base

An observation of the net monetary bases both prior to the introduction of e-money and after the introduction of e-money indicates the likelihood of a profound effect, of the introduction of e-money, on the net monetary base and make it contingent on time deposits that can be substituted with e-money. The net monetary bases are;

$$B_n = B - K_{op}(1 - q_d\beta) - (D^e + A\beta)q_d - (1 - \alpha)T_0q_t - ER_0 \quad (xi)$$

$$B_n^* = B - K_{op}(1 - q_d) - T_0q_t - ER_0 \quad (xii)$$

Equation (xii) subtracted from (xi) will yield the value;

$$B_n - B_n^* = K_{op}(1 - \beta)q_d + \alpha T_0q_t - (D^e + A\beta)q_d$$

And this suggests that the net monetary base will only increase if the fraction $(1 - \beta) \cdot q_d$ of autonomous currency in circulation and the fraction $\alpha \cdot q_t$ of the autonomous time deposits exceeds the fraction q_d of the demand deposits converted to e-money and fraction β of the near money assets which are held by the formal sector. In other words the credit creation process which operates via the multiplication of deposits can be boosted to the extent to that e-money replaces time deposits and the extent to which demand deposits are substituted for e-money. Hence care must be taken to ensure that e-money does not compete with demand deposit which still forms the basis for credit creation in most developing economies and e-money must to a significant extent replace time deposits. This achievement depends largely on the measures being

put in place to ensure that most of the informal sector – who constitutes a larger section of the economy holding time deposits – is made to patronize the use of e-money.

4.2 Money supply – interest rate nexus and the introduction of e-money

The introduction of the e-money, as shall be shown, increases the magnitude of the nexus between money supply and the interest rate. The difference between the partial derivatives of money supply with respect to interest rate before and after the introduction of e-money is given as;

$$\frac{\delta M^s}{\delta i} - \frac{\delta M^{*s}}{\delta i} = -\frac{(1 - q_d \cdot \beta)k}{q_d} \text{ and since } 0 < q_d \cdot \beta < 1 \text{ and } k < 0$$

$$\text{then } \frac{\delta M^s}{\delta i} - \frac{\delta M^{*s}}{\delta i} > 0$$

$$\text{which further implies that: } \frac{\delta M^s}{\delta i} > \frac{\delta M^{*s}}{\delta i}.$$

The above suggests that the rate of change of money supply with respect to a change in the interest rate is higher compared to case prior to the introduction of e-money. However we notice that this change is dependent on not just the demand deposit reserve requirement q_d and the parameter of currency response to interest rate changes k but also importantly on the parameter β capturing the amount of deposits that remain as deposits and not converted to electronic money by the reform and it is noticed that as this fraction increases towards the reciprocal of the demand deposit reserve requirement (that is, $\beta = 1/q_d$) then the status quo is maintained as there is no change in the reaction of money supply to changes in the interest rate but if the value of this parameter tends towards zero then money supply becomes more sensitive to changes in the interest rate. This may have some implications for monetary policy measures that aim at

adjusting the interest rates as measures may have the effect of overshooting the target amount of money supply appropriate for a given period of time if they fail to take into consideration the responsiveness of money supply to interest rate changes. The relative weakness of the regulators to place a lid on the movement of real variables is suggested in Palley, (2001) and Griffith, (2004) where it is maintained that the tendency for e-money to substitute demand deposits may stifle the ability of the central bank to control money supply

4.3 Informal sector income, e-money and money supply

It is worthy of note that if the one of the primary purposes for which the cashless banking paradigm is introduced, which is to increase vault cash by discouraging the volume of quasi-money and cash in circulation, are not achieved there may be an adverse impact of informal income growth on money supply.

The equation (ix) shows that the rate of change of money supply to informal income is given as;

$$\frac{\delta M^s}{\delta Y} = -\frac{q_t t_2}{q_d} \text{ and since } t_2 > 0; q_t > 0 \text{ and } q_d > 0 \text{ we have that:}$$

$$\frac{\delta M^s}{\delta Y} < 0.$$

The above indicates that an increase in informal income will pose a threat to the growth of money supply and if this is the case then the central bank will be faced with a herculean task of shoring up the money supply when it deems fit if at that period there is a coexistence of growth in the informal income – as is the objective of the introduction of the so called microfinance schemes around parts of Nigeria – given the reserve requirements for demand deposits and time

deposits (quasi money). These issues become pertinent for the regulatory agencies in the event of the introduction of the electronic money or cashless banking paradigm.

4.4 Other implications of the introduction of cashless banking in literature

Asides the implications derived from modeling the behavior of the three agents involved in the banking system – the deposit money banks or commercial banks, the non bank public and the regulatory agency or the central bank – there are more implications that have been discussed and analyzed in literature.

In information technology circles, one major challenge that so easily besets the use of technology in industrial, economic and financial applications is the issue of security and if this be the case in even more sophisticated economies then what would be the fate of less developed economies like Nigeria? As suggested by Brown, (1997) the higher the value of smart cards, the higher the risk of improvement in the hacking technology and hence e-financial theft and hence in countries like Nigeria which still has majority of its population in abject poverty and deprivation, with the absence of adequate security infrastructure, there is the tendency the hacking business to become a lucrative addition to the industries in the underground economy. Buttressing this point is the case of money laundering. In a country like Nigeria that is riddled with corrupt public sector officials, there is the tendency for any opportunity to launder monies or money's worth via electronic payments media and this would be very efficient means of transferring laundered funds both within the country and abroad and some of the methods that could potentially serve as an engine with the aid of e-money is considered by Woda, (2006). There is also the issue of price stability, which according to European Central Bank, (2000) 'the emergence of electronic money

might have repercussions on the information content of monetary indicator variables with regard to the primary objective of price stability.’ And apart from this source of instability, Palley, (2001) notes that another source of instability could come from asset bubbles where electronic money used in debt settlement could directly depend on the nominal value of deposit money bank’s assets and hence increases in the value of these assets could increase the ability of the deposit money banks to make loans and this could engender a cyclical effect where rising asset prices, reinforces lending ability and vice versa thus leading to a bubble in the asset market. This issue would require a central bank that is not just far sighted but also pro active in putting the right amount of regulation to ensure the best practices in the banking sector while encouraging healthy competition. Fu, (2007); Crespo et al, (2007) and Alfaro et al, (2009) all agree that benefits from technologically advanced foreign direct investments comes as a result of the presence of not only innovative efficiencies but also the presence of absorptive capacity and innovation-complementary assets in the host country, this calls to question the readiness of the developing countries like Nigeria to adopt such ‘imported’ sophisticated measures as the electronic money as it requires a considerable level of absorptive capacity and innovation complementary assets. Thus there is no gain saying that the introduction of electronic money in a country like Nigeria would no doubt generate positive externalities that have the potential of creating new industries but this in turn begs the presence of adequate infrastructure. Hence one could hypothesize that the introduction of a cashless banking paradigm may have the impact of increasing the new demand for or stretching the already existing infrastructural facilities which play a major role in the absorptive capacity of developing countries like Nigeria.

5. Conclusions and Suggestions for further study

Cashless banking and electronic money are rather sophisticated means of solving the problems associated with the use of cash but as a sophisticated tool it requires great planning in its application and this is due to the archaic socio-economic, political and financial structures of developing countries like Nigeria. The existence of severe poverty, poor state of infrastructure, the slow pace of development of our banking sector and indeed the financial system and other major peculiarities of the Nigerian economy must be duly considered prior to the adoption of this new product.

Literature is developing on the issue of the cashless banking in developed economies and several models have been designed to capture monetary policy in the absence of cash but there are scanty literature on developing countries and the connection between electronic money, the dual systems of developing countries, the political dispensation of the time, the institutional and attitudinal reactions to change in Nigeria amongst other factors. This naturally calls for further analysis of the issue of cashless banking and electronic money.

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