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ABOUT THE JOURNAL

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FOCUS ON RESEARCH IN CONTEMPORARY ECONOMICS

EDITORIAL

The Editor-in-Chief and the Editorial Board are proud to present the second issue of the third volume of Focus on Research in Contemporary Economics (FORCE). We are driven to establish FORCE which is dedicated to create a well-established venue for high quality research in contemporary Economics. Its content mirrors widespread scholarly approaches and interests within the dimensions of Economics, Finance, Accounting, Banking, Business Administration, Marketing, Management, and other related areas in Social Sciences. Therefore, FORCE's contributions are not limited to a specific disciplinary philosophy or a particular approach.

This issue features five research articles that report essential findings and implications in Contemporary Economics. In the first article, Orori, & Muthinja (2022) examines the nexus between expansionary fiscal policy and resilience to COVID-19 economic shocks in Kenya.

In the second article, Henry (2022) recommends a New International Poverty Order (NIPO) by dealing with economic poverty alongside its mentality through value reorientation and investment education before promoting economic well-being.

In the third article, Ibrahim, Sule, Ifegwu & Salisu (2022) examines the impact of mobile telephone on economic growth in Nigeria using ARDL (Autoregressive distributed lag) as methodology, with data from 2001-2017.

In the fourth article, Musa, Sule & Salisu (2022) examine the impact of financial inclusion on economic growth in Nigeria from 1986 to 2020.

In the fifth article, Chivige & Sheefeni (2022) analyze the relationship and effects of foreign exchange rate on local inflation rate.

I would like to thank our authors, reviewers, and readers for their continuous support.

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Henry, J.T. (2022) Why Poverty Mentality Matter for Achieving the First Sustainable Development Goals (Sdgs) ın Nigeria. *Focus on Research in Contemporary Economics (FORCE), 3*(2), 357-367.

Musa, I., Magaji, S., Ifegwu, C., & Salisu, A. (2022). Analysis of Mobile Telecommunication and Economic Growth: Evidence from Ardl Modeling. *Focus on Research in Contemporary Economics (FORCE), 3*(2), 369-393.

Musa, İ., Magaji, S., & Salisu, A. (2022). Relationship Between Financial Inclusion and Economic Growth: Evidence from Ardl Modeling. *Focus on Research in Contemporary Economics (FORCE), 3*(2), 395-413.

Chivige T., & Sheefeni J. (2022). Foreign Exchange Rate and Inflation in Zimbabwe: 2009 – 2019. *Focus on Research in Contemporary Economics (FORCE), 3*(2), 415-438.

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THE LINK BETWEEN EXPANSIONARY FISCAL POLICY AND RESILIENCE TO COVID-19 ECONOMIC SHOCKS IN KENYA: EVIDENCE FROM NAIROBI CITY COUNTY

Moses O. Orori, & Moses M. Muthinja

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FOCUS ON RESEARCH IN CONTEMPORARY ECONOMICS

Submission date: 09.05.2022 | Acceptance date: 03.01.2023 RESEARCH ARTICLE

THE LINK BETWEEN EXPANSIONARY FISCAL POLICY AND RESILIENCE TO COVID-19 ECONOMIC SHOCKS IN KENYA: EVIDENCE FROM NAIROBI CITY COUNTY

Moses O. Orori*, & Moses M. Muthinja

ABSTRACT This study examines the nexus between expansionary fiscal policy and resilience to COVID-19 economic shocks in Kenya. We focus on two instruments of fiscal policy namely; public expenditure and public revenue from taxation. The study is on Nairobi City County, Kenya's largest county by population size and contribution to the country's Gross Domestic Product (GDP). With a target population of two million economically active individuals, the study uses a sample of 110 respondents drawn from all the 17 constituencies in the county using quota sampling. Using multiple regression, increased public expenditure leads to a slight increase in resilience to COVID-19 economic shocks while decreased taxation does not lead to an increase in resilience to COVID-19 economic shocks, thus our findings suggest that increased public expenditure and reduced taxation during the pandemic period in Nairobi City County had minimal implications on the resilience to covid-19 economic shock in Nairobi City County.

KEYWORDS: *Economic shocks, Expansionary Fiscal Policy, COVID-19 Pandemic, Resilience*

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1. INTRODUCTION

The struggle to contain a major economic downturn due to COVID -19 economic shocks has given prominence to a field of research focused on the economic consequences of the pandemic coupled with government response policies used to cushion the economy from economic shocks of the pandemic. The importance of this topic is reflected through economic instability throughout the global economies as a result of COVID-19 economic shocks and the effects of fiscal policies employed to gain resilience from the economic shocks of the pandemic which is a gap that requires more investigation.

Fiscal Policy consists of a range of measures utilized by governments in influencing the level of taxation and government expenditure to obtain economic stability (Farhi and Werning, 2016). In this study, we recognize and focus on the importance of a sound fiscal policy applied to counter economic shocks and increase economic growth amidst an economic downturn. In light of the fiscal policy implemented to counter economic shocks from the COVID-19 pandemic in Kenya, we focused on; government spending, private investment spending, and consumption spending by individual consumers as the components of public expenditure utilized by the government to implement its fiscal policy. On taxation, we dealt with taxation on income and value-added tax which were the fiscal policy tools the government utilized to implement its fiscal policy.

In terms of measuring resilience to COVID -19 economic shocks, we applied the ecological measure, it's a measure of resilience based on a comparison between the state of the economy before the COVID-19 pandemic and its state after the impact of the pandemic shocks, this measure also determines the magnitude of shocks that the economy can withstand before it can change (Holling 1973, 1996, 2001; McGlade et al. 2006; Walker et al. 2006). The Engineering measure of resilience was applied to measure the economy`s rebound to its original growth path after the economic shocks of the pandemic. Martin (2012) an adaptive measure was utilized to measure adaption or reconfiguration of the economy to enable resilience against economic shocks of the pandemic.

The study was on Nairobi City County which is Kenya's largest county by population size and contribution to the country's Gross Domestic Product (GDP). We assume that the changes in individual demand and spending are influenced by the changes in income due to increased government expenditure, taxation,

and COVID-19 economic shocks outlined in this study. We consider revenue contribution from economic activities occurring outside the County as negligible and the amount of revenue that leaks into other counties as a result of economic activities occurring within Nairobi City County as also negligible.

We focused on the fiscal policy tools utilized by the Kenyan government to cushion the economy from the COVID -19 economic shocks. We put into account that Kenya is a low-income country, the multiplier effects obtained from a fiscal policy may not obtain the expected results; they could produce a zero-effect due to varied consumer behavior and the scale of economic damage (Kraay, 2010; Ilzetzki, Mendoza and Vegh, 2010) and delays in implementation due to political interference and inefficient bureaucratic systems (Green, 2010).

2. LITERATURE REVIEW

Research work that has been done in and around the link between expansionary fiscal policy and resilience to COVID-19 economic shocks with different approaches in methodology, focus of their study, and results obtained include;

Nechifor et.al, (2020) using the JRC DEMETRA model studied the impact of Corona Virus-2019 and short-term economic rejuvenation in Kenya. The results show that the measures employed such as lowering tax and increasing the level of expenditure on health, tourism, and infrastructure with external borrowing may accrue a short-term recovery of income. They focus more on initial short-term recovery in specified sectors of the economy.

Fornaro and Wolf (2020) used a standard advanced Keynesian illustrative economy model, they analyze how the monetary policy used alongside the fiscal policy can be utilized in response to the COVID- pandemic. The results show that applying an aggressive expansionary fiscal policy will boost investment that in turn can push the economy out of stagnation, easing the monetary policy will mitigate the drop in global demand, In our study, we focused on expansionary fiscal policy and linked each policy tool to resilience to COVID-19 economic shocks.

Guerrieri et al. (2020) used the Keynesian supply model in multiple sectors incomplete markets with liquidity constrained consumers, they analyzed how supply shocks due to a pandemic can create effects that mirror aggregate

demand shocks and the combination of policy tools that would address the demand deficiency. The results obtained show that Demand can overreact to a supply shock as a result of the pandemic`s effects on the supply chain and cause a demand deficient recession.

Faria-e-castro (2020) used a nonlinear DSGE calibrated model to analyze the effects of COVID-19 in the United States and the ensuing fiscal policy response. Results show a forty percent decrease in employment in the service sector and a reduction of GDP by15 percent in the initial three months of the pandemic followed by a very gradual recovery. Our study focused on resilience to specific expansionary policies in a low-income economy based on a descriptive research methodology.

Barro et al., (2020) and Correia et al., (2020) used comparison studies with available data to study the impact of 1918 influenza to infer on health and economic effects of Covid-19. Results show decreased economic output and shocks in supply and demand due to economic distress.

Sarangi (2015) used a Structural vector autoregressive model to analyze the effectiveness of fiscal policy in Jordan in the absence of economic shocks due to a pandemic. Results show that expansionary fiscal policy has a positive impact that is productive to economic growth.

Nawaz and Khawaja (2016) used a solo growth model to analyze the effects of fiscal policy on economic growth in 56 countries, the study does not include effects from economic shocks due to a global pandemic, The results are a positive correlation between the growth of the economy and fiscal policies in developed countries which is negative in underdeveloped countries.

Audu (2012) used a Co-integration error mechanism model to analyze the effects of fiscal policy on the economy in Nigeria. Results show increased economic stability of Nigeria with an application of the fiscal policy which was done in absence of the COVID-19 economic shocks.

Poudel et al., (2020) by Searching and reviewing published articles that are related to the psychosocial effects caused by COVID-19 and other outbreaks analyzed the socio-economic and mental health aspects of Covid-19 in Nepal.

Results show limited availability of raw materials due to closed borders which led to panic buying and hoarding of goods among the Nepalese creating a shortage.

3. RESEARCH PROBLEM

Global economic crisis due to COVID-19 economic shocks has pushed for a great need to outline COVID-19 economic shocks; the state of economic resilience to the shocks caused by the pandemic and negative or positive externalities accrued from the fiscal response policies applied to cushion the economy from the COVID-19 economic shocks.

Studies we reviewed on economic resilience as an area of research have revolved around shocks due to varied causes other than those caused by a global pandemic of COVID-19`s magnitude. The three measures of resilience (Ecological, Engineering, and Adaptive measures) have been put to test as explained in a study by Angulo and Trivez (2018) who use Ecological, Engineering, and Adaptive measures of resilience to analyze resilience to economic shocks of Spanish regions, results show that resilience is accrued based on location and sectoral advantage in the economy.

Bene, Frankenberger, and Nelson, (2015) more studies have focused on the design, monitoring, and evaluation of resilience interventions with empirical and conceptual considerations. Our study focused on the COVID-19 economic shocks, we used the three measures of resilience to link expansionary fiscal policy and resilience to COVID-19 economic shocks in Kenya as evidenced from Nairobi City County which is a gap in research that requires extensive approaches in research.

4. METHODOLOGY

To examine the link between expansionary fiscal policy and resilience to COVID-19 economic shocks we adopted a descriptive research methodology. Our target population was two million economically active individuals, we obtained a sample size of 110 respondents drawn from all the 17 constituencies in the county using quota sampling. We did not have access to the entire population due to COVID-19 restrictions thus we opted for a non-probability sampling technique to ensure that the final sample size was an accurate representation of the target population.

As we were handling a very large population, we wanted to ensures efficient representation in the final sub-population thus we acquired our sample size through this technique; (sample size/population size) x stratum size (Pedhazur and Schmelkin, 1991). According to Mugenda and Mugenda (2003) in descriptive research, a sample size of 10-50% is acceptable.

(Sample size) 200,000 X 1100 (size of each stratum)
(Population) 2000,000 N=110 (Sample size)

We used multiple regression to determine the relationship between the dependent and independent variables.

The following model was used for analysis;

$$Y= \beta 0 + \beta 1X1 + \beta 2\ X2+ \varepsilon$$

Where;

Y= Resilience to Covid-19 economic shocks based on Adaptive, Ecological, Engineering and measure
X1=Increased public expenditure
X2=Decreased taxation
β0=Constant
β1, β2 = Co-efficient of each independent variable in the model
ε= Error Term

5. RESULTS AND DISCUSSIONS

(Table 1.0 Regression Co-efficient Results)

	Unstandardized Coefficient B	STD Error	Standardized Coefficient Beta	T	sig
Constant	**3.537**	**.505**		**7.004**	**.000**
Increased Public expenditure [X1]	**.147**	**.102**	**.048**	**.460**	**.646**
Decreased taxation [X2]	**-.131**	**.109**	**-.126**	**1.202**	**-233**

We obtained results as shown in table 1.0. when the independent variables (Increased public expenditure and decreased taxation) are at constant zero, resilience to COVID-19 economic shocks is at 3.537. The results show that a unit increase in increased public expenditure leads to a 0.147 increase in resilience to COVID-19 economic shocks in Nairobi City County which is a positive but weak relationship. A unit increase in decreased taxation leads to a -0.131 increase in resilience to COVID-19 economic shocks in Nairobi City County which is a negative relationship.

Based on this finding we determined that increased public expenditure and reduced taxation during the pandemic period in Nairobi City County had minimal implications on the resilience to covid-19 economic shock in Nairobi City County.

6. CONCLUSION AND RECOMMENDATIONS

The results we obtained show that increased public expenditure and decreased taxation had a minimal impact on resilience to COVID-19 economic shocks in Kenya as evidenced by Nairobi City County. Increased public expenditure had a positive relationship with resilience to COVID-19 economic shocks. we recommend more focus be put on this area to ensure a stronger resilience to economic shocks of a similar magnitude to those caused by the COVID-19 pandemic.

The results from our study show that decreased taxation has a negative relationship with resilience to COVID-19 economic shocks in Nairobi City County meaning that decreased taxation does not always boost economic activities to foster economic growth in varied economic circumstances.

To conclude we note that countries have variations in income sources and type of expenditure, this means that vital economic sectors vary thus a shutdown economic sector in one country could be the vital economic sector to boost economic growth for another country which should be considered when applying the fiscal policy in different economies. We have obtained the given relationships in our measurements of the link between expansionary fiscal policy and resilience to COVID-19 economic shocks in Kenya as evidenced by Nairobi City County but more techniques and keen consideration to our findings should be applied in expanding this area of study.

7. LIMITS OF THE STUDY

We did this study at the peak of the COVID-19 pandemic where the researchers encountered difficulties in conducting interviews and distribution of questionnaires to a fairly larger population sample due to restrictions in movement and social distance put in place to contain the spread of the virus restrictions.

Due to COVID-19`s devastating effects some people were not willing to respond adequately to questions in and around this topic.

8. SUGGESTION FOR FURTHER RESEARCH

We recommend that other studies to be done should focus on increasing the number of samples to obtain more analysis into the study post COVID-19 containment restrictions.

We applied the regression model to determine the association between the dependent and independent variables a study should be conducted with application of other models to determine if there are changes in the relationship of the dependent and independent variables as obtained in this study.

We conducted this study in Nairobi City County with a focus on the two main variables that expansionary fiscal policy (increased public expenditure and

decreased taxation), the study should be replicated in other counties and regions with additional variables so as to determine their effects in different research sites.

DISCLOSURE OF CONFLICT

The authors declare that they have no conflicts of interest.

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WHY POVERTY MENTALITY MATTER FOR ACHIEVING THE FIRST SUSTAINABLE DEVELOPMENT GOALS (SDGS) IN NIGERIA

James Tumba Henry

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Submission date: 23.07.2022 | Acceptance date: 28.12.2022 RESEARCH ARTICLE

WHY POVERTY MENTALITY MATTER FOR ACHIEVING THE FIRST SUSTAINABLE DEVELOPMENT GOALS (SDGS) IN NIGERIA

James Tumba Henry*

ABSTRACT Over the years, the global effort to reduce multidimensional poverty has intensified, especially in low-income countries like Nigeria. Yet, poverty indices are increasing, with more people feeling persistently economically poor. This feeling is because poverty mentality might be closely linked with consumption, income and wealth. However, policymakers unconsciously often time overlook the harmful implication of poverty mentality when initiating economic poverty alleviation programmes. From observation, this poverty mentality of the beneficiaries of poverty alleviation programmes in Nigeria makes them engage in deadweight spending. Thus, this study recommended a New International Poverty Order (NIPO) by dealing with economic poverty alongside its mentality through value reorientation and investment education before promoting economic well-being.

KEYWORDS: *Multidimensional poverty, poverty mentality, value reorientation*

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1. INTRODUCTION

The first fundamental objective of the Sustainable Development Goals (SDGs) is to end extreme poverty globally. Members of the United Nations adopted these goals in 2015 as a universal call to action to end poverty, ensure environmental sustainability and promote peace and prosperity worldwide on or before 2030 (United Nations Development Programme [UNDP], 2021). The SDGs replaced the Millennium Development Goals (MDGs) adopted in 2000 as a global effort to tackle extreme poverty and hunger, expand primary education to all children, and prevent the scourge of deadly diseases. According to the UNDP (2021), the MDGs achieved remarkable results: (1) more than one billion people have been lifted out of poverty since 1990, (2) child mortality dropped by more than half since 1990, and (3) the number of out-of-school children dropped by more than half since 1990, and (4) HIV/AIDS fell by almost 40 per cent since 2000.

Despite the achievements of the MDGs between 1990 and 2015, about 736 million people still lived on less than US$1.90 a day (UNDP, 2021). Moreover, Southern Asia and sub-Saharan Africa, which accounted for 80 per cent of those living in abject poverty, experienced limited economic progress and threats caused by climate change, food insecurity, and conflicts. Thus, the SDGs were adopted as a far-reaching approach to ending multidimensional poverty by targeting the most vulnerable, increasing the supply of basic needs, and supporting countries devastated by climate and conflict-related disasters.

The World Bank in 2015 sets the international poverty threshold to $1.90 per day, under which an individual is considered to be living in poverty (World Bank, 2016). For Nigeria and other lower-middle-income countries, the new benchmark is set at $3.2 a day (Silver & Gharib, 2017). This threshold is based on the cost of essential food, clothing and shelter required to sustain one adult. From the preceding, it is evident that economics and world development organizations have stereotyped the concept of poverty as income, consumption and wealth. Giurge and Whillans (2019) opined that these narrow economic poverty measures must be challenged. Thus, it could be said that non-economic factors such as poverty mentality might be essential in reshaping peoples' economic well-being and societal progress (Stiglitz *et al*., 2009; Karademas, 2006; Helliwell, 2006).

Conceptually, a poverty mentality is a mindset developed by individuals based on a solid belief that they will never have enough money. This mindset is driven by fear and can cause poor financial decision-making. This definition of poverty mentality further explains why government economic alleviation programmes have not yielded the desired results in third-world countries. In Nigeria, for example, successive governments have adopted different strategies to reduce the incidence of poverty in the country. Poverty alleviation programmes before 1999 include: National Accelerated Food Production Programme (NAFPP) and Nigerian Agricultural and Cooperative Bank in 1972; Operation Feed the Nation (OFN) in 1976; Green Revolution Programme (GRP) in 1979; Roads and Rural Infrastructure (DFRRI) in 1986; Better Life Programme (BLP) in 1987; National Directorate of Employment (NDE) in 1987; Family Support Programme (FSP) in 1993; Family Economic Advancement Programme (FEAP) in 1997. Poverty alleviation programmes after 1999 include: Poverty Alleviation Programme (PAP) and Poverty Reduction Strategy Process (PRSP) introduced in 2000; National Poverty Eradication Programme (NAPEP) launched in 2001; National Economic Empowerment Development Strategy (NEEDS) in 2004; Seven-Points Agenda in 2007; The Transformation Agenda (TAN) in 2012; Anchor Borrowers' Programme (ABP) in 2015; N-Power programme in 2016; Government Enterprise and Empowerment Programme (GEEP) in 2016; Unconditional Cash Transfer (UCT) in 2020; Presidential Youth Empowerment Scheme (P-YES) in 2020; National Youth Investment Fund (N-YIF) in 2020 among others.

These programmes were designed to financially empower beneficiaries (Nigerians) to establish small-scale businesses and create a value-chain of opportunities for others. However, these myriads of poverty alleviation programmes have not produced the desired results as most Nigerians face multidimensional poverty. Data from the Nigerian Living Standard Survey (NLSS), as reported by the National Bureau of Statistics (NBS) in collaboration with the World Bank in (2020) showed that 40 per cent (83million) Nigerians live in multidimensional poverty and is projected to increase to 45 per cent (90million) in 2022. Moreover, from my observation, due to their poverty mentality, most beneficiaries engage in deadweight spending like marrying more wives and buying cars, among others. These actions further impoverished and increased the incidence of poverty. Thus, this article argues that policymakers need to consider the influence of the poverty mentality as it can go a long way in hampering the socio-economic development of any society.

The remaining sections of this study are organized as follows: Section 2 discusses the economic cum social theories of poverty, while Section 3 gives the conclusion and recommendation.

2. ECONOMIC CUM SOCIAL THEORIES OF POVERTY

In economics and sociology, many theories have been proposed and identify different factors responsible for poverty, emphasizing income, consumption, wealth and social interactions. Without claim to being exhaustive, some of these theories, as highlighted by Ndiyo (2021), are discussed:

2.1. Vicious circle of poverty theory

Ragnar Nurkse propounded the vicious circle of poverty in his book titled "Problems of Capital Formation in Underdeveloped Countries", published in 1965 (Shamim, 2022). Nurkse sees poverty as a phenomenon enforced by low income, low savings, low investment, low capital formation, low productivity, and low employment (Hashim et al., 2016; Ndiyo, 2021). This circle is likely to continue in perpetuity, except there is an intervention from outside. The poverty cycle is sometimes called the development trap when applied to developing countries. The reasons for the vicious circle have been classified into; supply side causes, demand side causes and imperfect market causes. The supply side causes indicate that less developed countries are underdeveloped because their productivity is too low and cannot drive capital formation.

Similarly, the demand causes low purchasing power due to low income. Finally, an imperfect market condition occurs because resources are underdeveloped and citizens are economically backward. This imperfect condition limits the optimal utilization of natural resources. This theory has been criticized because development in LDCs is hampered by a lack of capital and poor decision-making ability.

2.2. Culture of poverty theory

Oscar Lewis propounded this theory in his book "Five Families: Mexican Case Studies in the Culture of Poverty", published in 1959. This theory was developed by observing the behaviour of poor people in New York, Puerto Rico and Mexico (Mandell & Schram, 2003; Sameti et al.,2012). This theory observed that living conditions of pervasive poverty might lead to building a culture or subculture to acclimate to those conditions. In other words, people raised in poverty

unconsciously developed attitudes and skills in consonance with the kind of life they share with those around them (Bradly, 2018; Addae-Korankye, 2019). Thus, a continuous exhibition of such attitudes and skills makes poor people endure the culture of poverty. However, according to Small et al. (2010) culture of poverty theory has been criticized due to its many theoretical inconsistencies. In addition, this theory has been criticized for its assumption of fixed and unchanging poverty culture wherein no amount of intervention can change the attitudes of poor people (Bradly, 2018). This reasoning implies that poverty is caused by individuals rather than social or economic conditions.

2.3. Poverty individualization/democratization

This theory was developed by the German Sociologist Ulrich Beck in his book titled "Risk Society: Towards a new Modernity", published in 1992. This theory was presented based on German experience and criticizes the culture of poverty theory (Ndiyo, 2021). Beck argued that individual attitudes are less traditionally connected to values and norms and are not dependent on some collective identity relative to social class. This assertion implies that class society has given way to the individualized community, and people are required to create their own life and life biography (Leibenstein, 1957; Ndiyo, 2021). In addition, Beck argued that some individuals would experience poverty only as a temporary condition in the short, medium or long term. Leisering and Leibfried in 1999 expanded the individualization theory by dividing Beck's theory into democratization, demoralization and biographisation. This theory has been criticized that more individuals will be invaded by poverty because everyone cannot be prone to poverty. In real life, some individuals will experience poverty more than others.

2.4. Monetary theory of poverty

Booth and Rowntree propounded the monetary theory of poverty in the 19th and 20th centuries. This approach to poverty is the most widely employed theory to measure and study poverty among economists because it is consistent with neoclassical microeconomic theory (Soria, 2007). Poverty in this approach connotes a shortfall in a family or personal income and consumption falling below a certain threshold of resources (UKEssays, 2018). The instruments for measuring poverty under this approach are the poverty line and the necessities of life. The poverty line sets a certain threshold below which people are called poor (Sameti et al.,2012). For instance, the less than 1 US dollar a day proposition by the World Bank and International Monetary Fund (IMF). On the

other hand, the basic necessities criteria or Unfulfilled basic needs index identifies goods and services needed to sustain one's life. The approach perceives income or consumption as equivalent to economic well-being. This theory has been criticized for being too myopic to fit the real-life situation because social relations and welfare considerations are left out. This shortcoming has made the poverty line condition a misleading instrument for measuring poverty.

2.5. Classical deficiency theory of poverty

Sen Amartya postulated the classical individual deficiency theory in 1985 to provide a framework that can be employed to analyze inequality, individuals, poverty and groups' well-being (Sameti et al., 2012). This approach attributes poverty to the failure of an individual to make good choices and work hard. According to Daana (2018) and Ndiyo (2021), this approach blames poverty on a "lack of certain genetic features, intelligence and even punishment from God for sins committed in the present or former life". This theory is rooted in the laissez-faire principle wherein people are responsible for the result of their economic decisions. Thus, government intervention in people's economic life will result in more poverty. This theory has been criticized because it might take longer to build skills and knowledge; therefore, time, money and other resources are sacrificed during training.

2.6. Nonclassical progressive social theory of poverty

The neoclassical progressive social theory of poverty was developed as a criticism of the classical individual deficiency theory of poverty by Rank Mark, Yoon Hong-Sik and Hirschl Thomas in 2003 in their research article titled "American Poverty as a Structural Failing: Evidence and Arguments". Rank et al. (2003) viewed poverty beyond individual deficiency and attributed it to social, economic and political distortions that restrict opportunities and resources to produce wealth and surmount poverty. This explains how economic and social systems, especially capitalism, created an army of the unemployed population to keep the wage rate low in the 19th century (Ndiyo, 2021). It was argued that people might work hard and have brilliant attitudes but still leverage the poverty trap caused by dysfunctional economic and social systems. Thus, poverty is attributed to a social, economic and political configuration that makes poor people disadvantaged no matter their commitments. This theory was criticized because it concentrated on social, economic and political structures as the cause of poverty, forgetting that the system causes behaviour and individual

behaviour is the primary cause (Brady, 2108).

2.7. Geographical disparity theory

John Kenneth Galbraith propounded the geographical disparity theory of poverty in his thesis titled "The Position of Poverty", published in 1969 as a theory of inequality. This theory attributed poverty to geographical dispositions. It emphasized that poverty occurs when people, cultures and institutions in specific locations lack what it takes to generate adequate income, well-being and power to assert redistribution (Omideyi, 2007; Ndiyo, 2021). This theory is also discussed within the economic agglomeration proposition, which reveals the concentration of industries in a particular location and attracts auxiliary services and markets (Danaan, 2018; Ndiyo, 2021; Omeje et al., 2022). This concentration attracts more industries while impoverished areas spawn more poverty (Addae-Krankye, 2019). Scholars have criticized this theory's disbelief in poverty alleviation programmes and that such intervention can cause more problems.

2.8. Cyclical interdependence theory

The cyclical interdependence theory is rooted in Myrdal Gunner's work in his book "Economic Theory and Underdeveloped Regions", published in 1957. This approach was developed as a theory of "interlocking, circular, interdependence within a process of cumulative causation", explaining economic development and underdevelopment. Myrdal argued that community and personal welfare are traceable to a flow of negative consequences where one problem might generate multiple difficulties and result in poverty. According to Ndiyo (2021), the interdependence theory posits that lack of employment opportunities could lead to emigration, a decline in tax revenue, poorly trained workforce, poor school system, closure of business, affect the ability of firms to adopt advanced technology and attract new businesses. These problems will create unemployment and deepen the vicious cycle of poverty. The theory further observed that unemployment creates low income resulting in low savings, spending and consumption. Addae-Korankye (2019) opined that individuals cannot start their businesses and even embark on training leading to no expansion, market dwindling, disinvestment, and deficient opportunities. This theory was criticized for conceiving poverty as a trait that affects individuals and families without acknowledging the numerous criticisms of individualism (Rank, 2005; Brady, 2018).

2.9. Social exclusion/cumulative disadvantage theory

The concept of social exclusion came into use in France in the 1970s when the government used it to depict a growing problem group composed of people living on society's margins (Quirke, 2014). However, Rene Lenoir expanded the concept of social exclusion in his book "Les Exclus" which means "the excluded", published in 1974. Social exclusion is a multidimensional observable fact that connotes instances where a person or group of persons are denied the chance to participate in a civic obligation whether they crave to partake or not (Silver & Miller, 2003; Sameti et al., 2012). This theory analyses poverty as denying someone or a group the opportunity to participate and the right to use economic resources. Furthermore, Berafe (2017) sees the concept as a process by which a particular group of persons are systematically disadvantaged due to the discrimination against them based on their religion, race, ethnicity, gender, disability, age, and migration status, among others. Thus, poverty within social exclusion is seen as non-participation in producing goods and services, consumption, social interaction and political activities within a particular society. The symptoms of exclusion are unequal access to resources, denial of opportunities and unequal participation. This approach has been criticized for not having a conceptual definition due to its complexity and problems. According to Atkinson (1998), the concept can mean "all things to all people". Similarly, it was criticized for negative ideas and value-burdened concepts mirroring the prejudice of the middle class (Randolph & Judd, 1999).

The central tenets of all these economic and social theories of poverty have focused on only the concepts of consumption, income, wealth accumulation and social interactions. Conversely, subjecting these theories to a reality check in the Nigerian situation has shown that the multi-dimensions of poverty in the country are beyond the economic measure of poverty.

3. CONCLUSION AND RECOMMENDATION

Over time, empirical evidence and macroeconomic policy efforts have focused on economic poverty (consumption, income and wealth), ignoring the poverty mentality. Observation has shown that financial support beneficiaries of poverty alleviation programmes engage in deadweight spending. This article argued that the poverty mentality seriously threatens the government's effort toward reducing multidimensional poverty in Nigeria in line with the SDGs. This rife and precarious situation deserves the attention of policymakers as much as

economic poverty. Thus, this study recommends a New International Poverty Order (NIPO) by dealing with economic poverty alongside "poverty mentality" through value reorientation and investment education before promoting economic well-being.

DISCLOSURE OF CONFLICT

The authors declare that he has no conflict of interest.

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FOCUS ON RESEARCH IN CONTEMPORARY ECONOMICS

ANALYSIS OF MOBILE TELECOMMUNICATION AND ECONOMIC GROWTH: EVIDENCE FROM ARDL MODELING

Ibrahim Musa*, Sule Magaji, Chukwumeka Ifegwu, & Ali Salisu

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FOCUS ON RESEARCH IN CONTEMPORARY ECONOMICS

Submission date: 28.07.2022 | Acceptance date: 13.01.2023 RESEARCH ARTICLE

ANALYSIS OF MOBILE TELECOMMUNICATION AND ECONOMIC GROWTH: EVIDENCE FROM ARDL MODELING

Ibrahim Musa*, Sule Magaji, Chukwuemeka Ifegwu, & Ali Salisu

ABSTRACT This study examines the impact of mobile telephone on economic growth in Nigeria using ARDL (Autoregressive distributed lag) as methodology, with data from 2001-2017. The study reveals that mobile penetration had a positive impact on real GDP per capita. Which means as more people get access to mobile phones, GDP per capita is expected to grow. 10% increase in mobile penetration will lead to a 0.5 % increase in average annual GDP per capita. The study concludes that mobile telephony can aid sustainable economic development when used appropriately, with the full participation of all stakeholders, especially in a country like Nigeria. The intrinsic value of telecommunications lies not in easing communications and information, but in enabling growth and development. The study recommends that Consumer protection policies are needed to protect consumers from unfair calls and mobile data charges will ensure consumer get the value for their money, which will lead to increased consumption and investment in the industry.

KEYWORDS: *Telecommunication, economic growth, ARDL Model.*

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1. INTRODUCTION

Telecommunication sector in many countries around the world witnessed exponential growth in the last three decades (Oladipo and Wynand, 2020; Leila 2019: Amavilah, Asongu, Andres, 2017). Telecommunication expansion has been observed both direct and indirect benefit to economic growth (WDI, 2018; Sajjad 2017 NCC 2014; Mohsin, Khan & Malik 2012).

In 2015 the estimated global number of people with mobile phones was at 4.7 Billion and the number of active mobile devices was at 7.6 billion which was more than the global human population; owing to the fact that some people have more than one mobile device. During the period the industry generated US$1.1 trillion in revenues, payed US$430 billion in tax, employed 17 million people directly and 15 million indirectly, was responsible for 4.2% of global GDP and global 4G connection passed 1 billion people across 151 countries according to GSMA (2016).

Global system for mobile communication (GSM) helps the nation in the growth of her economy as it makes available an easy and efficient way of satisfying the communication needs required to promote and enhance trade between Nigeria and her international partners it also plays an important roles locally in advocating the several government communications initiatives and thereby connecting all the sectors of the nation's economy together so as to attain a mutual aim. Most importantly, it supports investment which promotes employment opportunities in the long haul. At the nation's micro economy, the GSM had an incredible contribution of 53% in 2003 to the nation's Gross domestic product (GDP). In the year 2015, GSM Market alongside other parts of the telecommunications sector contributed 1, 645, 82 billion naira to the GDP of the nation in the final quarter of the year, that is, 8.8%.

Mobile telecommunication services are an integral part of economic activities so it continues to offer unprecedented opportunities for economic growth especially in the developing market. According to Lloyd and Fenio (2017). It has reduced the globe into a village through reduction of time and space".

Nigerian Government considers mobile telecommunication services to be so vital to national interest and economic growth that it was placed directly under its control until recently when deregulation and competition were introduced (Akinwale, Sanusi, Surujlal, 2018; Mamoun and Talib 2017 Lee, 2003). These

advances in mobile telecommunication technology have been an important vehicle in permitting information exchange to develop as a valuable commodity for moving the country into post industrial and information driven economic growth.

Nigeria is witnessing a period of rapid growth in the use of mobile phones and mobile internet services which has led to an increase in the share of disposable income spent on mobile services. whether these is for business or social interaction, the tremendous impact on economic growth and the potentials for further growth cannot be ignored any more. Figures from the National Bureau of Statistics (NBS) shows that services now account for 52% of the GDP as of 2015 and ICT is a key driver of growth and according to the Nigerian Communications Commission (NCC); Nigeria has become the largest telecoms market in Africa and the middle east, with more than 140million active telecoms subscribers in 2015 and over 4 million phones entering the country every month. Nigeria accounts for 29 percent of all internet usage on the continent of Africa and this figure is expected to rise.

Nigerians spent over US$1.2 billion on 21 million mobile phones in 2012 (according to venture Africa) which means on average Nigerians spent N8,000 purchasing mobile phones. In contrast, the total expenditure on agricultural products in that year was below US$2 billion which is very close to the amount spent in purchasing phones, this is truly amazing because Nigeria is a net importer of agricultural produce which means Nigerians spent almost equal amount of money on food and mobile phones. So what government policies have been put in place to reap the huge benefits from the mobile phone market? What impact does the expenditure on mobile phone have on household income and business in Nigeria? According to the (NCC); Nigeria has 150 million active lines. When we calculate the number of active lines and the current average revenue per user (ARPU) benchmark of US$8 (N2516). Then we can assume that Nigerians spend a total of N380 billion on their lines monthly which adds up to about N4.5 trillion annually. A study by Sridhar and Sridhar (2004) found that the impact of telecommunications penetration on total output is significantly higher for developing countries than for OECD countries. So, what is the impact of the huge expenditure on telecom services on the economy? Has the expenditure facilitated economic activities and increased economic growth? Or has it been just a mere expenditure on a luxury item? These constitute the problem of interest for this research.

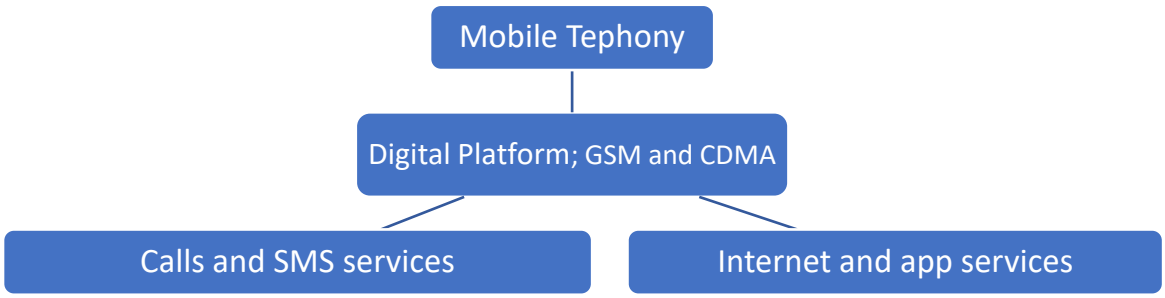
The objective of the research is to examine the impact of mobile telephony on economic growth in Nigeria. The study intends to cover a span of 17years (2001-2017) because GSM was introduced in Nigeria in 2001.This range was chosen to ensure availability of data and for the analysis to be meaningful and aid in the achievement of the objectives work

2. LITERATURE

2.1. Conceptual literature

Oxford dictionary refers to mobile telephony as simply the operation or use of mobile phones. It is a term use for telephone services provided to phones that may move around rather than stay in a fix position. In a nutshell all services provided to mobile phones primarily calls, SMS, internet and apps are referred to as mobile telephony.

Figure 2.1: Basic structure of mobile telephony



In Nigeria they are two main digital mobile telephony system which are GSM and CDMA. The NCC reports that there are about 139,486,832 GSM subscribers and 217,566 CDMA subscribers in Nigeria as of September 2021.

a. *Global Satellite(GSM);*developed by the European Telecommunications Standards Institute (ETSI) as a second-generation digital network used by phones and tablet. GSM is the most popular mobile platform in Nigeria (as in table 1 below) some example are MTN, Airtel, Glo and 9mobile.

b. *Code Division Multiple Access (CDMA);* CDMA is also a second-generation digital network but it uses code-division unlike GSM. The platform is very popular in Nigeria (table 1 below) although it had a very good start with STARCOM. Some of the CDMA service providers still in business are MULTILINKS and VISAFONE.

Both GSM and CDMA offer ways to cram multiple phone calls or Internet connections into one radio channel. In terms of network quality, they can both provide good network or bad network so network quality is dependent on the service provider. The most important distinguishing factor as far as the consumers are concern is that; GSM service providers usually store data of their subscribers on removable sim cards which makes it easier for customers to transfer their sims from one phone to another while the customer data on CDMA is stored on the phone giving the service providers greater ownership of the device.

Table 1: Market share for technology

Year	Technology	Mobile (GSM)	Mobile (CDMA)	Fixed (Wireless/Wired)	VoIP
2017	Percentage	99.70%	0.15%	0.10%	0.03%

(Source: NCC 2017)

The deregulations of the telecom industry in Nigeria in 2001 created an exponential growth in the GSM market which grew from barely less than a million subscribers to over 140 million subscribers as of 2017.

Table 2: Telecom contribution to GDP

Year	2017	2016	2015	2014	2013	2012	2011	2010
Percentage	9.50%	9.13%	8.50%	7.60%	7.40%	7.70%	8.60%	8.90%

(source: NCC 2017)

2.1.1. The mobile ecosystem in Nigeria

A very unique mobile ecosystem has evolved in Nigeria which has the telecom service providers or mobile operators (MTN, Airtel, GLO & 9Mobile) in the middle of it. A report by GSMA (2012) defines the mobile ecosystem as follows;

a. Suppliers of support services: such as Legal services, Advertising and Accounting services.

b. Mobile application developers: they develop applications for mobile phones. BudgIT, Traclis, Jobs in Nigeria, Genii games, and others.

c. Handset importers and dealers: On its own is a multibillion dollar sector some of the players here include Handset importers, Handset dealers, Emerging local manufacturers like SOLO Devices.

d. Other suppliers of capital items: Computer equipment, Motor vehicles, Furniture and other, office equipment.

e. Network equipment suppliers: Local infrastructure, suppliers and providers of maintenance, International equipment suppliers with local offices in Nigeria such as Ericsson, Huawei, Nokia, Alcatel and Aviat.

2.1.2. Telecommunication services in Nigeria

a. e-Services and Mobile telephony

Mobile telephony is the backbone of e-services in Nigeria. e-services are just a medium of bring goods and services to customers via electronic devices. It is vital in collecting information about user needs and preferences to guide producer's decision making. Some examples of e-services from different sectors includes.

b. e-Government

e-Government is the use of information and communication technologies(ICTs) to improve the activities of public sector organisations. Oyeneka (2013) refers to it as mobile government which is extending the concept of government further with delivery of information and services to the doorsteps of the citizens in a personalized way via what they already have, the mobile phone.

c. e-Health

e-health is the use of information and communication technologies(ICTs) in health Interventions. Apps like Smart Health app focus on providing accurate baseline information resource on HIV/AIDs, TB and malaria.

d. e-Commerce

e-commerce is a process of buying, selling, transferring, or exchanging products, services and/or information via electronic networks and provide contact information for customers. Most established business have a website where the attend to the needs of customers. SMEs and individual can sell their product on social media.

2.2. EMPIRICAL LITERATURE

Minges(2015)examined the impact of various ICTs including fixed and mobile broadband services using cross sectional analysis for 120 developing and developed countries during the period 1980-2006 and the framework of the

analysis is based on endogenous growth model. 'The study concludes that a 10-percentage point increase in fixed broadband penetration would increase GDP growth by 1.21percent in developed economies and 1.38percent in developing ones. However, while the coefficient was significant at the 1 percent level for developed economies the significance was only significant at 10 percent for developing economies'

A report by Deloitte for GSM Association (GSMA) in 2012 measured the impact of next generation mobile services on economic growth which basically measured the impact of mobile data usage to economic growth. The report used Panel Data from several countries and econometrics analysis to measure the impact of mobile telephony on economic growth.

Zhang, (2021), examine the relationship between broadband and economic growth in China during the COVID-19 pandemic period (March 2020, April 2020, March 2019, and April 2019) anchored under Cobb-Douglas production function. The study used regression analysis and findings reveal that broadband penetration limited the effect of the pandemic on China's economic growth given the positive and significant relationship established with the variables. Maneejuk and Yamaka (2020) carried out an analysis of the impacts of telecommunications technology and innovation on economic growth in developed and developing economies using time-series kink regression of Hansen (2017) and Panel kink regression of Zhang et al. (2017), and Tibprasorn et al. (2017). Empirical findings reveal that the telecommunications technology and innovation give a relatively more massive impact on the economic growth of developing countries compared to developed countries. Using Panel Vector Auto regression analysis to examine the nexus between telecommunication infrastructures, economic growth and development in 46 Africa from 2000 to 2015(David, 2019). The scholar made use of human development index, and mobile line, fixed line and internet access penetration and result reveals existence of a bidirectional long-run relationship between telecommunication infrastructures, economic growth and development. The effect of telecommunication infrastructure development on the economic growth of 40 sub-Saharan African countries using panel data for the period 2006-15 was carried out by Haftu (2019). Outcome of the study reveal that per capita income of the region will have a positive impact on an increase in ICT in the shape of mobile phone subscribers in the selected period.

Okyere, Poku-Boansi, and Adarkwa, (2018) examine the relationship between telecommunication and transport sector in Ghana using Spearman's rank correlation technique. Empirical findings establish that telegraph, fiber optic networks and telephone facilities as components of telecommunication, exhibit bidirectional relationship with transport sector in Ghana. Similarly, study by Enowbi (2015) who adopted methodology of Datta and Agarwal (2004) to examine telecommunication and economic growth nexus across 44 African countries for the periods of 1990–2010. Finding shows that telecommunications (fixed and mobile lines) contribute in a major way to the economic development; in addition, investment in telecommunications is subject to increasing returns. In another study by Cleeve and Yiheyis (2014) who used Ad hoc structural analysis to examine telecommunication and economic growth in 36 African countries 1995–2010. Results reveal that increased mobile penetration contributes to the growth rate of GDP. In the study carried out by Jung, (2020) institutions and telecommunications investment a sample of 13 European countries during the period 2007–2015. The study uses panel regression and results confirmed positive association between institutional quality and telecommunication investment levels. Furthermore, findings also pointed out at institutional quality being more relevant for most disadvantaged countries, in terms of development and digital connectivity.

Usman, Ozturk, Hassan, Maria & Ullah, (2020) have conducted an analysis of the effect of ICT on energy consumption and economic growth in Bangladesh, India, Pakistan and Sri Lanka for the period of 1990-2018 using bounds testing approach of cointegration and error correction modelling. Finding confirms that, in the long-run, ICT exert positive and significant effect to the economic growth of India only while exhibiting contrary outcome on the other economies. In the study using Generalised Method of Moments technique investigates how information and communication technology (ICT) affects value added across sectors in 25 countries in Sub Saharan Africa for the periods of 1980–2014 (Asongu, Rahman, Nnanna & Haffar, 2020). Findings from the scholars show that mobile phone and internet penetrations exert indirect effects on value added to the agricultural and manufacturing sectors while there is direct effect on value added to the service sector. The study by Solomon and van Klyton (2020) carried out in 39 African countries from 2012 to 2016 to investigate the impact of digital technology usage on economic growth using GMM estimator. Finding shows that individual usage of ICT was positively associated with growth.

However, Gruber and Koutroumpis (2010) found significant positive effects of mobile telecommunications diffusion on GDP and productivity growth using data from 192 countries for the 1990 to 2007 period. Vu (2013) using econometrics and growth accounting, find that the intensity of ICT use in Singapore has a significant positive link with value-added and economic growth, especially in the manufacturing sector. In the study conducted by Commander, Harrison, and Menezes-Filho (2011), the results showed a positive relationship between ICT capital and the productivity of firms in Brazil and India. According to Cardona et al. (2013), ICT acts as GPT (general purpose technology), which is an enabling technology for further innovations that affect economic growth and productivity beyond the effect of regular capital goods. Bertschek et al. (2015) by means of survey analysis used broadband internet to proxy telecommunication, and the results revealed a positive relationship between broadband internet and economic growth.

Koutroumpis and Pantelis 2009 conducted a study covering 15 European Union countries for the period 2003-2006. Using panel data analysis with GDP, working population, mobile penetration and tertiary education per 1000. Regression analysis were run using two different technique (Generalized Method Moment (GMM) and Three Stage Least Square (3SLS)) with two control parameters (random and fixed effects). Their analysis found out that for each 10 percent point increase in mobile penetration there is a significant impact on GDP growth ranging from 0.26percent to 0.85percent.

Badran et al., (2012) in a study on telecommunication industry and economic growth argued that in many emerging countries telecom industry is the one of most important source of revenue for national treasury. Based on an empirical study in Egypt, Saudi Arabia and India; Graber and Venkata (2013) suggested that the revenue of telecommunication industry which generated from providing various services is accountable for two or three percent of total GDP. Zhang (2013), Bowles (2012) both of them argued that the presence of internet continuously transforms the economy of Australia as the internet user was increased from 73 percent in 2007 to 87 percent in 2009. In another study based on the internet consumption model Zhang (2013) and Song, (2015). found that internet diffusion has a strong positive correlation with GDP per capita.

Magaji & Eke (2015) Used data from 16 West African countries and examines the links between Per Capita Income, Trade and Financial indicators, Education

and Freedom indicators. Others are Internet users, Broadband and Mobile Cell phone Subscribers. Meanwhile Fresh Water Supply (which is assumed as a bench mark public sector-led water resource management performance indicators) and Access to Safe Drinking Water (a bench mark private sector-led water resource management performance indicators) represents indicators of water resources management. The results show that income, ICT and government trade policies influence the efficient management of cross-country water resource. Freedom indicators strongly affect water resource management performance indicators (WRMPI). Moreso, Internet Users, Broadband Subscribers, and Mobile cell phones Subscribers have a positive association with WRMPI. Contrary to wide spread expectations, education does not influence WRMPI.

Although there is available empirical literature on mobile telecommunication and economic growth, a gap is crated as Nigeria is not well researched regarding telecommunication and economic growth which this study intends to undertake.

2.3. Theoretical framework

2.3.1. Endogenous Growth Theory

The sources, forms and effect of economic growth has always been an important topic of discussion throughout all the economic school of thoughts. What are the sources of growth, what are the forms of growth and how does growth effect the individual households and macro-economic activities at large. Economist argue whether economic growth is an end in itself or merely a means to an end (the end been economic development). But one fact they all agree on is that economic growth is an important perquisite in achieving economic development.

The endogenous growth theory or new growth theory was developed as a reaction to the flaws of the neoclassical (exogenous) growth theory it tries to prove that investment in capital, innovation and knowledge are key contributors to economic growth. Romer endogenous growth theory was first presented in 1986 in which he takes knowledge as an input in the production function. The theory aimed at explaining the long run growth by endogenizing productivity growth or technical progress. Romer believes technological change was generated by daily economic activity and so it is endogenous to the model of growth. It also gives emphasis to knowledge and information shift within industries which he considered as a public good and that firms should promote

learning by investing.

From equation(6) the Romer model introduce technology augmenting capital.

$$Y = f(A^t K^a L^{1-a}) \quad (1)$$

A is a constant that is >0 and represents technological change and if a = 1 then, $Y = A^t K^a L^{1-a}$

One limitation to the previous literature on this study is on an unresolved neoclassical model-theory of economic growth and that improvement in telecommunications infrastructure alone is not sufficient to stimulate economic growth. Therefore, we consider some possible theoretical objections against the theory. Growth is mostly due to advances in technology which is taken as exogenous. For this purpose, the neoclassical model's assumption of constant, exogenous technological change need not be a problem.

3. METHODOLOGY

3.1. Sources of data

The sources of data for this study will be secondary data from International Telecomm Union and World Bank. The period for the data will range from 2001 to 2017 because Mobile telephone services started in 2000 and data for the industry became available from 2001.

3.2. Technique of data analysis

To examine the relationships between the variables, the study employs Unit root test was carried out by the study using the Augmented Dickey Fuller (ADF) test (1979), the Phillips-Perron (PP) test (1988), and the Kwiatkowski-Phillips-Shin-Schmidt (KPSS) test (1992). the Study also employs autoregressive distributed lag model (ARDL) suggested by Pesaran et al. (2001) for cointegration investigation (time series data) and error correction (short run) analysis. The ECM version of modified ARDL is used to investigate the short run dynamic relationships. All this will be done through the ECM (Error Correction Mechanism) applied through the Ordinary Least Square (OLS) method. The long run model is used to generate the Error Correction Term (ect) by which we estimate the speed of adjustment of the model to long run equilibrium. Diagonestic test and stability test.

3.3. Model specification

This study adopts and modifies a standard endogenous growth model similar to those used by Andrainavo and Kpodar (2011) and Lee, Levendis and Quteirrez (2009). The model by Andrainavo and Kpodar is the most elaborate model in the study of mobile telephony because it includes mobile penetration as endogenous determinants of growth. And since this study is adopting an endogenous growth model frame work the study intends to keep mobile penetration as determinant of growth. GSMA(2013) used 3G penetration as determinant variable but since there are no concrete data on 3G penetration in Nigeria, the study intends to replace these variable with mobile penetration. The adding of mobile internet penetration means the study is not studying a particular kind of GSM technology (edge, 2G or 3G) but the entire mobile internet usage notwithstanding the kind of mobile platform. Also the Andrainavo and Kpodar model is a panel model but would be modified into a time series model as we are concerned only about Nigeria in this study. The modified model is as follows;

$$gdp_t = \alpha gdp_{t-1} + \beta X_t + e_t \quad (2)$$

Where:

X_t = *(gov, inv, trade,mobnet, mobpen)*

$E[e_{it}] = 0$

In the above growth equation, GDP is GDP per capita. From the model we assume a dynamic process in which the current value of the dependent variable may be influenced by past ones, that is why we include the lagged value of GDP as controlled on the right-hand side. trade is a country's annual trade volume as a proportion of its GDP and is a proxy for the degree of openness of a country to international trade-in is the annual share of the countries investment to GDP. Gov is the annual government consumption of goods and services as a proportion of GDP. mobPen is the level of mobile penetration measured my number of mobile phones per 100 population and mobnet is mobile internet penetration as measure the number of people using mobile internet data per 100 population. From growth literatures the aprior expectation for the magnitude of the coefficient of each X_{it} is positive. Therefore;

GDP : Real GDP per capita

Gov: Government expenditure as share of GDP

Inv: Investment expenditure as share of GDP

Trade: Trade expenditure as share of GDP (Openness of the economy)

Mobpen: mobile penetration

Mobnet: mobile internet penetration

e- Error term

From equation (1) when we take the natural log of the equation. we derive the following;

$$\ln(gdp)= \alpha\ln(gdp_{t-1}) +\beta_1\ln(gov_t) + \beta_2\ln(inv_t) + \beta_3\ln(trade_t) +\beta_4\ln(mobnet_t) + \beta_6\ln(mobpen_t)+ e_t \ldots. \quad (3)$$

Following Pesaran et al, (2001), the ARDL representation of the model is expressed as;

$$\Delta lngdpt = \beta_0 + \beta_1 lngdpt_{-1} + \beta_2 lngovt_{-1} + \beta_3 lninvt_{-1} + \beta_4 lnmobnet\ t_{-1} + \beta_5 lnmobpen\ t_{-1} + \sum_{i=1}^{p} \phi^1 \Delta lngdp^{t-i} + \sum_{i=1}^{p} \phi^2 \Delta lngov^{t-i} + \sum_{i=1}^{p} \phi^3 \Delta lninv^{t-i} + \sum_{i=1}^{p} \phi^4 \Delta lnmobnet^{t-i} + \sum_{i=1}^{p} \phi 5 \Delta lnmobpen^{t-i} + \mu_t \quad (4)$$

Equation 10 represents the Long run form of the model is model

$$\ln(gdp)= \alpha\ln(gdp_{t-1}) + \beta_1\ln(gov_t) + \beta_2\ln(inv_t) + \beta_3\ln(trade_t) +\beta_4\ln(mobnet_t) + \beta_6\ln(mobpen_t) + e_t \ldots\ldots\ldots \quad (5)$$

The short run dynamics is estimated using an error correction model (ECM) specified as;

$$\Delta lngdpt=\varphi_0+\sum_{i=1}^{p} \phi^1 \Delta lngdp^{t-i} + \sum_{i=1}^{p} \phi^2 \Delta lngov^{t-i} + \sum_{i=1}^{p} \phi^3 \Delta lninv^{t-i} + \sum_{i=1}^{p} \phi^4 \Delta lnmobnet^{t-i} + \sum_{i=1}^{p} \phi 5 \Delta lnmobpen^{t-i} + \delta ECTt - 1 \ldots\ldots\ldots\ldots \quad (6)$$

Δ is the difference operator; β_0 is the constant term; and β_1 - β_4 are the long run elasticities (coefficients of the explanatory variables); ϕ_1- ϕ_4 are the short run elasticities (coefficients of the differenced explanatory variables); *Ln* is natural logarithm; *P* is the lag length; δ is the speed of adjustment parameter, *ECT* is error correction term lagged for one period, In the long run model, the a prior expectation is that the coefficient on all the explanatory variables are positive.

3.4. Justification of the inclusion of variable

The study measured the impact mobile telephony has had on the economic growth of Nigeria. Since we are not measuring the impact of telecom in general but the impact of mobile telephony in specifics, our model contains two variable that would serve as good indicators for the impact, mobile telephony has had on growth. First is mobile penetration which measures the number of mobile phone subscription as per 100 population which is indicative of how common and regular is the use of mobile devices in the country the source of the data is International Telecom Union (ITU). Secondly is mobile internet penetration which means the number of mobile internet users per 100 population, this variable is unique to the study and its from International Telecom Union (ITU).

Other variables included in the model are all standard determinants of economic growth; government expenditure as a share of GDP is included the effect of government consumption of goods and services in economic growth, as a measure of the degree of openness of the economy which has enormous impact on growth the model includes trade expenditure as share of GDP and investment expenditure as a share of GDP would capture the effect of ever changing investment expenditure on growth. All the above data are sourced from the World Bank.

Finally, GDP per capita would serve as a measure of economic growth. From the model we have GDP per capita as the dependent variable and a lag value of GDP per capita as an independent variable. The reason for having a lag of GDP per capita on the right side of the equation is because we assume that growth from one year's influences growth from the next year and the data is from World Bank.

4. RESULTS AND DISCUSSION

4.1. Unit root test result

Augmented Dickey-Fuller Test

The results from the test show that none of the series (GDP, GOV,INV,MOBNET,TRADE) is stationary at level as their test statistics are all smaller than the 5% critical value of -3.478305 for rejection of hypothesis of a unit root. However, the null hypothesis of non-stationarity is consistently rejected for all the when they are expressed in first differences suggesting that they are all integrated of order one (I(1)). The results reported are for those with intercept and trend. However, the results with no (intercept or trend) and with trend were not significantly different.

Test statistics with intercept and trend for the variable MOBPEN are smaller than the critical value of -3.478305 at 1%,5% and 10% both at level and first difference, suggesting that the series in I(2).

Table 3: ADF Test results (with Intercept and Trend)

Variable	Test Statistics	Critical Value	Probability	Decision
With Intercept and Trend				
LNGDP	-1.275897**	-3.478305	0.8853	I(1)
D(LNGDP)	-8.986386**	-3.479367	0	
LNGOV	-1.369394**	-3.482763	0.8605	I(1)
D(LNGOV)	-7.726507**	-3.48397	0	
LNINV	-3.12646**	-3.478305	0.1087	I(1)
D(LNINV)	-7.998141**	-3.479367	0	
LNMOBNET	-1.559144**	-3.482763	0.7979	I(1)
D(LNMOBNET)	-3.721933**	-3.482763	0.028	
LNTRADE	-1.999457**	-3.482763	0.5902	I(1)
D(LNTRADE)	-8.014179**	-3.48397	0	
LNMOBPEN	-2.91173**	-3.24657	0.0221	I(0)
D(LNMOBPEN)	-1.417993**	-3.487845	0.8455	

Source: Authors computation using E-views 9.0

D indicates the 1st difference of the variable. **, indicates 5% level of significance

The results from the test show that none of the series (GDP, GOV,INV,MOBNET,TRADE) is stationary at level as their test statistics are all smaller than the 5% critical value of -3.478305 for rejection of hypothesis of a unit root. However, the null hypothesis of non-stationarity is 10 consistently

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Test statistics with intercept and trend for the variable MOBPEN are smaller than the critical value of -3.478305 at 1%,5% and 10% both at level and first difference, suggesting that the series in I(2).

Philip-Perron Test

Table 4: Phillip-Perron Test

Variable	Test Statistics	Critical Value	Probablity	Decision
With Intercept and Trend				
LNGDP	-0.973793**	-3.478305	0.9404	I(1)
D(LNGDP)	-10.48629**	-3.479367		
LNGOV	-1.394228	-3.482763	0.8533	I(1)
D(LNGOV)	-7.726507	-3.48397	0	
LNINV	-3.324411	-3.478305	0.0711	I(1)
D(LNINV)	-7.998137	-3.479367	0	
LNMOBNET	-1.313268	-3.478305	0.8761	I(1)
D(LNMOBNET)	-15.35246	-3.479367	0.0001	
LNTRADE	-2.028279	-3.482763	0.5747	I(1)
D(LNTRADE)	-8.026641	-3.48397	0	
LNMOBPEN	-2.831394	-3.478305	0.1916	I(1)
D(LNMOBPEN)	-11.24646	-3.479367	0	

Source: Authors computation using E-views 9.0

D indicates the 1st difference of the variable. **, indicates 5% level of significance

The Null hypothesis for the philip-perron (PP) test is that the variable has unit root and the alternative is that it doesn't. The PP test was conducted using intercept and trend. The spectral estimation method is the EViews default Bartlett kernel and bandwidth is Newey-west bandwith. The test statistics for all the variables is less than the critical values (5% level of significant) at level but greater than the critical values (5% level of significant) at 1st difference. These means the variables are stationary at order 1, making them all I(1) processes.

Kwiatkwoski-Philips-Schmidt-Shin Test

Table 5: KPSS test result

Variable	Test Statistics	Decision (5% critical value = 0.146000)
LNGDP D(LNGDP)	0.23922 0.100263	I(1) **
LNGOV D(LNGOV)	0.190292 0.100613	I(1) **
LNINV D(LNINV)	0.092249 0.272895	I(0) **
LNMOBNET D(LNMOBNET)	0.272895 0.138327	I(1) **
LNTRADE D(LNTRADE)	0.201180 0.048277	I(1) **
LNMOBPEN D(LNMOBPEN)	0.259018 0.136249	I(1) **

Source: Authors computation using E-views 9.0

D indicates the 1st difference of the variable. **, indicates 5% level of significance. 5% critical value = 0.146000

The Kwiatkowski–Phillips–Schmidt–Shin (KPSS) test figures out if a time series is stationary around a mean or linear trend, or is non-stationary due to a unit root.If the LM statistic is greater than the critical value, then the null hypothesis is rejected; the series is non-stationary.

The ADF test suggests that all variables are I(1) aside from MOBPEN which is I(0), in the PP test all the variables are I(1) and KPSS unit root test suggest that the variables are a mixture of I(0) and I(1) process. So according to Nkoro and Uko (2016) since the series is a mixture of I(0) and I(1) processes Pesaran and Shin (1999) and Pesaran et al (1996b) proposed Autoregressive Distributed Lag (ARDL) approach to cointegration or bound procedure for a long-run relationship will be appropriate.

4.2. ARDL Model Cointegration Test

Table 6: Bound Test

Critical Value Bounds

Significance	I0 Bound	I1 Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

Source: Authors computation using E-views 9.0

F statistics=15.06016 K=5 Prob(F-Statistics)=0

The table above shows the bound test computation of the ARDL model at different level of significant (1%, 2.5%, 5%, 10%). The Null hypothesis for the test is of 'no cointegration'. Since the F statistics is 15.060 which is geater than the I(0) and I(1) bound, we therefore reject the null, implying that there is a long run relationship between the variables. This gives justification to the use of an Error Correction Model (ECM).

Table 7: ARDL Model Cointegration form (Short run)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNGDP(-1))	0.219605	0.10844	2.025124	0.051
D(LNGDP(-2))	0.219605	0.10844	2.025124	0.051
D(LNGDP(-3))	0.219605	0.10844	2.025124	0.051
D(LNGOV)	-0.106138	0.046264	-2.294186	0.0283
D(LNGOV(-1))	0	0.037091	0	1
D(LNGOV(-2))	0	0.037091	0	1
D(LNGOV(-3))	0.160336	0.043601	3.677347	0.0008
D(LNINV)	0.226359	0.077855	2.907426	0.0065
D(LNINV(-1))	0	0.045673	0	1
D(LNINV(-2))	0	0.045673	0	1
D(LNINV(-3))	-0.076135	0.048247	-1.578025	0.1241
D(LNTRADE)	-0.034716	0.023276	-1.491496	0.1453
D(LNTRADE(-1))	0	0.029717	0	1
D(LNTRADE(-2))	0	0.029717	0	1

D(LNTRADE(-3))	-0.114728	0.030092	-3.812503	0.0006
D(LNMOBNET)	0.149968	0.047407	3.16345	0.0033
D(LNMOBNET(-1))	0	0.013395	0	1
D(LNMOBNET(-2))	0	0.013395	0	1
D(LNMOBNET(-3))	0.072522	0.021101	3.436822	0.0016
D(LNMOBPEN)	0.140941	0.035911	3.924666	0.0004
CointEq(-1)	-0.942882	0.118468	-7.95895	0

Source: Authors computation using E-views 9.0

Estimated using ARDL

Table 7 shows the short run cointegration form of the ARDL model, significance is at 5% level. The coefficient of the variable CointEq is the speed of adjustment in the ARDL which implies that the model moves towards long run equilibrium at the speed of 94%. However, since the bound test suggested that our variables are cointegrated, we then estimate an Error Correction Model (ECM).

4.3. Long run estimates

Table 8 : Long run estimate

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.349429	0.71401	6.091549	0
LNGDP(-1)	0.489486	0.083744	5.845019	0
LNGOV	0.072142	0.027126	2.65951	0.0102
LNINV	-0.1157	0.044586	-2.594934	0.0121
LNTRADE	-0.05381	0.021296	-2.526988	0.0144
LNMOBNET	0.000469	0.017327	0.027042	0.9785
LNMOBPEN	0.047178	0.015608	3.022726	0.0038
R-squared	0.984309	F-statistic		585.5029
Adjusted R-squared	0.982628	Prob(F-statistic)		0

Source: Authors computation using E-views 9.0

Estimated using Least square method

Table 8 above is the long run model,. The error correction term is generated via this process.

The coefficient of LNGDP lag is positive and significant which agrees with a prior expectation and economic theory which says economic growth from one year has an impact on economic growth for the next year. LNGDP has a coefficient of 0.434 which is statistically significant with a probability of 0.

The variable LNGOV is also positive and significant implying that government spending has a positively impact on GDP per capita. The significant coefficient

of government spending as a ratio of GDP, implies that a 10% increase in Government spending will lead to 0.7 percent annual growth rate of GDP per capita.

The coefficients of LNINV and LNTRADE, -0.115 and -0.05 respectively, are both negative and significant which is contrary to a prior expectation. A look at the individual observations of the variables showed that as real GDP per capita grew the ratio of investment to GDP fell and ratio of trade to GDP fell as well.

LNMOBNET has a coefficient of 0.000469 which is not statistically significant at 5% level of significant. This means that mobile internet penetration doesn't have a significant contribution to GDP per capita.

The coefficient of the variable LNMOBPEN (0.05) suggest that, for a given level of mobile penetration, a 10% increase in mobile penetration would increase annual growth rate of GDP per capita by an additional 0.5% point.

The model has a nice fit as the R-square is 0.98, which implies that 98% percentage of the variations in LNGDP is explained by the independent variables.

4.4. Short run dynamics

The coefficient of the ECT must be negative. It is the speed of adjustment of the system, the speed at which the system can get back to long run equilibrium.

Table 4.4.1 : Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.005443	0.005984	0.909661	0.3689
D(LNGDP(-1))	0.484504	0.3078	1.574088	0.124
D(LNGOV(-1))	-0.018452	0.054305	-0.339784	0.7359
D(LNINV(-1))	0.032927	0.072414	0.454709	0.652
D(LNTRADE(-1))	0.007143	0.03751	0.190428	0.85
D(LNMOBNET(-1))	-0.026224	0.049387	-0.530981	0.5986
D(LNMOBPEN(-1))	-0.00416	0.048425	-0.085901	0.932
D(LNGDP(-2))	0.132978	0.162803	0.816802	0.4193
D(LNGOV(-2))	-0.016341	0.047504	-0.344003	0.7328
D(LNINV(-2))	0.029484	0.059098	0.498898	0.6208
D(LNTRADE(-2))	0.007356	0.037406	0.196653	0.8452
D(LNMOBNET(-2))	-0.030055	0.022072	-1.361715	0.1815

D(LNGDP(-3))	0.132978	0.162803	0.816802	0.4193
D(LNGOV(-3))	-0.016341	0.047504	-0.344003	0.7328
D(LNINV(-3))	0.029484	0.059098	0.498898	0.6208
D(LNTRADE(-3))	0.007356	0.037406	0.196653	0.8452
D(LNMOBNET(-3))	-0.030055	0.022072	-1.361715	0.1815
D(LNGDP(-4))	0.531142	0.162803	3.262482	0.0024
D(LNGOV(-4))	-0.198957	0.047504	-4.18823	0.0002
D(LNINV(-4))	0.042803	0.059098	0.724274	0.4735
D(LNTRADE(-4))	0.167724	0.037406	4.483849	0.0001
D(LNMOBNET(-4))	0.035972	0.022072	1.629804	0.1116
ECT(-1)	-0.706775	0.368675	-1.917068	0.063

R-squared	0.625626	Durbin-Watson stat	2.039204
Adjusted R-squared	0.403025	F-statistic	2.810529
		Prob(F-statistic)	0.002686

Source: Authors computation using E-views 9.0

Estimated using least square method

In the ECM the system is getting adjusted at the speed of 71% towards long run equilibrium. Which also implies that about 71% departure from long run equilibrium are corrected each period. The probability of on the Error correction term (ect) is 0.063 which is slightly greater than 5% level of significant, the model is significant at 10% level of significant. Therefore, the ect results, although suggestive of an association, did not achieve statistical significance (P = 0.06).

The R-squared coefficient (0.62) implies that the fit of the model is good i.e. 62% of the variations in LNGDP is explained by the variations in the explanatory variables. The probability of the F-statistics (0.0026) confirms the statistical significance of the regression line at 5 per cent significance level. The R-squared was also found to be less than the Durbin Watson statistics to further confirm that there is no evidence of a spurious regression.

4.5. Model diagnostics result

Table 4.5.1: Residual Diagnostics results

Residual test	F-Statistic	Prob.
Serial Correlation F(2,35)	0.102872	0.9025
Heteroskedasticity F(22,37)	1.356046	0.2021

The null hypothesis of the Breusch-Godfrey serial correlation LM test is of 'no serial correlation'. The test rejects the null hypothesis of no serial correlation as the value of F-statistics is 0.102 and p-value of 0.9025, meanings the LM test

indicate that the residuals are not serially correlated.

For the Breusch-Godfrey heteroskedasticity LM test the null hypothesis is that the errors are homoskedasticity, while the alternative is the errors are heteroskedasticity. The F-statistics (1.356) at a probability of 0.202 which is greater than threshold ($p<0.05$), therefore we reject the null hypothesis which means the errors of the model are heteroskedastic.

4.6. Stability test

Figure 6: CUSUM Result

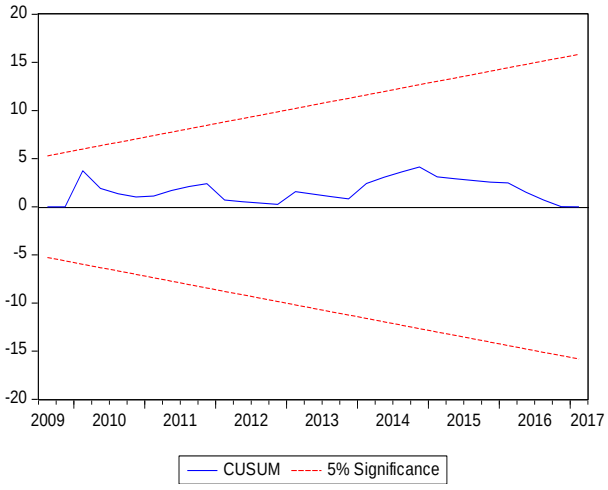
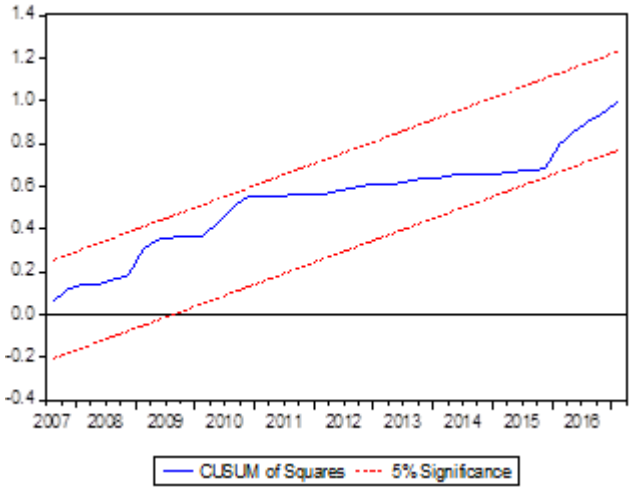


Figure7:CUSUMSQres



The plot of the CUSUM and CUSUMSQ in figure 4.2 and 4.3 respectively lies between the critical bounds at 5 per cent significance level. This implies that we cannot reject the null hypothesis and affirm that the model coefficients are stable over the sample time frame. Thus, the model parameters do not suffer from any structural instability.

5. CONCLUSION AND RECOMMENDATIONS

The study found positive impact of mobile telephony on economic growth of Nigeria so the study concludes that mobile telephony can aid sustainable economic development when used appropriately, with the full participation of all stakeholders, especially in a country like Nigeria. The intrinsic value of telecommunications lies not in easing communications and information, but in enabling growth and development.

Better Telecom regulations will foster growth in the mobile phone industry which the study has found to have a positive impact on economic growth. Consumer protection policies that protect consumers from unfair calls and mobile data charges will ensure consumer get the value for their money which will lead to consumption and investment in the industry. Mobile services providers as well have to be protected from damage to facilities angry communities, bandits etc., also laws that protect intellectual properties would be hugely beneficial to software developers, Apps developers and everybody that provides intellectual content in the mobile telephony ecosystem.

DISCLOSURE OF CONFLICT

The authors declare that they have no conflicts of interest.

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FOCUS ON RESEARCH IN CONTEMPORARY ECONOMICS

RELATIONSHIP BETWEEN FINANCIAL INCLUSION AND ECONOMIC GROWTH: EVIDENCE FROM ARDL MODELING

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FOCUS ON RESEARCH IN CONTEMPORARY ECONOMICS

Submission date: 14.09.2022 | Acceptance date: 07.02.2023 RESEARCH ARTICLE

RELATIONSHIP BETWEEN FINANCIAL INCLUSION AND ECONOMIC GROWTH: EVIDENCE FROM ARDL MODELING

Ibrahim Musa*, Sule Magaji, & Ali Salisu

ABSTRACT This study examines the impact of financial inclusion on economic growth in Nigeria from 1986 to 2020. The statistical properties of data were tested using Zivot-Andrew unit root test. The Zivot Andrew unit root test indicates that gross domestic product, commercial bank branches and mobile phone-based transactions are stationary at first difference while Automated Teller Machines and foreign direct investment are stationary at level. Bound test for long run shows that there is a long run relationship among the variables of interest. The Auto regressive Distributive Lag (ARDL) result indicates that in the short run, commercial bank branches have positive and statistically significant impact on gross domestic product in Nigeria. Automated Teller Machine has negative but statistically insignificant impact on gross domestic product in Nigeria. The long run coefficient shows that commercial bank branch has positive and statistically significant impact on gross domestic product in Nigeria. Automated Teller Machine has positive and statistically significant impact on gross domestic product in Nigeria. Mobile phone-based transaction has positive and statistically significant impact on gross domestic product in Nigeria. Foreign direct investment has positive and statistically significant impact on gross domestic product in Nigeria. The error correction term (ECT) meets all the theoretical and statistical requirements both in the sign and size. The ECT coefficient is -0.522626and significance at 5%. This indicates that at 52.26% of the disequilibrium due to the shock in the previous years is adjusted back to the long run equilibrium in the current year. The Granger causality test shows that commercial bank branches, automated teller machine domestic depositors' money in banks and foreign direct investment granger causes gross domestic product while mobile phone-based transactions do not granger cause gross domestic product. The study recommend that Central Bank of Nigeria should compel commercial banks to add the number of Automated Teller Machine in each branch and ensure constant service delivery service of the machines for customer to have access to their funds.

KEYWORDS: *Financial inclusions, FDI, economic growth, ARDL.*

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1. INTRODUCTION

Financial inclusion becomes so important at both global and national level by both government and non-governmental institutions such as World Bank group of G20, International Monetary Fund (IMF), Alliance for financial Inclusion (AFI) and Consultative Group to Assist the Poor (CGAP) came up with many policies and initiative to reduce financial exclusion throughout the world. These organizations together with governments of many countries are committed to advancing financial services to the people who do not have access to financial services. The World Bank Group offers a comprehensive set of instruments (financing, policy, advice, data and technical assistance) to more than 100 emerging and developing countries to increase their access to financial services. Today, all the countries work on financial inclusion and setting it as a priority goal. Given the increased awareness of the contribution of financial sector development to poverty reduction and economic growth, financial inclusion has been placed high on the national agendas of many developing countries, including Asia and Africa (Demirgue- kunt, Hu & Klapper, 2019).

There is a consensus about the importance of financial inclusion on development, particularly as a tool to improve poor household lives and speed economic activity. That is why global and national level policy makers have included financial inclusion in their development priorities (World Bank 2012, Alliance for Financial Inclusion 2011). Generally, poor lives and works in informal economy and is excluded from wage-earning employment opportunities. Financial inclusion has assumed a greater level of importance among policy makers and researchers across the globe. This is as a result of its efficient role as a driver of economy, and also, the promise it holds as a tool for economic development, particularly in the area of wealth creation, employment generation, poverty reduction, improving welfare and general standard of living (Charles-Anyaogu, 2020). Financial inclusion ranked the seventh in the sustainable development goals. Financial inclusion got importance throughout the world due to its substantial impacts on growth, entrepreneurship, employment, income inequality and poverty alleviation (Dixit & Ghosh, 2013). Financial inclusion has positive impacts on individuals level of income and thereby, economy as whole. Enhancing financial inclusion modernizes the agriculture, promotes innovation, surges entrepreneurship and increases growth (Kelkar, 2010 and Igwe, Magaji & Darma, 2021).

The centre for financial inclusion publication (2015) describes full financial

inclusion as a state in which all people who can use financial services have access to a full suite of quality services, provided at affordable prices, in a convenient manner, and with dignity for the clients.Financial inclusion or access to finance is the ability to access appropriate financial products and services. However, it is the benchmark used to access how financial services reach to common people in the economy. The World Bank (2016) stated that financial inclusion and access to finance are different principles. However, failure to use financial services does not necessarily mean a lack of access. Many people may have access to financial services at a reasonable price, but choose not to use them for religious and other purposes. Financial institution provides customer-friendly services at an affordable price, is cost-effective or economically rational, and considers real consumer access to financial services to be timely (Demirguc-Kunt, Klapper, Singer, Ansar, & Hess, 2018).

The main objective of the paper is to investigate the relationship between financial inclusion and economic growth in Nigeria. The specific objectives are to assess the impact of commercial bank branches on economic growth in Nigeria and to examine the response of automated teller machine on economic growth in Nigeria.The rest of the paper is organised as follows: literature review which is the second part of the paper, methodology in which the objectives of the paper could be achieved and is the third part of the paper, part four of the paper is presentation and analysis of the empirical findings and the final section concludes the paper.

2. EMPIRICAL LITERATURE

Ngoma (2019) examines the determinants of financial inclusion in Zimbabwe using a binary logit model and employed the followings variables which includes account ownership, saving, borrowings, mobile money account, income, workforce, education, and gender. This study established that individual characteristics: age, income, gender, education and employment status were the determinants of financial inclusion in Zimbabwe. In addition, this study established that trust in financial institutions was the major reason why the majority remained unbanked.

Elsayed & Elatroush (2019) investigate the main determents that may affect financial inclusion in sample of 21 middle–income countries using cross

sectional data, variables used in the study includes Financial institution account, ATMs, commercial bank branches, borrowings from financial institutions, borrowings to start or operate a business, percentage of savings within financial institutions, savings for education, savings to start, and finally operate or expand a business. The study employed Two stages least squares and principal component techniques. The mojor problem with the paper is inability to show and present the major findings of the study.

Dandibi, Wurim, & Umaru (2019) examine the impact of financial inclusion and financial literacy on the performance of agro-based SMEs in Yobe State, Nigeria using cross sectional data and administering 315 questionnaire. The study used financial literacy, availability, accessibility, affordability and usability and employed Ordinary least square model (OLS). The result revealed that availability, accessibility, affordability and usability of financial services all have significant effect on the performance of agro-based SMEs in Yobe State. Also, financial literacy fully mediated the relationship between the availability of financial services and the performance of agro-based SMEs in Yobe State while partially mediating the relationship between accessibility and affordability of financial services and performance.

Anthony-Orji, Orji, Ogbuabor, & Onoh (2019) investigate the impact of monetary policy shocks on financial inclusion in Nigeria using the Vector Autoregression Model (VAR). Financial inclusion, interest rate, money supply, and deposit rates of bank deposit are the variables in the model. Findings of the study reveal that shocks to minimum rediscount rate, interest rate, broad money supply and deposit rates of deposit banks all have significant impact on financial inclusion in Nigeria. The study recommends that there is need to adopt effective monetary policy measures that will increase financial inclusion in the country.

Ong'eta (2019) establishes the determinants of financial inclusion. The paper established that factors that determine financial inclusion are both demand related factors and supply related factors. The demand related factors include; income of individuals or households, education, collateral, being in employment guarantee scheme, income inequality, age, financial literacy, savings and gender. The supply related factors that determine financial inclusion includes; high interest rates (affordable credit), innovation (agent banking and mobile banking), ICT, bank branches, sensitization of financial products. No methodology, variables are not shown, and the data used in the analysis.

Bouzkurt, Karakus & Yildiz (2018) investigate the factors generating changes in the financial inclusion levels based on data from 120 countries from 2011 to 2014 (panel data). The study adopted OLS and spatial regression analysis and used the followings variables in the analysis. The results show that social, banking and political factors play an important role in the determination of change in financial inclusion. The study also finds that financial inclusion convergence among the countries.

Tambunlertchai (2018) examines the factors that determine access to formal savings products and to looks at what the barriers to saving are. Administering 5100 questionnaires in Myanmar. Variables employed in the analysis includes age square, gender, marital status, own money, mthlyinc, primedu, lowsecedu, hisecedu, higher edu, infconsumer, fent and infent. The study employed logit model and found that a low level of saving in Myanmar, and that formal savings increase with income, education, and keeping a budget, among other factors.

Nwafor & Yomi (2018) investigate the determinants of financial inclusion in Nigeria using time series data and adopted Two-staged Least Squares Regression Method and includes the following variables in the model GDP, Financial Deepening Index expressed as Broad Money Supply to GDP, Financial Deepening Index expressed as Bank Credit to GDP, Commercial Banks Deposit From Rural Areas, Commercial Bank Loans to Rural Areas, Commercial Bank Loan to Deposit Ratio and Commercial Bank Loan to Small and Medium Scale Enterprises. Findings revealed that financial inclusion have significant impact on economic growth in Nigeria and that financial industry intermediation have not influenced financial inclusion within the period under review. It was recommended that Nigerian banks should develop financial products to reach the financially excluded regions of the country as this will increase GDP per capital of Nigeria and consequently economic growth.

Brownbridge, Bwire, Rubatsimbira & Grace (2017) assess the strength of the impulse response of inflation to the monetary policy variable using consumer price index (CPI), nominal exchange rate, nominal gross domestic product (GDP) and the policy interest rate as variables in the analysis. The study employed panel vector error correction (PVEC) methodology and panel vector auto-regressions (PVARs). The results suggest that economies with higher

levels of financial inclusion exhibit stronger impulse responses, although this does not necessarily imply that higher levels of financial inclusion are the cause of stronger monetary transmission mechanisms as the degree of financial inclusion may be correlated with other aspects of development which also affect the monetary transmission mechanism.

Abdullahi & Fakunmoju (2017) examines the effect of financial inclusion on SMEs contribution to sustainable economic growth between 1970 and 2015 in Nigeria using time series data and used the following variables in the model. The study employed Ordinary least square model (OLS) and revealed that financial inclusions have positive effect but do not significantly affect sustainable economic growth at 5%. It was recommended that sustainable growth and development can be achieved in Nigeria if SMEs operators have access to loans facilities.

Okoye, Erin & Modebe (2017), in their study; financial inclusion as a strategy for enhanced economic growth and development investigated the outcome of financial inclusion on economic growth and development in Nigeria over the period 1986 to 2015 using the Ordinary Least Squares technique. They measured financial inclusion in the study using loan to deposit ratio, financial deepening indicators, loan to rural areas, and branch network. Measures of financial deepening adopted in the study are ratios of private sector credit to GDP and broad money supply to GDP. Economic growth was proxied by the researchers as growth in GDP over successive periods while per capita income was adopted as a measure of poverty, hence an index of development. The study showed that credit delivery to the private sector has not significantly supported economic growth in Nigeria and that financial inclusion has promoted poverty alleviation in Nigeria through rural credit delivery. The study recommended that the monetary authorities should deepen financial inclusion efforts through enhanced credit delivery to the private sector as well as strengthen the regulatory framework in order to ensure efficient and effective resource allocation and utilization.

Tuesta, Sorensen, Haring & Cámara (2015) analyses the three dimensions determinant of financial inclusion in the case of Argentina, from a micro-economic perspective that is cross sectional data. The study employed level of education, income, credit card, debit card, e- payments, and formal credit

as variables and adopted probit model. The study found that level of education, income and age are all significant variables which determine whether they have financial products such as accounts, credit and debit cards, formal credit and electronic payments.

3. METHODOLOGY

The paper examines the relationship between financial inclusions and economic growth in Nigeria from 1986 to 2020. The models shall assume a linear relationship between the dependent and independent variables.

GDP =F (CBBA, ATMAD, MBPT, FDI)…… (3.1)

Where;

GDP= Gross domestic product

CBBA = Branches of commercial banks per 100,000 adults ATMAD = Automated Teller Machine per 100,000 adults MBPT = mobile phone-based transactions

FDI =Foreign direct investment

Where

Economic growth refers to sustained rise in the value of economic activities within a country over a period of time. The Gross Domestic Product (GDP) often comes in handy in measuring the aggregate worth of an economy.Commercial banks branch per 100,000 adults, (CBBA),Automated Teller Machines per 100,000 adults (ATAMAD), mobile phone-based transactions (MBPT). Foreign direct investment is measured as percentage to GDP.

3.1. Auto Regressive Distributed Lag (ARDL) Model

For the purpose of achieving the objectives of the paper, the study employed Auto Regressive Distributed Lag (ARDL) Model. When variables are found to be stationary at different order of cointegration then the suitable test for such model is ARDL(Asteriou& Hall, 2007). However, one must test for both cointegration and stability to ensure long-run relationship among the variables and that the data-generation process conforms with the model, respectively(Asteriou& Hall,

2007). If the variables are cointegrated then there is the need to test for Error correction model (ECM) which shows how much of the disequilibrium is being corrected over a period; what is called 'adjustment effect' (Asteriou& Hall, 2007).Error correction model (ECM) possesses advantages of resolving the problem of spurious regression because it eliminates trend in the variables involved; and that the disequilibrium error term is stationary variable, which is prevented from exploding over time (Asteriou& Hall, 2007). The general autoregressive distributed lag (ARDL) ECM is presented in equation

Δ = + ∑ −1 − ˆ 1 εt……... (3.2)

Where Δ is the difference operator, is a vector of dependent variable, xt-1is the matrix of lag values of explanatory variables and is the adjustment effect or error correction coefficient which is expected to be negative for the error to be corrected. Specifically, the ECM model to be tested is specified in equation.

Δ = + ∑ 1 − 0
∑ Δ − ∑ + ∑ Δ − + ∑ Δ − − ˆ −1 + ε ……

(3.3)

If = 1 then 100% of the adjustment takes place within single period (instantaneous/full adjustment). If = 0 then there is no adjustment. Thus, any other value is interpreted accordingly; a value of closer to 1 implies quick adjustment, and value closer to 0 implies slow adjustment.

The null and alternative hypotheses for bound test concerning the test for cointegration are:

Ho: = =ϒ1= = = = 0 (No long run relationship).

H1: ≠ ≠ϒ1≠ ≠ ≠ ≠ 0 (there is long run relationship).

Decision rule: If F-statistics is greater than any of the critical values of all bounds, reject the null hypothesis otherwise to accept the alternative hypothesis.

4. EMPIRICAL RESEARCH

4.1. Descriptive statistics

Table 4.1 Descriptive statistics

Statistics	LGDP	LCBBA	LATMAD	LMBPT	LFDI
Mean	11.26185	0.676333	0.997125	6.756218	0.135649
Median	11.44032	0.660865	1.039505	7.606334	0.190924
Std. Dev.	0.404913	0.078972	0.306628	1.659323	0.251365
Skewness	-0.419827	0.365971	-2.653391	-0.692907	0.271054
Kurtosis	1.579152	2.177051	9.865000	1.748700	2.753195
Jarque-Bera	3.064304	1.364607	84.70143	3.922010	0.399144
Probability	0.216070	0.505451	0.000000	0.140717	0.819081
Observations	34	34	34	34	34

Source: Researcher computation using E-views 10.

Table 4.1 shows the result of descriptive statistics of the study, it indicates that the standard deviations of the variables employed are far away from their means. The Skewness of the distribution shows negative values of gross domestic product, Automated Teller Machines per 100,000 adults and mobile phone-based transactions, this indicates that gross domestic product and Automated Teller Machines per 100,000 adults are skewed to the left and are normally distributed except for mobile phone-based transactions because it is greater than zero. Commercial bank branches per 100,000 adults and foreign direct investment shows positive values but less than one, it implies that, these variables are skewed to the right and are normally distributed. The Kurtosis in the table shows that all the variables employed are normally distributed except for Automated Teller Machines per 100,000 adults because is greater than 3. The Jarque-Bera test for normality is also estimated. It indicates that all the variables employed are normally distributed as their p-values are greater than 5% except for Automated Teller Machines per 100,000 adults.

4.2. Zivot and Andrew Unit Root Test

The study employed Zivot and Andrew unit root test in order to identify the order of integration among the variables employed, because ignoring unit root test with break may lead the acceptance of null hypothesis where is supposed to be rejected.

Table 4.2 Zivot-Andrew Unit Root Test

	Level		First difference	
Variables	Statistics	Break point	Statistics	Break point
LGDP	-3.399245	2015	-6.282190**	1994

LCBBA	-4.458530	1993	-5.702734**	1994
LATMAD	-5.621703**	2009		
LMBPT	-3.900394	2012	-6.353647**	2005
LFDI	-5.049258**	2010		

Source: Researcher computation using E-views 10.Asterics** indicates stationary at 5% level of significance.

Table 4.2 shows Zivot-Andrew unit root test, the test indicates that gross domestic product, Commercial bank branches per 100,000 adults, and mobile phone-based transactionsare stationary at first difference that is I (1) process, the break dates are 1994, 1994 and 2005 respectively. Automated Teller Machines per 100,000 adults and foreign direct investment are stationary at level that is I (0) process, the break dates are 2009 and 2010 respectively. Therefore, evidence from Zivot-Andrew unit root test shows mixture of order of integration among the variables employed.

4.3. Round Test for long run

The test is conducted in order to ensure the existence of long run association among the variables employed.

Table 4.3 Result of Cointegration Bounds test

Statistics	Value		Critical bounds			
F-statistics	14.63319**		1%	2.5%	5%	10%
		I(0) Bound	3.06	2.7	2.39	2.08
		I (1) Bound	4.15	3.73	3.38	3

Researcher computation using E-views 10.

From table 4.3, the result of co-integration bound test indicates a higher value of F-statistics than any of the critical values of all bounds 14.63319. Therefore, there is a strong evidence of cointegration in the model. This provides evidence of adopting Autoregressive Distributed Lag (ARDL) model in the study.

4.4. Results of Autoregressive Distributed Lag (ARDL) Model

As a result of unit root tests and bounds test conducted in the study which suggests the use of ARDL model. The appropriate model (number of lags) is selected automatically using Akaike Information Criterion (AIC) which is seen as more robust model. Below, both short run and long run parameters of the model are presented.

4.4.1. Short run relationship

Below the result of short run parameters of the ARDL model is presented. AIC suggests a (1, 1, 1, 0, 0) model after testing for up to 486 different models.

Table 4.4 Short run parameters of the ARDL model

Variables	Coefficient	Std. Error	t-Statistic	Prob.
D(LCBBA)	0.593560	0.145941	4.067131	0.0009
D(LATMAD)	-0.086206	0.021677	-3.976884	0.0011
R-squared	0.995865			
Adjusted R-squared	0.993539			
S.E. of regression	0.030946			
Sum squared resid	0.015323			
Log likelihood	59.78224			
F-statistic	428.1552			
Prob(F-statistic)	0.000000			
Durbin-Watson stat	2.153691			

Source: Researcher computation using E-views 10

The result from table 4.4 indicates positive and statistically significant impact of Commercial bank branches on gross domestic product in Nigeria in the short run, the positive finding is in line with economic appriori expectation which assumed a positive relationship between Commercial bank branches and gross domestic product. Furthermore,Automated Teller Machines shows negative but statistically insignificant impact on gross domestic product in Nigeria in the short run, the negative finding is contrary to economic appriori expectation which assumed a positive relationship between Automated Teller Machines and gross domestic product. The R-squared and its adjusted value are very high 0.995865, this implies that 99% change in gross domestic product is explained by Commercial bank branches, Automated Teller Machines, mobile

phone-based transactions and foreign direct investment in Nigeria. The p- value of f-statistics indicates (0.000000), this means that Commercial bank branches, Automated Teller Machines, mobile phone-based transactions and foreign direct investment have 100% significance influence on the gross domestic product in Nigeria.

4.4.2. Long run and error correction result

As a result of bound test, which confirm the existence of long run relationship among the variables of employed.

Table 4.5 ARDL Long run form Results and ECM

Variables	Coefficient	Std. Error	t-Statistic	Prob.
LCBBA	0.593453	0.311005	5.123558	0.0001
LATMAD	0.369419	0.085381	4.326694	0.0005
LMBPT	0.113133	0.024311	4.653564	0.0003
LFDI	0.148589	0.105302	1.411073	0.1774
CointEq(-1)*	-0.522626	0.044037	-11.86779	0.0000

Source: Researcher computation using E-views 10

The result from table 4.5 indicates that commercial bank branches has positive and statistically significant impact on gross domestic product in Nigeria in the long run, this means that one unit increase in commercial bank branches in Nigeria will cause 0.59% increase in gross domestic product. The positive finding is in line with economic appriori expectation which assumed a positive relationship between commercial bank branches and gross domestic product. Automated Teller Machines shows positive and statistically significant impact on gross domestic product in Nigeria in the long run, this implies that one unit increase in Automated Teller Machines in Nigeria will bring about 0.36% increase in gross domestic product. Furthermore, mobile phone- based transactions shows positive and statistically significant impact on gross domestic product in Nigeria in the long run, the positive finding is similar with economic appriori expectation which assumed a positive relationship between mobile phone-based transactions and gross domestic product. This means that one unit increase in mobile phone-based transactions will cause 0.11% increase in gross domestic product in Nigeria. Foreign direct investment indicates positive and statistically significant impact on gross domestic product in Nigeria in the long run, this means that one unit increase in foreign direct investment will cause 0.14% increase in gross domestic product in Nigeria.

The error correction term (ECT) meets all the theoretical and statistical requirements both in the sign and size. The ECT coefficient is -0.522626and significance at 5%. This indicates that at 52.26% of the disequilibrium due to the shock in the previous years is adjusted back to the long run equilibrium in the current year.

4.4.3. Post estimation tests

Table 4.6 Post estimation tests

Tests	P-value
Serial correlation	0.4556
Heteroscedastics	0.1647
Normality	0.8710
Ramsey test	0.0315

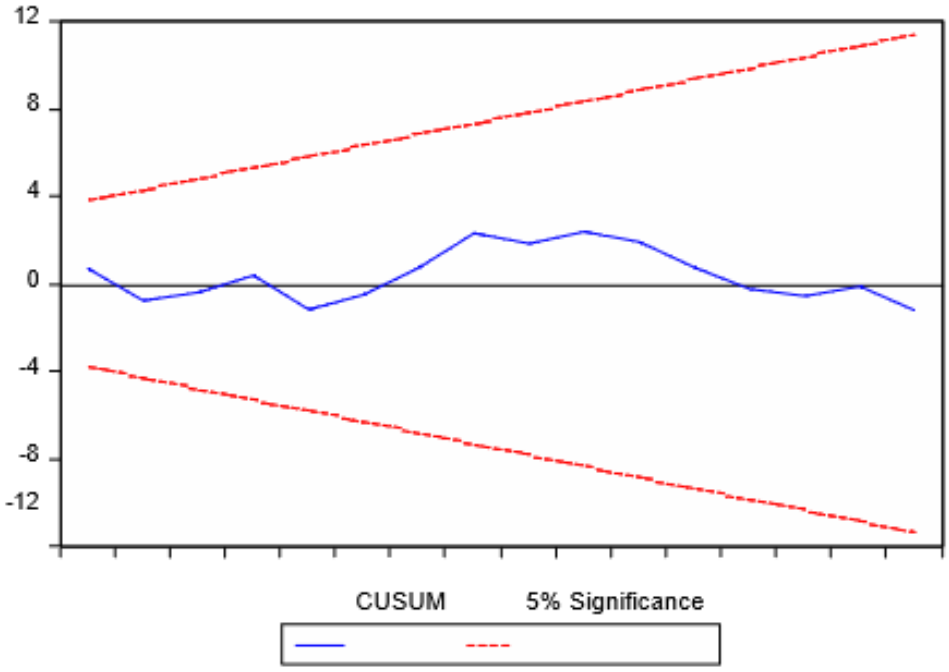
Source: Researcher computation using E-views 10.

The model passed all post estimation test such as serial correlation, Heteroscedasticity, and normality test except for Ramsey reset test, as their probability values are greater than 5%. We can conclude that the model is robust.

4.4.4. Stability

Stability test of the model is employed in order to ensure the data generating process is compatible with the estimated coefficient of the model.

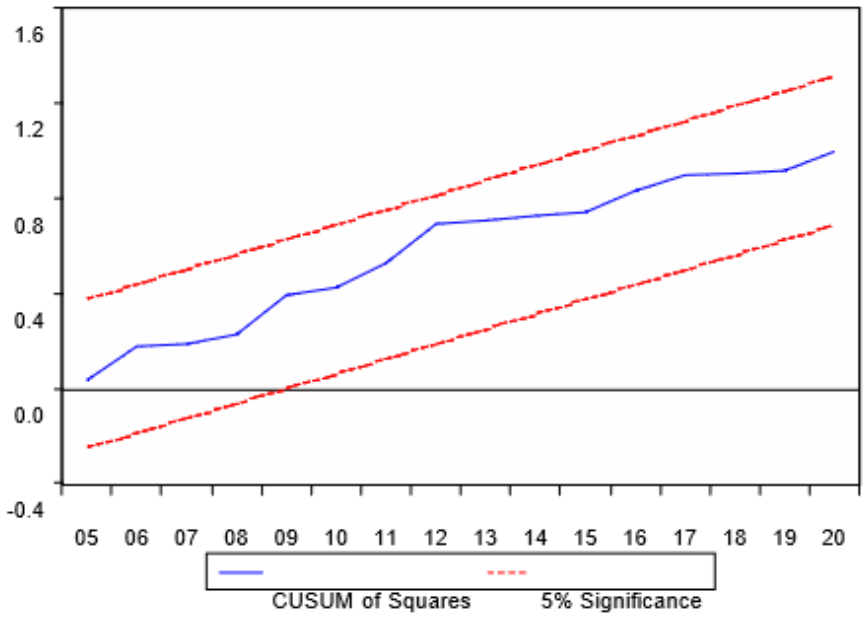
Figure 4.1 CUSUM PlotRecursive Residuals of ARDL model.



Source: Researcher computation using E-views 10.

From Figure 4.1, the CUSUM plot is within 5% level of significant, this means that the model is stable. This shows that there is no chance of having spurious regression.

Figure 4.2 CUSUM SQUARE Plot Recursive Residuals of ARDL model.



Source: Researcher computation using E-views 10.

From Figure 4.2, the Cumulative sum square plot is within 5% level of significant, this means that the model is stable. This shows that there is no chance of having spurious regression.

5. CONCLUSION AND RECOMMENDATIONS

The paper investigates the relationship between financial inclusions and economic growth in Nigeria using quartly data from 1986 to 2020. The Auto Regressive Distributive lag (ARDL) model has been used in the analysis. The short run result shows that, the short run result indicates that a commercial bank branch has positive and statistically significant impact on gross domestic product in Nigeria. Automated Teller Machine has negative but statistically insignificant impact on gross domestic product in Nigeria. Moreover, the long run result shows that commercial bank branch has positive and statistically significant impact on gross domestic product in Nigeria. Automated Teller Machine has positive and statistically significant impact on gross domestic product in Nigeria. Domestic depositors' money in banks has positive and statistically significant impact on gross domestic product in Nigeria. Mobile phone-based transaction has positive and statistically significant impact on gross domestic product in Nigeria. Foreign direct investment has positive and statistically significant impact on gross domestic product in Nigeria. The error correction term (ECT) meets all the theoretical and statistical requirements both in the sign and size. The ECT coefficient is -0.522626and significance at 5%. This indicates that at 52.26% of the disequilibrium due to the shock in the previous years is adjusted back to the long run equilibrium in the current year. The article recommends that Central Bank of Nigeria should compel commercial banks to add the number of Automated Teller Machine in each branch and ensure constant service delivery service of the machines for customer to have access to their funds. More and improved financial services should be made available to rural dwellers and the economy in general to help them participate and contribute more to national productivity.

LIST OF ABBREVIATIONS

1. ARDL - Auto Regressive Distributive Lag
2. ATM - Automated Teller Machine
3. FDI - Foreign Direct Investment
4. ECT - Error Correction Term

5. CBN - Central Bank of Nigeria
6. WBG - World Bank Group
7. IMF - International Monitory Fund
8. AFI - Alliance for Financial Inclusion
9. CGAP - Consultative Group to Assist the Poor
10. SME - Small and Medium Enterprise
11. GDP - Gross Domestic Product
12. CBBA - Branches of Commercial Banks per 100,000 adults
13. ATMAD - Automated Teller Machine per 100,000 adults
14. MBPT - Mobile Phone Based Transaction
15. LGDP - Laged Gross Domestic Product
16. LCBBA - Laged Branches of Banks per 100,000 adults
17. LATMAD - Laged Automated Teller Machine per 100,000 adults
18. LMBPT - Laged Mobile Phone Based Transaction
19. LFDI - Laged Foreign Direct Investment

TABLES

FIGURES

DISCLOSURE OF CONFLICT

The authors declare that they have no conflicts of interest.

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FOREIGN EXCHANGE RATE AND INFLATION IN ZIMBABWE: 2009 – 2019

Tariro Chivige*, Johannes P S Sheefeni

ABSTRACT

The loss of an independent monetary policy in Zimbabwe brought about by the introduction of a multicurrency system in 2009 deprived the country of monetary and exchange rate instruments. This meant that the country could not react to asymmetric shocks as well as fluctuations in the business cycle not in line with the anchor. Using the Autoregressive Distributed Lag (ARDL) model of estimation, this study analysed the relationship and effects of foreign exchange rate on local inflation rate. The period of study was broken down into two parts, the first being from 2009:02 up until 2014:11 before the introduction of the fiat currency while the second was from 2014:12 up until 2019:02 when the fiat currency was at par with the USD. Overall, exchange rates influenced the inflation rate more during the period that Zimbabwe was solely using a foreign multicurrency economy as compared to the period when it had introduced its pseudo currency in the currency basket.

KEYWORDS: *Exchange rate, Inflation rate, Multicurrency*

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1. INTRODUCTION

When the Zimbabwean government introduced the multicurrency system in 2009, it meant that the country extinguished all the rights it had in determining its exchange rate as it did not have its own local currency within the currency basket (Matanda, et al., 2018). The loss of an independent monetary policy deprived the country of monetary and exchange rate instruments to react to asymmetric shocks as well as fluctuations in the business cycle not in line with the anchor country (Kavila and Le Roux, (2016). Multiple currencies were now accepted as legal tender in Zimbabwe though the use of the United States Dollar (USD) and the South African Rand (ZAR) was higher compared to all the other currencies (Pindiriri 2012).

By using multiple currencies in Zimbabwe, the country's economy could easily be affected by the changes in the purchasing power of the other currencies it considered as legal tender. The appreciation or depreciation of such currencies would easily reflect on the local prices that were in the market during such periods (Matanda, et al., 2018). The issue of trade also brings into light the effects of the appreciation or depreciation of foreign currencies had on the local prices in the economy (Munyawiri, 2014). Zimbabwe, being a small open economy was prone to both the appreciation and or depreciation effects of the currencies of those countries that it traded with, be it in exports or imports. These exchange rates of the foreign currencies had a huge bearing on the steadiness of the Zimbabwean economy as these economies had a huge bearing on the price levels mainly via imported inflation (Pasara and Garidzirai, 2020).

When a large fraction of a country's trade is denominated in foreign currencies as was the case in Zimbabwe, its rate of inflation is more strongly affected by exchange-rate fluctuations (Whitten, 2016). These fluctuations can affect domestic inflation rates indirectly via the exchange rate pass through effect and the indirect effect of currency fluctuations dwarfs the direct effect because of the huge influence it exerts on the economy in both the near term and long term. The pass through of the exchange rates was therefore expected to be high as Zimbabwe is an import dependent country (Matanda, et al., 2018).

Statistics from ZIMTRADE (2021) have shown that South Africa, Zambia, Mozambique, China are among the countries that Zimbabwe mostly traded with during the period under review. This was established while assessing to

establish countries that are found in both the top ten of Zimbabwe's imports and exports. In the last decade, in terms of the direction of trade flows, the EU which used to be the top traditional trading partner of Zimbabwe for both imports and exports accounting for two thirds of total trade, during the pre-dollarisation era, has since been overtaken by South Africa and China. South Africa is now Zimbabwe's largest trading partner. China has also increasingly become a significant trading partner of Zimbabwe in recent years (CZI, 2020).

The introduction of the multicurrency system, to a greater extent improved the country's trading patterns, both for personal consumption, production, and retail purposes. (Chanakira, 2019). With most of the general populace now earning in mainly USD, this meant that even individuals could now easily import goods for their own personal use (Nkomazana, 2014). This was mainly because during this period, the country was a rather importing country with not much production going on, hence most people ended up opting to import goods from neighboring countries, South Africa, Botswana, Mozambique, and Zambia. The same could also be observed in the production sector where producers and retailers now had the purchasing power to import their raw materials and merchandise and this, to a certain extent also improved the country's exports. Countries like China were also seen to contribute a lot in the amounts of imports that were recorded in the country with imports from China to Zimbabwe totaling USD3 926 204 000.00 between 2009 and 2019. Increases in the country's exports were also recorded during this period (ZIMTRADE, 2020).

The situation of increased spending and importation can be linked to Keynes theory of consumption. With increased incomes, people have more disposable income to spend hence they increase their consumption levels (Keynes, 1936). This also has feed in effects to the industry sector were the demand for goods and service also increases due to an increase in the spending patterns in the economy. Since local industry cannot meet the local demand levels, both consumers and producers hence look at filling this gap by imports.

With Zimbabwe being an open economy as it is, it is then imperative to study how its trading patterns given the then prevailing exchange rates affected the general price levels in the country during the period under scrutiny. Such trading patterns therefore mean that fluctuations in the trading partner countries could also have a spillover effect in the general price levels in Zimbabwe. Given the tenets of the exchange rate pass through theory, it is imperative to know the

feed in effects of the changes in the exchange rates of the country's trade partners in order to analyse how much these changes affected the domestic price levels. This trading, coupled with the use of foreign currencies as legal tender, therefore had some sort of a definite effect on the general price levels in the country. It therefore becomes essential to study how the individual exchange rates of the then widely used currencies as well as those of its major trading partners affected the price levels in Zimbabwe, also given that, all the currencies of the countries included in this study were seen as legal tender.

To clearly elaborate on the issue at hand, the major goal of this paper is to then investigate the effects of the changes in the foreign exchange rates on the price level in a multicurrency economy.

2. LITERATURE REVIEW

In this section of the Chapter, an analysis of the theories that constitute the gamut of literature on the effect of changes in the foreign exchange rates on inflation is examined. An analysis of previous research conducted on the subject matter is also given.

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2.1. Theoretical Literature

There are a number of theories that endeavour to explain and to shed light on the determination of exchange rate. Some of these theories include the Purchasing Power Parity and Quantity Theory of Exchange Rate, Balance of Payment Theory, the Mundell-Fleming model and the Portfolio Balance model. Though there may be a number of theories as highlighted, this study does not seek to explore how exchange rates are determined. It rather confines its scope to the exploration of how the exchange rates may have an effect on the price levels, thus it is the Purchasing Power Parity (PPP) and the Quantity Theory of the Exchange Rate which best explain the motives of this particular study.

The traditional PPP theory put forward by Cassel (1921) states that two countries' currencies exchange rate is in equilibrium when their purchasing power is the same between the two countries. What this means is that the countries' exchange rates should be equal to the proportion of the two countries' price levels of a similar fixed basket of goods and services. This can be represented by the following equation:

$$P_a = E\,P_b \quad \text{.....(1)}$$

Where Pa represents the price of a basket in country A, Pb is the same basket's price in country B and E is the exchange rate of the two countries' currencies.

From the above equation, we therefore can deduce that the exchange rate is determined as the ratio of the two counties price ratio.

$$E = P_a / P_b \quad \text{.....(2)}$$

What this therefore implies is that when a nation's domestic price of goods and services increases (i.e., when the country is experiencing inflation), that nation's exchange rate will have to depreciate for it to return to the PPP level (Kallianiotis, 2013). The foundation of the PPP is premised on the "law of one price" which states that in the absence of transportation costs plus any added transactional costs, competitive markets will equalise the price of similar goods or service in the two countries and this occurs when the prices are stated in the same currency.

The key highlight of the PPP theory is that nominal exchange rate is bound to change when the price level change. Just as the Quantity Theory of Money states, price changes are affected by changes in the money supply in an economy (Piersanti, 2012). The same can be said about the nominal exchange rate as it exhibits that it is depended on the money supply and demand in each country as it depends on price levels. This can be explained when a country's central bank increases its money supply and causes the price levels to increase. It also causes its country's currency to depreciate as compared to other currencies.

Mankiw (1998) stressed that the Quantity Theory of Exchange rate also sometimes referred to as the Classical Theory of Exchange Rate is the monetary approach to exchange rate. This approach uses the Quantity Theory of Money and strict PPP to arrive at the theory of exchange rate. It is formulated by combining the Theory of Monetary Equilibrium and the exchange rate determination (Achieng, 2009). This theory shows the long run relationship linking money, exchange rates and prices. What this theory states is that the long run equilibrium exchange rate between two countries is determined by the relative supplies of and demands for those national money stocks. This model embodies the Quantity Theory of Money and the Purchasing Power Parity

relationships, the former linking money supplies, and demand to prices and the latter linking prices to the exchange rate, the conclusion being that the exchange rates are determined largely by relative money demands and supplies operating through the price levels especially of foreign traded goods (Kallianiotis, 2013).

To understand this Classical Theory of Exchange Rate the starting point is to understand the Quantity Theory of Money as given by the Cash Balance Approach. To explain the link between PPP and the Quantity Theory of money, the monetary approach to the Exchange rate makes certain assumptions as follows:

- In the long run prices are perfectly flexible though however output can still vary.
- Following the Cambridge approach to the QTM, real money balances depend only on Y i.e.

$$M^d = PkY \quad \ldots\ldots(3)$$

M^d being the demand for money, Y is the income, P is the price level and k is a constant.

From the above equation we can then get the real money demand equation expressed below:

$$\frac{M^d}{p} = kY \quad \ldots\ldots(4)$$

- The assumption of equilibrium therefore comes to play where it is assumed that money demand is equal to money supply : $M^d = M^s$ giving the following equation:

$$M^s = PkY \quad \ldots\ldots(5)$$

Which also gives the following equation for real money supply balances as:

$$\frac{M^s}{p} = kY \quad \ldots\ldots(6)$$

- The last assumption is that PPP always hold

Now from the above equations, looking at equation 1 assuming Pa represents domestic prices and Pb represents foreign prices, solving for the price level in each country, it will then be shown that :

$P_a = M^s{}_a / k_a Y_a$ (Domestic economy) and $P_b = M^s{}_b / k_b Y_b$ (Foreign economy)

The above expressions show that the price level P is determined by the ratio of nominal money supplied Ms to nominal money demanded (kY). Prices rise if there is “more money chasing fewer goods” (James, et al., 2012).

Now from the explanation earlier, recall that PPP shows the relationship between prices and the exchange rates equation 2. Substituting the prices using the money market equilibrium conditions enables us to get the fundamental equation of the monetary model of the exchange rates which is:

$$E = \frac{P_a}{P_b} = \frac{\left(\frac{M^S{}_a}{k_a Y_a}\right)}{\frac{M^S{}_b}{k_b Y_b}} = \left(\frac{M^S{}_a}{M^S{}_b}\right) / (k_a Y_a / k_b Y_b) \quad \text{.....(7)}$$

ow from the above equation we can see that if the domestic money supply increases, E, the exchange rate increases which as well shows a depreciation of the currency (James, et al., 2012). Also, if local Y, the income increases, E decreases which shows an appreciation of the local currency. On the other hand, if Pb increases, E will also decrease, showing an appreciation of the local currency.

2.2. Empirical Literature

It is generally common knowledge that the levels of inflation in a country usually have an impact on how the currency of that particular country behaves on the world market. When the value of a currency depreciates usually because of inflation, the effects will usually spill over and affect the strength of the currency on the world market. In a fully dollarized or multicurrency system, the system is somewhat different from the normal one. However, the effect of the exchange rates on the domestic price levels is hence assumed to be the same in almost all dollarised countries.

Dollarised economies

Phiakeo (2017) studied the effects of the exchange rate on domestic prices in dollarized economies in Southeast Asia from 2000 to 2015. The study used the dynamic panel model with fixed effects estimation. From the study's results, it was indicated that there is an indirect impact of the exchange rate pass-through in dollarized economies to domestic inflation and economic growth via the interaction term variable between exchange rate depreciation and dollarization degree. However, though the impact was indirect, changes in the exchange rates ultimately affect the inflation rates in the countries included in the study.

Sean, et al., (2018) also investigated the relationship between inflation, exchange rate as well as money supply in Cambodia by using a Bayesian VAR approach. Monthly data for the period between October 2009 and April 2018

was used. The paper based its study on the money in utility function as well as the Purchasing Power Parity (PPP) theories. The results revealed that money supply was mainly affected by its previous period. At the same time, the exchange rate illustrated a positive correlation with inflation. Depreciation of the exchange rate resulted in the increased inflation in Cambodia. Kou and Hongsakulvasu (2018) also obtained similar results for the Cambodian economy. Using GARCH modelling approach the authors found that dollarization does depreciate the Riel per US dollar and induces the exchange rate volatility which has an effect on the price levels. On top of that, the exchange rate movements brought about by dollarisation also had a negative effect on the inflation rate in the country.

Srithilat, et al., (2018) found a bidirectional causality between the exchange rate and the inflation rate in Southeast Asian countries. Using a panel VECM, the study analysed the relationship between inflation, exchange rate and currency substitution in five highly dollarised Asian countries. The study also showed an association between all the variables and that the inflation rate had a positive and significant impact on the currency substitution in the long run meaning that economic uncertainty and economic instability led to the loss of confidence in holding domestic currency in Southeast Asia economies in the long run. Similarly, Nigeria, a dollarised economy also experienced a high exchange rate pass through as compared to its counterpart South Africa (the two economies are regarded as the highest in Africa) ascertaining the view that exchange rate pass through is higher in dollarised countries as compared to non dollarised economies. This is according to Balcilar, et al, (2019) study on the exchange rate pass through in these two countries using the Autoregressive Distributed Lag (ARDL) model. For Nigeria, the pass-through effect was quite visible with the exchange rate variations causing changes in the inflation rate. For South Africa, the result was quite different as prices proved to a bit stickier as compared to Nigeria.

Park and Son (2020) also conducted a cross country study which sought to understand the determinants of dollarization as well as to investigate the relationship between exchange rates and inflation rates in countries with differing levels of dollarization. The study's aim was to see whether the degree of dollarization also had an impact on the effect of exchange rate on inflation rate. The study made use of twenty-eight countries with differing levels of dollarization for the period 1995 to 2016. The variables included in the analysis were foreign liabilities over saving deposits (dollarization), inflation rate, growth

in foreign exchange rate, real exchange rate, real GDP growth, degree of openness and degree of government effectiveness. The study used the fixed effects model in analyzing the causes of deepening dollarization. Just like in the cross-country dollarised economies studies mentioned above, it was also concluded that high inflation, low flexibility exchange rate, depreciation of the real economy and a decline in trade openness are the main causes of high degrees of dollarization. Among other reasons, these were also part the causes that led Zimbabwe to a multicurrency use economy (Pindiriri and Nhavira, 2011). As for the analysis of the effect of exchange rate on inflation rate, it was found that the higher the level of dollarization, the greater the penetration effect of the exchange rate pass through to inflation in the economy. Also, the depreciation of the domestic currency had strong negative effects on the inflation rate through the rise in the price of imported goods. Lastly, the external variables related to the foreign exchange markets, such as foreign exchange rate, were found to have significant effects on inflation in dollarized countries.

Safi and Mashal (2020) analyzed the exchange rate pass through in Afghanistan, a highly dollarized economy. Using a simple regression model with two variables namely exchange rate and the inflation rate, a least squares method was used to estimate the model. Monthly data for the period March 2018 to March 2020 were used. Findings from this study revealed that exchange rate influenced the inflation rate by 44%, while the rest of the influence was from the other variables that were excluded from the study. To test for the causal effect between the two variables, Granger causality tests were also run. The results revealed that the exchange rate did cause inflation and was a significant variable in determining the inflation rate. The study hence recommended that the monetary authority in the country intervenes in managing the exchange rate as it was found to influence the exchange rate. Quite on the contrary, Mundaca (2018) in his study on the effects of the central bank innervations in managing the exchange rate in the dollarised Peru however argues the fact that the involvement in the exchange rate matters by the central bank increased Peru's local currency volatility against the US Dollar. However, there has been some improvements on the exchange rate pass through in Peru. Since the Government embarked on a de-dollarisation path in 2002, there has been some significant decrease in the inflation rate and the country has been experiencing low and stable inflation.

In import dependent countries, the exchange rate pass through as well as the strengths of the domestic currencies in such economies is easily affected by the

changes in the foreign currencies that are of much use to the economies just as the situation in dollarised economies. Safi and Mashal (2020) found that for Afghanistan, an import dependent country, the demand of the US Dollar is very high which depreciates the Afghani exchange rate and with the depreciation of the domestic currency, the prices of imported products rise. The study revealed a highly correlated relationship between the exchange rate and the inflation rate. However, according to the pair-wise Granger Causality tests it was indicated that the exchange rate does cause inflation.

Non dollarised economies

The results for the non dollarised economies are a bit conflicted and are not as direct as those for the import dependent and dollarised economies.

Liu and Chen (2016) examined the relationship between import prices, inflation, and exchange rate in China. The study sought to explore the effect that exchange rate has on domestic prices in the country between 2003 and 2012. The study's variables included the Chinese CPI, broad money supply, GDP, import price index, producer price index, nominal effective exchange rate, domestic demand, and foreign supply. The study used a VEC model. Granger causality tests were also conducted. Among the six variables of study all the variables were seen to granger cause CPI individually and jointly except the money supply variable. The study revealed that a shock on the imported price has positive impact on the CPI. The results of the study showed that a shock on the nominal effective exchange rate in China had negative effects on that country's consumer price index (CPI) which meant that an appreciation of the RMB caused the CPI to decrease. However, this was contrary to what other empirical studies had found. Jixiang et al, (2011) suggested that RMB appreciation would cause the domestic prices in China to increase. Through a granger causality test they conducted for period 2005-2010, Zhu and Liu (2012) also came to the same conclusion of a positive relationship between RMB appreciation and the domestic inflation, implying that China's domestic inflation fluctuations are a domestic issue rather than imported.

Sen et al, (2019) attempted to establish a long run interrelationship between, inflation, exchange rates and interest rates in the five fragile emerging market economies (South Africa, Brazil, Indonesia, India and Turkey). The study used the Autoregressive Distributed Lag test for threshold cointegration as the method of estimation. The study argued that in an open economy, which most

likely depend on imports such as the countries they were studying, it is probable that an appreciation or depreciation in exchange rates could influence the domestic price levels. Results from the study revealed that exchange rate and the inflation rates in the countries under study move along together in the long run. This implies that the depreciation of their currencies creates an inflationary effect on domestic prices through raising the prices of imported goods. The findings make theoretical sense as all the countries in the sample study are import-dependant and have persistent current account deficits.

Using a SVAR modelling approach, Ha, Stocker and Yilmazkuday (2020) studied how exchange rate movements in 34 developed countries affected the countries inflation rates. The study found that the source of the shock on the exchange rate matters in effecting any changes to the inflation rate. Domestic shocks on the exchange rate were seen to be a major cause of variance of inflation and exchange rates in most countries as compared to global shocks. The results of the study affirmed what other researchers allude to that country characteristics, structural factors , monetary policy frameworks as well as the nature of shocks all play an important role in determining the direction and magnitude of the exchange rate effects on the price levels. In Egypt the effect of the exchange rate on the domestic prices was seen to be substantial however slow and incomplete. Changes in the exchange rates were seen to mainly affect the consumer price index (CPI) the most as compared to the other indices (Helmy, et al., 2018). The structural factors in Egypt were seen a factor of how the changes in the exchange rates affected the domestic price levels. Price and import controls were responsible for the way in which the exchange rate pass through affected the different indices in the country.

Zimbabwean Economy

Coming to the Zimbabwean economy. The country, due to its adoption of a full multicurrency system and its heavy reliance on imports makes it prone to the global shocks that pass through the foreign currencies it had adopted as legal tender. Just like in most developing countries, the monetary policy strongly responded to exchange rate movements because these have relevant effects even on the commercial trade in the country. Pindiriri (2012) analysed the determinants of inflation in a post dollarized Zimbabwe for the period January 2009 up until December 2011. The influence on inflation by factors such as GDP, imports, consumer's expectation about future inflation, interest rates, output, exchange rates and money supply among others was analysed. The study made

use of the USD/ZAR exchange rate as these were the major currencies that were being used in the country before the reintroduction of its local currency. Results of the study were more or less similar to some other pre-dollarized studies conducted for the same country. The findings supported the claim that the exchange rate, money supply, consumer's expectations about future inflation and imports were the major determinants of inflation during the period under review.

It was revealed that the variations in inflation and the exchange rate had sharply decreased and taken a nosedive following dollarization, as compared to the pre-dollarization era. Prior to the adoption of the multicurrency era, there existed a long run relationship as well as a bi-directional causality between the exchange rate and the inflation rate and vice versa. The results found by Pindiriri (2012) were also supported by Kavila and Le Roux (2016) who studied how inflation in a post-dollarized Zimbabwe reacted to macroeconomic shocks using monthly data between the periods 2009:01 and 2012:12. The study made use of the VECM approach to analyse the objectives of study. The variables used in the study were the inflation rate, ZAR/USD exchange rate, international oil and food prices, money supply and the South African inflation rate. The study revealed that, the inflation rate in Zimbabwe during the period under review was mainly influenced by international oil prices, as well as the ZAR/USD exchange rate. The observed relationship was strong and positive. The studies conducted in Zimbabwe for the multicurrency use era however just looked at the USD/ZAR exchange rate effect on the inflation rate as these were the two major currencies that were in circulation. Makena (2017) also used the same exchange rate and found the same results as to those that were done during the multicurrency era. It is however important to note that there were other currencies that were in use during the multicurrency era in Zimbabwe which meant that the direction the feed in effects from the exchange rates came from different directions.

2.3. Literature Gap

The literature discussed above exhibit that quite a number of studies have been conducted to explore the relationship between inflation rate and exchange rates. However, it is important to note that of the studies conducted on the subject matter, focus was mainly given to economies that use their own local currency as legal tender as well as those countries that had fully dollarized or partially dollarized. From such studies, the exchange rates used where those of the local currencies against the USD.

However, according to the researcher's knowledge there has not been a single study that sought to address the exact subject matter in the magnitude that was explored in this paper. Particularly, that of a multicurrency economy. This leaves a yawning gap that needs to be explored. This study therefore studies the relationship that exist between inflation rates and foreign exchange rates in a multicurrency economy, not a mono or dual currency economy. This study also goes a step further to include not just one exchange rate, but three exchange rates in a bid to examine if their effects are just the same as in mono or dual currency economies. Studies that have so far focused on the Zimbabwean multicurrency use economy, have almost always used only the ZAR/USD exchange rates, ignoring the effects of the other currency exchange rates that were in circulation during the multicurrency use era. By doing so, an analysis of the different exchange rates and their possible impact on the domestic inflation rate is made possible.

By addressing this gap, this study contributes significantly to literature on the effects of inflation rates and the exchange rates in multicurrency economies.

3. MATERIALS AND METHODS

In analysing the relationship between inflation rates and the exchange rates, scholars have employed a diverse range of econometric techniques. This study makes use of the Auto Regressive Distributed Lag (ARDL) model as it suits the study's overall objectives. The Eviews econometric software was used for the econometric analysis, This study seeks to assess the effects of the exchange rates on the inflation rate as well as their long run relationship. The nature of the data available also made the use of the ARDL modelling technique as most suited.

3.1 Analytical framework

In 2009 after suffering a ruthless hyperinflation for many years, Zimbabwean authorities decided to adopt a multicurrency system in which a bunch of foreign currencies were now seen as legal tender in the country. From 2009:02 up until 2014:11, the currency basket in the country comprised of only foreign currencies. However, in 2014:12, the government introduced a local surrogate currency, the bond coins which were followed by the bond notes in 2016 which were purportedly at par with the US dollar, which was the major currency in circulation (RBZ, 2014; RBZ, 2016). Their reason was that the introduction of

this surrogate money would ease up business operations. In early 2019, the monetary authorities however announced that the Bond currency (local fiat currency) would no longer be at par with the USD but was now going to be rated against all other currencies (RBZ, 2019).

For this reason, this study is going to separate the study into two time periods. The first period is going to be from 2009:02 up until 2014:11 before the introduction of the fiat currency while the second period is from 2014:12 up until 2019:02 where the fiat currency was at par with the USD before the introduction of the legal local currency.

The ARDL model is used to study the effects of foreign exchange rates and the interest rate on the price level. The model was implicitly introduced by Davidson et al. (1978) and later popularised by Pesaran and Shin (1995). The ARDL model is an OLS based model which can be used for both nonstationary and mixed order of integration time series which is an advantage as compared to other modelling techniques which requires all the variables to be integrated of the same order before the estimation.

A dynamic Error Correction Model (ECM) can be derived from ARDL through a simple linear transformation. Likewise, the ECM integrates the short-run dynamics with the long-run equilibrium without losing long-run information and avoids problems such as spurious relationship resulting from non-stationary time series data (Shrestha and Bhatta, 2018). The model is also capable of simultaneously displaying both the short run and long run parameters.

The ARDL model can be presented as follows (ARDL p, q):

$$y_t = \alpha + \delta_t + \emptyset_1 y_{+-1} + \ldots + \emptyset_p y_{t-p} + \beta_0 x_t + \ldots + \beta_q x_{t-q} + \epsilon_t \quad \ldots\ldots\ldots\ldots (8)$$

In the model above,

Y is the dependant variable, and it depends on p lags of itself.

Y also depends on the current value of the explanatory/ independent variable X as well as q lags of X.

X are the independent variables.

ϵ_t is a random disturbance term

The model assumptions are:

$$\text{Cov}\,(\epsilon_t, \epsilon_s) = 0, \text{for t} \neq \text{s and Var}(\epsilon_t) = \sigma^2$$

Now expressing equation 1 in error correction form we get:

$$\Delta y_t = \alpha_0 + \sum_{k=1}^{p} \forall_j \Delta y_{t-k} + \sum_{k=1}^{q} \partial_j \Delta x_{t-k} + \sum_{k=1}^{p} \varepsilon_i \Delta z_{t-1} + \lambda_1 y_{t-1} + \lambda_2 x_{t-1} + \lambda_3 z_{t-1} + \mu_t \quad (9)$$

The first part of the equation from α, $\forall$ up until ε represents the short run dynamics of the model while the second part with the λ represents the long run dynamics of the model.

However, there are a few estimation techniques that should be performed prior to the actual final estimation of the ARDL. First, the unit root tests were run prior to the estimation because macro variables are usually known for their non-stationarity. Unit roots tests were thus performed to check for stationarity. The Phillips- Perron (PP) tests was used to test for the existence of unit root. Second, the ARDL Bound-test to co-integration technique was preferable when dealing with variables that are integrated of different order, I (0), I (1) or combination of both and robust when there is a single long run relationship between the underlying variables in a small sample size (Wickens, 2011). Third, the selection of an appropriate lag structure using the information criteria for lag length is very important for the ARDL modelling. Fourth, after ascertaining that there was cointegration and long run relationship between the independent and the dependent variables, the next step was to run an Error Correction Model (ECM). This is a time series model that is run when variables are evidently cointegrated and it manages to reveal both short-term and long-term effects of one time series on another (Harrell, 2015). From the EC model results, the cointegration equation and the associated coefficient shows the speed at which the dependant variable returns to equilibrium after a change in the other variables. Last but not least, in a bid to further validate the study's data, residual diagnostic tests were conducted. The diagnostic tests that were conducted included the stability test, the serial correlation test as well as the heteroscedasticity test. For the stability test, the CUSUM test for stability was conducted.

3.2 Data sources and characteristics

Data that was used in this study was obtained from the Zimbabwe Reserve Bank (RBZ), the South African Reserve Bank, World Bank, and the International Monetary Fund. The period of study is from 2009:02 up until 2019:02, hence the

study made use of monthly data for its regression analysis. The dependent variable remains the Consumer Price Index (CPI), the independent variables being the interest rate (lending interest rate) and foreign exchange rates. In this study, the exchange rates represent the rate at which the currencies of South Africa, Mozambique and China were exchanged for the US Dollar. Hence, these were the major currencies that were in use during the multicurrency era were included as variable. Therefore, the exchange rate of the US Dollar against South African Rand (USD/ZAR), the USD against the Chinese Yuan (USD/CNY) and the Mozambique Metical (USD/MZN). These currencies were included in the variables study because according to ZIMTRADE, apart from South Africa, Mozambique and China were among the top countries that traded with Zimbabwe the most during this period. In this study the assumption that the exchange rate movements of the currencies that were in circulation in the country affect the inflation rates in the country is taken. This is done due to the fact those currencies were the legal tender in the country hence their appreciation or depreciation will be noted in the price levels. It is expected that with the depreciation of the mentioned currencies against the USD the prices of both imported products from the countries and also the local prices rise as shown by the studies of Maune, et al., (2020) and Safi and Mashal (2020). This is in line with the Exchange rate pass through theory as backed by the law of one price in the PPP Theory, price changes due changes in the exchange rate of a country and also in the currencies of the trading partner currencies can filter through into the domestic price levels.

4. RESULTS INTERPRETATION AND ANALYSIS

The variables were denoted as follows. Zimbabwe Inflation rates (denoted by LCPI), Zimbabwe average lending rate (LLR), and exchange rates of US Dollar against Chinese Yuan (LUSDCNY), South African Rand (LUSDZAR) and Mozambique Metical (LUSDMZN). The data was converted into log forms first before the estimation. The Eviews estimation software was used to run the regression model.

4.1 Stationarity Test

The stationarity test was conducted using the Phillips Peron (PP) to determine the order of integration. Table 1 reveals that for the first period all the variables are integrated of order 1 with the exception of LUSDZAR. Therefore, there is a mixture of I(0) and I(1). On the contrary, the results for the second period shows the same order of integration which is I(1). Thus, it is appropriate to apply the

ARDL since there is no variable integrated of order 2.

Table 1: Stationarity test using the PP.

	2009: 02 to 2014: 11			2014: 12 to 2019: 02		
Variable	**Level**	**First Difference**	**Conclusion**	**Level**	**First Difference**	**Conclusion**
LCPI	-1.916 (0.388)	-10.219** (0.000)	I (1)	2.224 (1.000)	-3.904** (0.019)	I (1)
LLR	-2.595 (0.296)	-6.442** (0.000)	I (1)	-1.880 (0.650)	-5.834** (0.000)	I (1)
LUSDCNY	-1.542 (0.778)	-4.576** (0.003)	I (1)	-1.848 (0.666)	-3.817** (0.024)	I (1)
LUSDZAR	-3.986** (0.017)	-6.080** (0.000)	I (0)	-2.093 (0.537)	-5.076*** (0.001)	I (1)
LUSDMZN	-1.9414 (0.621)	-5.475** (0.001)	I (1)	-1.266 (0.885)	-4.577*** (0.003)	I (1)

Source: Author's computations. Note: * and ** means H0 is rejected at 1% and 5% level of significance respectively. Probability values are in parentheses (--)**

4.2. Bound test: Determining the Long Run Relationship Between the Variables.

Tables 2a and 2b shows the results for the Bound test to cointegration. For the first period, the F statistic value of 4.699 is greater than I (1) of 4.57 at 5%, similarly, the F-statistic value of 6.024 is also greater than both bounds. Therefore, the null hypothesis of no levels relationship is rejected and it is concluded there is long run relationship between inflation, lending rate and foreign exchange rates.

Table 2a: Bounds test for cointegration – 2009: 02 to 2014: 11.

Test Statistic	Value	Signif.	I (0)	I (1)
F-statistic	4.699	10%	3.03	4.06
K	4	5%	3.47	4.57
		2.5%	3.89	5.07
		1%	4.4	5.72

Source: Author's computations

4.1 ARDL and ECM Estimations

After running the model pre-estimation tests above and being guided by their results, the ARDL regression model as well as the Error Correction model were run. The results from the regressions are shown below.

Table 3: Summary of long and short run results (LCPI as regressand)

	LLR		**LUSDCNY**		**LUSDMZN**		**LUSDZAR**	
	First Period	Second Period	First Period	Second Period	First Period	Second Period	First Period	Second Period
ARDL – long run coefficients	**0.006**** (2.502)	0.035 (0.634)	-0.024 (-0.159)	0.444 (1.145)	0.033 (1.431)	-0.100 (-0.989)	0.029 (1.617)	-0.026 (-0.221)
ECM – short run coefficients		0.035 (0.750)	-0.024 (-0.128)	0.444 (1.568)	0.033 (1.667)	-0.100 (-1.313)	**0.029*** (1.757)	-0.026 (-0.323)
ECT	First Period **-0.166**** (-5.014)	Second Period **-0.472**** (-5.946)						

Source: Authors computations. Note: ** and * shows level of significance at 5% and 10% respectively. In parenthesis (--) are the t-statistics.

The purpose of the study was to ascertain the relationship between Zimbabwe Inflation rate (denoted by CPI), Zimbabwe average lending rate (LR), and exchange rates of US Dollar against Chinese Yuan (USD/CNY), South African Rand (USDZAR) and Mozambique Metical (USDMZN) during the multicurrency use era.

It has been shown that during both period of dollarisation (first period) and when Zimbabwe introduced a fiat currency to the currency basket (second period), there was a long run relationship between the aforementioned variables. For the first period, table 3 shows that the USD/Chinese Yuan exchange rate is negatively affects inflation, though statistically insignificant. This is to say a depreciation in the USD/CNY caused inflation. The USD/MZN and the USD/ZAR exchange rates positively affects inflation which was also statistically insignificant. The finding on the USD/ZAR are in line with that of Kavila and Le Roux (2016) where a positive relation was established between the USD/ZAR exchange rate and the inflation rate. Lastly, the variable interest rate is statistically significant and positively affects inflation. This meant an increase in lending rate was passed on say as a cost to the production and sell of goods and services immediately, hence increases in the price levels as well. Therefore, one can conclude that the overall inflation cause in the first period is the USD/CNY exchange rate. Similar results were also found for the short run estimates except that the USD/ZAR was statistically significant.

For the second period, it was also shown that there was a long run relationship that was exhibited by the variables during the period Zimbabwe had introduced its fiat currency in the currency basket and it was purportedly deemed to be at par with the USD (between December 2014 and February 2019). The long run estimates shows that USD/MZN and USD/ZAR negatively affects Zimbabwe's inflation, though statistically insignificant. The foreign exchange rates with negative effect on the CPI implies that the depreciation of the currencies against the USD causes the inflation rate to increase. On the contrary, the USD/CNY positively affects inflation but statistical insignificant. This scenario could be because of a trade imbalance between the two nations with Zimbabwe being the net importer in most instances. Statistics show that China was the second highest country Zimbabwe imported most of its goods from during the period of the study. The result is in tandem with what most literature on dollarised economies state. Sadeghi et al (2015), Sean et al (2018) and Carranza et al (2011) exhibited a positive relationship between exchange rate appreciation and the domestic inflation. The authors state this phenomenon is mostly found in highly dollarised economies. Lastly, the variable interest rate also positively affects inflation in Zimbabwe but also statistical insignificant. The phenomenon is justified because lending rates were largely stagnant during the first few years after the introduction of the multicurrency system. Similar results were obtained under the error correction model. The error correction terms for both periods are negative and statistically significant.

Overall, the results of this study are in line with the research by Park and Son (2020). Just like the Zimbabwean case before the adoption of the multicurrency system, inflation was seen as the common factor for the adoption and or the deepening of dollarization. The study found that there was a relationship between the exchange rate and inflation in dollarised countries and that the depreciation of the domestic currency against the USD had a significant positive effect on the price levels.

5. CONCLUSION

The overall objective was to study the effects of foreign exchange rates on the inflation rate in a multicurrency economy. The variables of the study were the CPI, interest rates as well as the foreign exchange rate of the US Dollar against the South African Rand, Mozambique Metical and the Chinese Yuan. There has not been much literature that has been published with regards to the relationship between foreign exchange rates and the inflation rate in a multicurrency

economy, especially one without its own local currency in the currency basket. This study thus, went on to fill this gap by analysing how the variables in question relate and affect each other.

The study made use of the Autoregressive Distributed Lag model (ARDL). This was the best method of estimation given that the relationship, both short run and long run among the variables needed to be studied. The nature of the data also made it prudent to apply the use of the ARDL model. Such a modelling technique has been used before to study almost similar research though a different number of other modelling techniques have also been used. The study period was divided into two separate analyses and similar estimation techniques were applied to the time periods in order to give a clear and fair analysis as well as comparisons.

From the regression analysis conducted, results from the first period showed that all the independent variables in the study except for the USD/CYN were significant in affecting the inflation rate during the period under study. There was also evidence of cointegration among the variables and signs of a long run relationship between inflation rate and the independent variables were observed. The diagnostic tests conducted confirmed that the model was a good fit for the study. Overall, inflation was determined by movement in foreign currency exchange rates during the first period of the study and lending rates also contributed to inflation outturn. This result concurs with other studies such as Pindiriri (2012) and Kavila and Le Roux (2016) that were previously conducted during the same time period (before the introduction of the pseudo currency) though the other previous studies only used the USD/ZAR exchange rate.

During the second period of study, the interest rates did not significantly affect the inflation rate. All the other variables, however had a significant effect on the inflation rate though normally after some passage of some lag. The bounds test for cointegration revealed that there was evidence of cointegration between the dependant variable CPI and the independent variable hence there was evidence of a long run relationship as well.

Results for the second period however differ slightly from those of the first period. Some of the foreign exchange rates were now significant in affecting the inflation rates though there was no evidence of such during the first period.

Overall, exchange rates influenced inflation rate more during the period that Zimbabwe was solely using a foreign multicurrency economy as compared to the period where it has introduced its pseudo currency in the currency basket. The effects of the exchange rates on the inflation rates differ between the two periods, some of the used exchange rates having a negative relationship with the inflation rates, while others have a positive relationship as supported by previous literature.

DISCLOSURE OF CONFLICT

The authors declare that they have no conflicts of interest.

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