

Determinants of Financial Depth: A Case Study of Mortgage and Microfinance Banks in Nigeria

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Abstract

Financial depth is an important components of financial development for which determinants have been examined by a number of extant studies, using different kinds of financial depth indicators. This study aims at analyzing the factors that determine financial depth using the assets of mortgage and microfinance banks as indicators of financial depth. The study employs data that span from 1992 to 2021, using Auto-regressive Distributed Lag (ARDL) model. It is found in the study that the policy of conversion of community banks to microfinance banks and the introduction of mortgage warehouse fund have positive effects on microfinance and mortgage banks' assets. Also, it is found that literacy rate has negative effect only on the microfinance bank assets. Thus, this study recommends further deepening of the various segments of financial system, policy makers should strengthen the existing policies and create the new similar policies and reforms with respect to each indicator of financial depth.

Keywords: Financial Depth, Financial Development, Microfinance, Mortgage

JEL Classification: G23, O12

1. Introduction

Financial depth or financial development has become a great factor behind the long-run economic growth in the perspective of endogenous growth theories. This is because an improvement in financial sector allocates resources efficiently and thus can boost long term economic growth (see Valickova, Havranek & Horvath 2015; Nyasha & Odhiambo, 2015 and Sehrawat & Giri, 2015). Over the last few decades, there has been a substantial improvement in financial development in many developing countries, which include Nigeria. The average ratio of private credit to GDP increased from 23% in 1980 to 32% in 2000, while the average ratio of liquid liabilities to GDP rose from 32% in 1980 to 42% in 2000 in the developing world (Huang, 2010). In particular, domestic credit to private sector, as an indicator of financial development, increases in Nigeria from 3.7% of GDP in 1960 to 4.9% in 1970. Then, it soared to 8.2% in 2000 and increased further to 14.2% in 2017 (World Bank, 2019). But, despite this increase over the years, the level of financial development in Nigeria is still far below the level of financial development in OECD member countries. For instance, the domestic credit to

private sector (DCPS) in Nigeria is 14.21%, 15.68% and 14.21% in 2015, 2016 and 2017 respectively. In United Kingdom, the DCPS is 130.79%, 130.91% and 133.63% in 2015, 2016 and 2017 respectively, while that of France is 95.09%, 97.37 and 101.37% in 2015, 2016 and 2017, respectively (World Bank, 2019). Also, in the USA, another OECD country, the DCPS is 179.66%, 182.66% and 190.62% in 2015, 2016 and 2017 respectively (World Bank, 2019).

Due to the differences in the level of financial sector development in various countries of the World, studies have beamed their search light towards searching for the factors that may be responsible for variations in the level of development in financial sectors in countries of the world. According to Huang (2010), many empirical studies have revealed that institutions, trade and financial openness, geography, economic growth, economic development, population, religion, language and ethnic characteristics have been major factors behind the development of financial sector. Also, La Porta, Lopez-de Silanes, Shliefer and Vishny (1997) have emphasised the importance of reforms as a determinant of financial development. This is because legal administration is the dominant actor which designs and regulates the financial environment and the functioning of financial system. But, inspite of all the reforms aimed at promoting financial depth, Nigeria has not reached an appreciable level of financial depth like the OECD countries (Oke, 2011). Also, the country is still facing some problems in the financial sector. Specifically, the country is facing some challenges in banking sector, which inhibit the efforts taken by government to promote financial development. The challenges include, among others, inefficient service delivery, people's loss of trust in banking institutions, increasing bad loans, abject poverty and illitracy, which make it difficult for the average Nigerians to deposit money in banks. According to Acha (2012), microfinance institutions are not without their own problems which range from frequent changes in government policies, lack of requisite human capital, inadequate infrastructural facilities and socio-cultural misconceptions, frauds and forgeries, and bad corporate governance. So, this study aims to augment the findings of the existing studies and thereby provide insights for the government on the policy variables that determine financial development or financial depth in Nigeria and also to reveal some alternative indicators of financial development that were not employed in the extant literature, through which government can strengthen financial development.

Of course, many studies have responded to this need at the empirical level including Oke (2011); Girma & Shortland (2008); Huang (2010); Law & Saini (2012); Hechmy (2016); Anchang (2016); Bayar (2017); Kim & Lin (2010); Bittencourt (2010); Wahid, Shahaz & Azim (2011); Ozturk & Karagoz, (2012) and Almalki & Batayneh (2015). Such studies, however, have been bedeviled by lack of consensus or contradictory findings. Beside the aforementioned contradictory findings, such studies also exhibit methodological pitfalls that need to be remedied. For instance, most of the studies on Nigeria employed broad money supply (M_2), credit to private sector, market capitalisation and stock market index as indicators of financial depth. But, there are still many indices that have not been employed by the extant studies on the subject matter in Nigeria, thereby creating a methodological gap that needs to be filled. Aside from those neglected indicators of

financial depth that this study will be the first to analyse, potentially relevant explanatory variables and factors abound, which the existing studies have failed to examine their actual effects on financial depth, whether in Nigeria or elsewhere. In the specific context of Nigeria, such variables and factors include financial liberalisation, urbanisation, literacy rate, financial reforms and policies (including dummies that are to capture each of conversion of community banks to microfinance banks and introduction of mortgage warehouse). In addition, most of the existing studies are similar in analysing financial depth, which is defined as financial aggregate (like M_2 , banking credits, etc.) expressed in relation to GDP as if GDP (as opposed to the people) is the ultimate beneficiaries of increase in such financial aggregates. Arguably, since people are the ultimate beneficiaries, expressing such financial aggregate in per capita terms should be a preferred alternative. Thus, such studies, while still retaining the tradition of defining financial depth in relation to GDP, should also have explored the “provocative” but more logical alternative definition of such financial aggregates in per capita terms and analyse both for a comparison. It is an attempt to make a contribution to, and shed a further light on, the existing empirical studies that are bereft of consensus in their findings as well as to also fill the aforementioned methodological gaps that motivate the present study. The objective of the study is to assess the variables that determine financial depth in respect to mortgage and microfinance banks in Nigeria.

2. Literature Review

Financial depth is a component of financial development. Čihák, Demirgü-Kunt, Feyen and Levine (2013) examined financial development and classified it into four aspects with a view to study the characteristics of financial system. These four aspects are financial access, depth, efficiency and stability. Basically, financial depth is related to the size of banks, financial markets and other financial institutions in a country in comparison with a measure of economic output. A widely used proxy for depth of financial system in empirical studies is domestic credit to private sector as ratio of GDP (World Bank, 2016). Other variables used as proxy for depth of financial depth by previous studies, for example, Aggarwal, Demirguç-Kunt and Martinez (2006), Gupta, Pattillo and Wagh (2009), Motelle (2011), Oke (2011), Karikari, Mensah and Harvey (2016) and Mustapha, Bakare and Mustapha (2019); include assets of financial institutions in relation to GDP, M_2 in relation to GDP, deposits in relation to GDP and gross value-added of financial sector in relation to GDP. Also included are market capitalisation in relation to GDP and market total value traded in relation to GDP. The present study widens the list to include the mortgage banks and microfinance banks in relation to GDP. Also, the mortgage banks and microfinance bank assets are alternatively expressed, as an innovation, in real per capita terms, instead of just in relation to GDP.

In addition, mortgage banks are entities or institutions that originate mortgages (Mustapha, 2023). They may use their own fund to finance mortgages. After the mortgage is originated, the mortgage banker might retain the mortgage in a portfolio, or it can be sold to investors. Also, they might service the mortgage or the servicing right might be sold to other financial institutions. The primary business of mortgage bank is to earn the fees attached to loan origination. Most mortgage

bankers do not retain the mortgage in their portfolios. Examining another concept, microfinance banks are companies licensed by the Central Bank of Nigeria (CBN) to carry out the business of providing financial services such as savings and deposits, loans, domestic funds transfer and non-financial services to microfinance clients. It is different from the Deposit Money Banks in terms of the smallness of loans advanced, savings collected, absence of asset-based collateral and simplicity of operations (CBN, 2017). Also, while cheques are drawn on them, they cannot partake in the clearing activities of banks and they do not finance international businesses or deal with foreign exchange (Mustapha, 2023).

In order to show the relevance of this study to the existing theories, financial liberalisation and simultaneous openness hypotheses were reviewed. Considering Financial Liberalisation Theory, the theory, as put forth by McKinnon (1973) and Shaw (1973) in their seminal works, states that financial repression in terms of repression of interest rate, high cash ratio and reserve ratio and credit administration control is detrimental to financial sector development and economic growth. McKinnon (1973) believes that interest rate ceiling (i.e. interest rate below the market equilibrium rate) reduces savings, suppresses the loanable funds and investments (thereby hampering financial development) and consequently lower economic growth rate. Shaw (1973) is of the opinion that low interest rate ceilings and underdeveloped financial system results in poor allocative efficiency of credit. But higher interest rate and minimal government intervention in the financial system will raise allocative efficiency as well as savings. According to McKinnon and Shaw, financial policies that control interest rate and bring about restriction in the financial system should be dismantled to give room for financial liberalisation, which will promote financial development and result into economic growth. Following the above theory is Simultaneous Openness Hypothesis of Rajan and Zingales (2003) which states that financial development is a function of trade and capital account flows (openness). They stressed that interest groups, specifically industrial and financial gladiators, frequently stand to lose from financial development. This is because it usually results into competition, which undermines their returns. It argues that the industrial and financial gladiators' opposition will be weaker when an economy is open to both trade and capital flows, which gives room for improvement in financial development. The benefit of openness is not only because trade and financial openness limit the ability of investors to block the development of financial markets but also because the new opportunities created by openness may generate more profits or returns for them which can outweigh the negative effects of increased competition that may emanate from financial and trade openness.

In the case of empirical review of the study, it is done based on the impact of each explanatory variable on financial depth or financial development in each of the extant studies reviewed. To start with, the studies reviewed in respect of financial depth and trade openness show that trade openness has positive effects on financial depth (e.g., Kim, Lin and Suen, 2009; Law and Habibullah, 2009 and Zhang, Zhu and Lu, 2015). The reason for scanty studies on this is that it was not until 2009 that the empirical studies on effects of trade openness on financial development started to emerge. In the case of effect of remittances on financial depth, the study

reviewed include Aggarwal, Demirgüç-Kunt and Martinez (2006), Gupta, Pattillo and Wagh (2009), Motelle (2011), Oke (2011), Karikari, Mensah and Harvey (2016) and Mustapha, Bakare and Mustapha (2019). In the case of effects of governance on financial depth studies such as Girma and Shortland (2008), Huang (2010), Law and Saini (2012), Hechmy (2016), Anchang (2016) and Bayar (2017) reveal that governance indicators have positive effect on financial depth. Studies like Boyd, Levine and Smith (2001), Kim and Lin (2010), Bittencourt (2010), Wahid, Shahaz and Azim (2011), Ozturk and Karagoz (2012) and Almalki and Batayneh (2015) show that the effect of inflation rate on financial depth is positive. Also, the effects of per capita GDP on financial depth is positive in many studies (Arestis & Demetriades, 1997; Celderona & Liub, 2003; Christopoulos & Tsinasb, 2004; Ito, 2006; Abu-Bader & Qarn, 2008; Kar, Nazlioglu & Agir, 2011; Ono, 2017). It is also established that financial liberalization has positive impact on financial depth in a number of studies which include Demetriades, Fattouh and Mouratidi (2002), Ang and McKibbin (2005), Ito (2006), Ahmed (2013) and, Aigbovo and Igbinsosa (2015). Studies such as Nicholas (2009) and Elijah and Uchechi (2012) were reviewed and they showed that interest rate has negative effects on financial depth. In the case of financial openness, the extant studies (such as Beji, 2007), Ersoy, 2011 and Umutlu, Gultekin and Özkaya, 2020) show that financial openness has positive effects on financial depth.

Specifically, the study has reviewed studies on the effects of per capita GDP, financial liberalisation, inflation, trade openness, financial openness, real interest rate, remittances and governance on financial development of financial depth. The review also shows that a number of previous studies have employed different indices of financial depth, which include ratio of domestic credit to private sector to GDP, ratio of money supply (M_2 or M_3) to GDP, ratio of bank credit to GDP, ratio of deposit to GDP, to mention but a few. It is noted from all the studies reviewed that none of those studies employed any of non-deposit money banks (viz: mortgage and microfinance banks' assets). To address the gap in the empirical literature, this study employs microfinance and mortgage banks' assets as indicators of financial depth. Also, as far as the researcher knows, this study will be the first to assess the effects of urbanisation and urbanization on financial depth. Although, studies abound on the relationship between financial literacy and financial inclusion and on the impact of financial literacy on savings (See Antonia, Theres & Lukas, 2018; Mahdzan & Tabiani, 2013) but there is no study that has examined the effect of degree of general literacy (as opposed to financial literacy) on financial depth. Thus, examining the effect of general literacy rate on financial deepening constitutes another research gap to be filled by this study.

3. Methodology

In order to give a theoretical backing to the study, the theoretical framework is made to be eclectic by employing three different theories which include Financial Liberalization Theory of McKinnon (1973) and Shaw (1973) and Simultaneous Openness Hypothesis of Rajan and Zingales (2003) and they are as reviewed in Section 2 above.

The specified models cover the two variables from non-deposit money banks. So, two variables are employed (viz: assets of mortgage and microfinance banks) as dependent variables separately as indicators of financial depth pertaining to non-deposit money banks. The study does not consider any financial depth indicator pertaining to development banks as a dependent variable for there are no statistics available on it. The two variables (viz: MORTB for mortgage bank assets and MICFB for microfinance bank assets) are measured as ratios of GDP and, alternatively, they are expressed in real per capita terms. This innovation makes the specified and estimated models to be four. None of the existing studies reviewed ever employed primary mortgage banks and microfinance banks assets as indicators of financial depth. So, it is another area through which the current study is contributing to knowledge.

There are two equations for non-deposit money bank financial depth indicators, with both of them relating to small-scale banking activities. The first is the model for microfinance bank-related financial depth variable defined as the total assets of the microfinance banks, alternatively expressed in relation to GDP and in real per capita terms and denoted as MICFB, with the model specified in Equation (1). The second, on the other hand, is the model for primary mortgage bank-related financial depth variable defined as the total assets of the primary mortgage banks, alternatively expressed in relation to GDP and real per capita terms and denoted as MORTB, with the model specified as in Equation (2). Given the alternative expressions in relation to GDP and in real per capita terms, the Equations (1) and (2) would result into four separate equations, the estimate of which are as reported in Tables 4.7a and 4.7b and discussed in Section 4. Equations would have been specified for development bank-related financial depth variables also, as a non-deposit category of banks, but for non-availability of statistical data for this banking category. Meanwhile, the two equations are specified as below.

$$\text{MICFB}_t = \pi_1 + \pi_{01}\text{TOPEN}_t + \pi_{11}\text{FINLIB}_t + \pi_{21}\text{PCGDP}_t + \pi_{31}\text{REM}_t + \pi_{41}\text{FOPEN}_t + \pi_{51}\text{URB}_t + \pi_{61}\text{LIT}_t + \pi_{71}\text{RIR}_t + \pi_{81}\text{GOV}_t + \pi_{91}\text{CONVDUM}_t + \mu_{t1} \dots \dots \dots 1$$

$$\text{MORTB}_t = \pi_2 + \pi_{02}\text{TOPEN}_t + \pi_{12}\text{FINLIB}_t + \pi_{22}\text{PCGDP}_t + \pi_{32}\text{REM}_t + \pi_{42}\text{FOPEN}_t + \pi_{52}\text{URB}_t + \pi_{62}\text{LIT}_t + \pi_{72}\text{RIR}_t + \pi_{82}\text{GOV}_t + \pi_{92}\text{MWFDUM}_t + \mu_{t2} \dots \dots \dots 2$$

In each of the Equations (1) and (2) above, the a priori expectations of parameter estimates are $\pi_{ij} > 0$ for $j = 1, 2$ and $i = 0, 1, \dots, 9$ also as earlier discussed above. Concerning the positive sign expected of π_{9j} , which are the coefficients of MWFDUM and CONVDUMM in Equations 1 and 2 respectively, the justifications and background information in respect of the two dummies are as follows: Mortgage warehouse fund was established in 2014 by stakeholders in the mortgage sub-sector, including Mortgage Bankers Association of Nigeria (MBAN), Nigeria Mortgage Refinancing Company Plc. (NMRC), CitiHomes Finance Company Limited (a financial institution licensed by the CBN to carry out mortgage related services), Lion's Head Global Partners, etc. to serve as a special purpose Fund, with the aim of making available the short-term local currency and competitively-priced funding for primary mortgage lenders to boost their mortgage origination capability without relying on loans from commercial banks. MWFDUM, which is a

dummy for mortgage warehouse fund (that takes value of unity between 2014 and 2017 and zero value otherwise), is supposed to have a positive effect on MORTB. This is because mortgage warehouse fund is to provide more funds for primary mortgage banks in order to boost their activities, thus improving the financial depth of the banks. In respect of CONVDUMM, which stands for the conversion of community banks to microfinance banks (that took place in 2006 so that CONVDUMM takes a value of unity from 2006 onwards and a zero value before then), it is expected to have a positive effect on MICRFB. This is because the aim of the CBN in converting the community banks to microfinance banks is to enhance the access of small scale businesses and grass-root people to financial services and consequently achieve improvement in the depth of grass-root banking.

The data in the study are to be estimated using descriptive and correlation analyses, unit root and co-integration tests, regression analysis and the diagnostic tests. The data were sourced from the CBN statistical bulletin and World Development Indicator of the World Bank. The dependent variables, viz: MICRFB and MORTB are expressed as percentage of GDP and in real per capita terms. The explanatory variables such as TOPEN which is trade openness is expressed as the percentage of the sum of import and export to GDP while REM is measured as percentage of remittances to GDP. The FOPEN which is financial openness and it is expressed as the percentage of the aggregate of capital and physical accounts to GDP. FINLIB is expressed as presented by Fowowe 2008, using indicators of financial repression policies in Nigeria. Per capita GDP is denoted as PCGDP and measured as the ratio of GDP to population, while urbanization is represented as URBAN which is expressed as the total population of the people living in the city compared to the total population. LIT represents literacy rate and it is measured as the percentage of educated population to total population while RIR represents real interest rate, which is noted as interest rate less inflation rate. GOV symbolises governance indicator and it is expressed as put forth by Polity IV. MWFDUM and CONVDUM are mortgage warehouse fund dummy and conversion dummy which ranges from 1 to 0. All the data span from 1992 to 2021. Four Equations are estimated altogether. Two are for MICRFB and MORTB when they are expressed in relation to GDP and the remaining two are for when they are alternatively expressed in per capita forms.

4. Results

This section is on presentation and discussion of empirical results and it is organised into three sections. The first section presents the results of descriptive, trend and correlation analyses, while the second sub-section covers the unit root and co-integration tests. The third sub-section presents and evaluates the various regression equations in the study. Table 1 shows the descriptive statistics of the variables. The mean ranges between 0.34 and 291732.90, median ranges between 0.25 and 294044.60 and max ranges 0.87 and 385349. The min value for the variables ranges between 0.06 and 202704 while std dev. Ranges between 0.22 and 69418.16. The total number of observation for all the variables is 30.

Table 1: Descriptive Analysis of Data

Variables	Mean	Median	Max	Min	Std. Dev.	N
FINLIB	6.60	7.00	7.00	5.00	0.81	30
FOPEN	2.16	1.89	6.77	0.84	1.39	30
GOV	1.33	5.00	6.00	-88.00	16.97	30
LIT	41.08	34.73	71.33	23.42	17.30	30
PCGDP	291732.90	294044.60	385349.00	202704.00	69418.16	30
MICFBb	705.89	691.93	1689.00	109.71	416.23	30
MORTBb	973.26	734.09	2923.35	161.09	808.62	30
REM	3.71	4.16	8.31	0.12	2.34	30
RIR	0.66	4.57	14.34	-52.60	15.11	30
MICFBa	0.34	0.25	1.74	0.06	0.36	30
MORTBa	0.37	0.34	0.87	0.10	0.22	30
TOPEN	25.98	27.16	40.91	10.56	8.03	30
URBAN	40.73	40.38	52.28	30.68	6.88	30

Explanatory Note: FINLIB = financial liberalization, FOPEN = financial openness, GOV = governance indicator, LIT = literacy rate, PCGDP = per capita GDP, MICFBb = per capita microfinance bank, PCMORTBb = per capita mortgage bank, REM = remittances, RIR = real interest rate, MICFBa = percentage of microfinance bank, MORTBa = percentage of mortgage bank, TOPEN = trade openness and URBAN = urbanization rate, while N = total number of observation is 30.

Figure 1: Trend of FOPEN, GOV, LIT, PCGDP, PCMICFB and PCMORTB

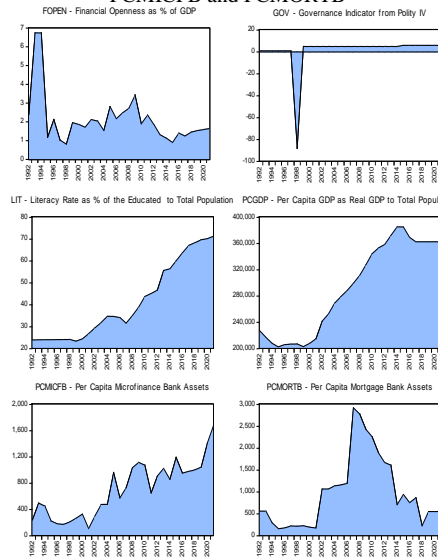
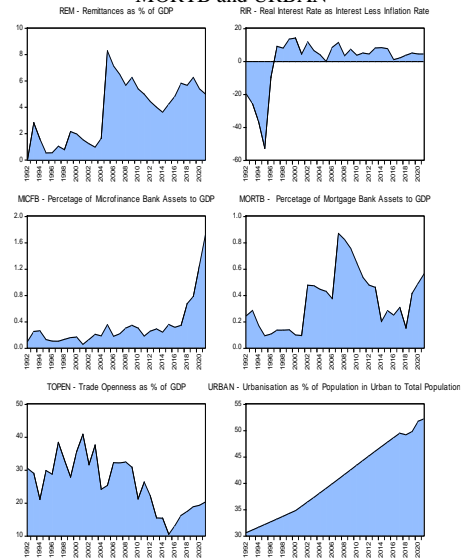


Figure 2: Trend of REM, MICFB, TOPEN, RIR, MORTB and URBAN



Note: MICFBa = microfinance bank assets when expressed in relation to GDP; MICFBb = microfinance bank assets when expressed in per capita terms; MORTBa = mortgage banks assets when expressed in relation to GDP; MORTBb = mortgage banks assets when expressed in per capita terms. FINLIB = financial liberalization; FOPEN = financial openness; LIT = literacy rate; TOPEN = trade openness; PCGDP = per capita GDP; REM = remittances; RIR = real interest rate; URBAN = urbanisation rate, GOV = indicator of governance

It is shown in Figure 1 and 2 that all the graphs show zigzag shapes at different periods with exception of GOV, LIT, per capita GDP and urbanization. None of the variables traverse beyond and negative side except RIR.

Table 2: Correlation Matrix of the Dependent and Explanatory Variables

Variables	FINLIB	FOPEN	GOV	LIT	PCGDP	PCMICFB	PCMORTB	REM	RIR	MICFB	MORTB	TOPEN	URBAN
FINLIB	1.00												
FOPEN	-0.45 (0.01)	1.00											
GOV	0.01 (0.96)	0.13 (0.49)	1.00										
LIT	0.50 (0.00)	-0.37 (0.04)	0.25 (0.18)	1.00									
PCGDP	0.59 (0.00)	-0.32 (0.09)	0.30 (0.10)	0.71 (0.00)	1.00								
MICFBb	0.50 (0.00)	-0.11 (0.55)	0.29 (0.12)	0.84 (0.00)	0.87 (0.00)	1.00							
MORTBb	0.40 (0.03)	0.08 (0.66)	0.21 (0.27)	0.07 (0.71)	0.42 (0.02)	0.39 (0.03)	1.00						
REM	0.56 (0.00)	-0.01 (0.94)	0.30 (0.11)	0.59 (0.00)	0.71 (0.00)	0.76 (0.00)	0.55 (0.00)	1.00					
RIR	0.78 (0.00)	-0.49 (0.01)	-0.02 (0.93)	0.20 (0.11)	0.38 (0.04)	0.27 (0.16)	0.30 (0.11)	0.35 (0.06)	1.00				
MICFBa	0.26 (0.17)	-0.10 (0.61)	0.15 (0.42)	0.71 (0.00)	0.51 (0.00)	0.77 (0.00)	-0.08 (0.67)	0.42 (0.02)	0.11 (0.55)	1.00			
MORTBa	0.14 (0.02)	0.10 (0.59)	0.24 (0.21)	0.22 (0.24)	0.47 (0.01)	0.56 (0.00)	0.91 (0.00)	0.59 (0.00)	0.32 (0.09)	0.27 (0.15)	1.00		
TOPEN	-0.23 (0.22)	0.14 (0.47)	-0.21 (0.27)	-0.79 (0.00)	-0.76 (0.00)	-0.68 (0.00)	0.00 (0.99)	-0.41 (0.02)	0.00 (0.98)	-0.43 (0.02)	-0.03 (0.88)	1.00	
URBAN	0.65 (0.00)	-0.40 (0.03)	0.27 (0.15)	0.77 (0.00)	0.75 (0.00)	0.89 (0.00)	0.27 (0.14)	0.70 (0.00)	0.44 (0.02)	0.67 (0.00)	0.40 (0.03)	-0.71 (0.00)	1.00
	FINLIB	FOPEN	GOV	LIT	PCGDP	PCMICFB	PCMORTB	REM	RIR	RMICFB	RMORTB	TOPEN	URBAN

Explanatory Note: FINLIB = financial liberalization, FOPEN = financial openness, GOV = governance indicator, LIT = literacy rate, PCGDP = per capita GDP, MICFBb = per capita microfinance bank, PCMORTBb = per capita mortgage bank, REM = remittances, RIR = real interest rate, MICFBa = percentage of microfinance bank, MORTBa = percentage of mortgage bank, TOPEN = trade openness and URBAN = urbanization rate, while N = total number of observation is 30.

From Table 2 above which shows the correlation coefficients of the pairs of variables employed in the study, it is shown that none of the pairs of the explanatory variables has correlation coefficients that is higher than 0.8, which is a bench-mark rule of thumb. So, none of the explanatory variables are highly correlated.

In estimating the result of the four equations, ARDL model is employed. The first regression result is that of equation for MICFB as the dependent variable and the independent variables are financial openness (FOPEN), literacy rate (LIT), trade openness (TOPEN), per capita GDP (PCGDP), real interest rate (RIR), governance indicator (GOV), remittances (REM), conversion dummy (CONVDUM) and urbanisation rate (URBAN). The second regression result, on the other hand, is that of equation for MORTB as the dependent variable that has the same set of explanatory variables as for the aforementioned MICFB equation with the exception of the conversion of microfinance dummy (CONVDUM), which is now replaced by the Mortgage Warehouse Fund dummy (MWFUDUM). The purposes being served by these two dummies are as stated in Section 3. The results are presented in Table 3. The dependent variables were expressed as ratios of GDP, which is in line with the tradition for measuring financial depth indicators as used by virtually all the existing studies, while the dependent variables are alternatively expressed in per capita terms. This is somewhat a departure from the tradition and the justification for this is that financial aggregates are direct benefit to human beings and is not directly beneficial to GDP. In other words, this forms an area of contribution to knowledge by the current study as no existing study reviewed measured financial depth indicators in this manner and, indeed, no known study has modelled financial depth indicators pertaining to non-deposit money banks,

whether expressed in relation to GDP, in real per capita terms or in whatever other alternative forms. The models are limited to only MICFB and MORTB due to non-availability of data for other non-deposit money bank-related financial depth indicators that should have been covered, particularly financial depth indicators pertaining to development banks.

Table 3: Results of Short-run ARDL Estimations for MICFB and MORTB Models when the Dependent Variables are expressed as Percentages of GDP and in Per Capita Terms

VARIABLES	MICFBa Model		MICFBb Model		MORTBa Model		MORTBb Model	
	Coeff	VIF	Coeff	VIF	Coeff	VIF	Coeff	VIF
FINLIB	0.027*** (3.128)	4.22	5.149*** (3.113)	4.37	0.288 (0.432)	5.34	4389.421 (0.402)	5.88
FOPEN	0.043*** (4.021)	2.87	-18.298 (-0.077)	3.21		2.11	4347.686 (0.722)	2.56
GOV	0.002 (0.218)	3.33	496.264 (0.376)	1.89	0.024 (0.732)	3.15	83.223 (0.114)	1.35
LIT	-0.053*** (3.114)	4.88	-321.05*** (-2.928)	2.91	-0.054 (-1.563)	4.10	-354.876 (-1.002)	2.44
PCGDP	-0.001 (-1.441)	5.78	192.179*** (3.991)	6.79	0.001*** (2.562)	6.14	231.272** (2.845)	5.56
REM	0.030*** (2.933)	4.47	238.777 (0.502)	5.98	0.013 (0.342)	4.99	403.714 (0.343)	5.00
RIR	-0.062 (-0.104)	7.53	-657.266*** (-2.856)	7.54	-0.036** (-2.781)	8.15	-847.57** (-2.116)	8.33
TOPEN	-0.011 (-0.544)	4.77	-1.514 (-0.177)	6.83	0.034** (2.482)	6.44	408.971** (2.593)	7.14
URBAN	-0.031 (0.216)	5.89	5368.620 (-0.325)	5.48	0.034 (0.821)	4.80	275.850	5.00
CONVDUM	0.161 (2.627)	2.5	3.916*** (3.203)	2.17	-	-	-	-
MWFDUM	-	-	-	-	0.757** (2.370)	2.37	0.371*** (3.008)	1.34
C	0.200 (0.421)	-	16638.013 (-1.806)	16638.013	-2.182 (-1.546)	-	-33750.131	-
R ²	0.882	-	0.811	0.811	0.892	-	0.888	-
Adjusted R ²	0.862	-	0.794	0.794	0.871	-	0.834	-
F-statistic for R ²	21.220***	-	25.721***	25.721	8.086***	-	8.321***	-
Hetero(χ^2)	1.421	-	1.562	1.562	2.111	-	1.302	-
S/Corr.(χ^2)	1.632	-	0.788	0.788	0.711	-	1.243	-
Jarq-Bera	0.254	-	0.222	0.222	1.327	-	-	-
N	30	-	30	30	30	0.515	-	-

Note: The following are the meanings of the acronyms used: MICFBa = microfinance bank assets when expressed in relation to GDP; MICFBb = microfinance bank assets when expressed in per capita terms; MORTBa = mortgage banks assets when expressed in relation to GDP; MORTBb = mortgage banks assets when expressed in per capita terms. FINLIB = financial liberalization; FOPEN = financial openness; LIT = literacy rate; TOPEN = trade openness; PCGDP = per capita GDP; REM = remittances; RIR = real interest rate; URBAN = urbanisation rate, GOV = indicator of governance, CONVDUM = conversion dummy and MWFDUM = Mortgage Warehouse Fund Dummy. Coeff is the coefficient of each variable with t-statistics in parentheses, The F-stat is the coefficient of F-Statistics, VIFa and VIFb are the variance inflation factor for MICFBa and MORTBa, and MICFBb and MORTBb models respectively and N = number of observation. The heteroscedasticity, serial correlation and Jarque-Bera tests statistic are denoted as Hetero(χ^2), S/Corr.(χ^2) and Jarq-Bera respectively. *** and ** means the coefficients are significant at 1% and 5% significance level respectively.

Source: Author's computation (2022)

Evaluation of Diagnostic Test Results for the Estimates

This sub-section is on the evaluation of the goodness of fit as well as the results of the diagnostic tests in respect to the estimates of the non-deposit money bank models reported in Table 3. The diagnostic tests are on the heteroscedasticity, serial correlation, multi-collinearity, normality in the distribution of residuals, model's stability and model misspecification. The evaluation of goodness of fit is first carried out below in Paragraph (a), after which the diagnostic test results were evaluated sequentially in the aforementioned order in Paragraphs (b) to (g). It can be seen from Table 3 that the R^2 are 0.88, 0.89, 0.811 and 0.88 for MICFBa, MORTBa, MICFBb and MORTBb models respectively, with F-statistics that is significant at 5% significance level. These indicate the respective percentages of variations in the dependent variables that have been explained by the explanatory variables. The Breusch-Pagan-Godfrey test for heteroscedasticity that is conducted shows the test statistics of 1.263 for MICFBa and 2.239 for MORTBa, with respective p-values of 0.527 and 0.452 when the two dependent variables are expressed as percentages of GDP. When the two variables are expressed in per capita terms, the test statistics are 1.222 for MICFBb and 1.113 for MORTBb, with corresponding p-values of 0.434 and 0.388. Based on the decision rule the null hypothesis of no heteroscedasticity cannot be rejected. Therefore, none of the equations suffers from the problem of heteroscedasticity. The Breusch-Godfrey test for the existence of autocorrelation that is conducted shows the test statistics of 1.567 and 0.623 for MICFBa and MORTBa models respectively, with corresponding p-values of 0.357 and 0.483, when the two variables are expressed in relation to GDP. The test statistics for MICFBb and MORTBb are 0.825 and 0.953 respectively, with p-values of 0.470 and 0.368, when the two variables are expressed in per capita terms. This implies that none of the models suffers the serial correlation problem.

The generated JB values, as reported in Table 3, are 0.254 and 1.327 for MICFBa and MORTBa models respectively, with corresponding p-values of 0.081 and 0.515. Also, the JB values are 0.222 and 0.500 for MICFBb and MORTBb models respectively, with corresponding p-values of 0.895 and 0.779. This means that the error terms are normally distributed and none of the models has the problem of non-normality in the distribution of residuals, regardless of whether the financial depth indicators are expressed as percentages of GDP or in real per capita terms. Using 10 as the benchmark for the rule of thumb of considering a variable of being collinear, the minimum and maximum VIF values with respect to MICFBa model are 2.50 and 7.53 respectively while that of MORTBa model are 2.11 and 8.43 respectively. Also, it is shown that the lowest and highest VIF values in respect of the MICFBb model are 1.89 and 7.54 while that of MORTBb model are 1.34 and 9.09 respectively. It means that none of the explanatory variables is too highly collinear with other explanatory variables in the models, irrespective of whether the financial depth indicators are expressed as percentages of GDP or in real per capita terms.

Evaluation of Performance of Explanatory Variables in the Equations

Financial Liberalisation (FINLIB): Concerning the estimates of FINLIB where the dependent variables are expressed as percentages of GDP, as reported in Table 3, the coefficients of FINLIB in the MICFBa and MORTBa models are 0.027 and 0.288 respectively. Also, the coefficients of FINLIB in the MICFBb and MORTBb models (when the dependent variables are expressed in per capita terms) are 5.149 and 4389.421 respectively. Based on the foregoing, FINLIB has positive effect on MICFB and no effect on MORTB, irrespective of whether the two variables are measured as percentages of GDP or in real per capita terms. Going by the positive effect of FINLIB on MICFB, the finding is in line with the postulation of the study. The observed ineffectiveness of the FINLIB on MORTB may be due to the fact that mortgage institution in Nigeria is just evolving and yet to be as robust as financial institutions like deposit money banks and others.

Financial Openness (FOPEN): when the financial depth indicators are expressed as percentage of GDP, the coefficients of FOPEN in the MICFBa and MORTBa models are 0.043 and 0.024 respectively. Similarly, when the dependent variables are expressed in real per capita terms, as reported in Table 3, its coefficients in the MICFBb and MORTBb models are -18,298 and 4347.686 respectively. Based on the above results, FOPEN has positive impact on MICFB when expressed as a percentage of GDP, but has no impact on MORTB, irrespective of how it is expressed, and no effect on MICFB, when it is expressed in real per capita terms. Based on the positive effect of FOPEN on MICFB, the finding is in consonance with the postulation of the study. The ineffectiveness of FOPEN on MORTB may be due to the fact that most of the foreign investment are not channeled toward primary mortgage banks financial institutions.

Governance (GOV): in Table 3 where the estimates are reported in respect of the dependent variables that are expressed as percentages of GDP, the coefficients of GOV in the MICFBa and MORTBa models are 0.002 and 0.001 respectively. Likewise, when expressing the variables in real per capita terms, as reported in Table 3, the coefficients of GOV in the MICFBb and MORTBb models are 496.264 and 83.223 respectively. Based on the above results, governance has no effect on MICFB and MORTB models irrespective of whether the two financial indicators are expressed as percentages of GDP or real per capita terms. The result is not in line with the study postulations. The lack of effect of governance on the financial depth indicators may be due to inappropriateness of what is actually adopted as the proxy for GOV in the sense that it may not truly capture the essence of governance that matters for financial development.

Literacy Rate (LIT): Considering Table 3, it is revealed that the coefficients of LIT in MICFBa and MORTBa models (where the dependent variables are expressed as percentages of GDP) are -0.053 and -0.054 respectively. Also, the coefficients of LIT in the MICFBb and MORTBb models (where the dependent variables are expressed in per capita terms) are -321.050 and -354.876 respectively. Based on the results above, it is concluded that LIT has negative effects on MICFB and has no effect on MORTB, irrespective of whether the variables are expressed as percentages of GDP or in real per capita terms. This is not in line with the

postulation of the study. The observed negative effect on MICFB may be due to lack of willingness of literate people to bank with microfinance banks because of their relative familiarity and comfort with more sophisticated banks like deposit money banks, suggesting that these more sophisticated banks deprive microfinance banks of literate customers.

Per Capita GDP (PCGDP): From Table 3, it is revealed that the coefficients of PCGDP in the MICFBa and MORTBa models (where the dependent variables are expressed as percentages of GDP) are -0.001 and 0.001 respectively. Also, the coefficients of PCGDP in the MICFBb and MORTBb models (where the dependent variables are expressed in per capita terms) are 192.179 and 231.272 respectively. Going by this results, it is concluded that PCGDP has positive effects on MORTB irrespective of whether it is expressed as a percentage of GDP or in per capita terms, a positive effect on MICFB when it is expressed in per capita terms, and no effect on MICFB when it is expressed as a percentage of GDP. Therefore, based on the preponderance of evidence, per capita GDP has positive effects on MORTB and MICFB, even though the evidence in support of its positive effect on MICFB that is expressed in relation to GDP is not all that convincing. These observed positive effect are in consonance with the postulation of the study. The finding is incomparable with the previous study, as none of the studies employed microfinance and mortgage banks' assets as indicators of financial depth.

Remittances (REM): In Table 3, the coefficients of REM in the MICFBa and MORTBa models (where the dependent variables are expressed as percentages of GDP) are 0.030 and 0.013 respectively. Similarly, its coefficients in the MICFBb and MORTBb models (where the dependent variables are expressed in per capita terms) are 238.777 and 403.714 respectively. Based on the evidence above, REM has positive effect on only the MICFB when it is expressed as a percentage of GDP, has no effect on it when it is expressed in per capita terms, and has no effect on MORTB, irrespective of whether it is expressed as a percentage of GDP or in per capita terms. With reference to the positive effect of REM on MICFB, this is in conformity with the study postulations in Sub-section 3 but the finding is incomparable with the previous study, as none of the studies employed microfinance and mortgage banks' assets as indicators of financial depth.

Real Interest (RIR): As reported in Table 3, where the dependent variables are expressed as percentages of GDP the coefficients of RIR in the MICFBa and MORTBa models are -0.062 and -0.036 respectively. Similarly, the dependent variables are expressed in per capita terms, the coefficients of RIR in the MICFBb and MORTBb models are -657.266 and -847.570 respectively. Based on this evidence, it is concluded that RIR has a negative effect on the MORTB irrespective of whether it is expressed as a percentage of GDP or in per capita terms, while it has a negative effect on MICFB only when it is expressed as a percentage of GDP, with no convincing evidence of its negative effect on MICFB that is expressed in per capita terms. This negative effect of RIR on MORTB and MICFB is not inconformity with our postulations in Sub-section 3. The rationale for this lies in the fact that increase in real interest rate discourages the borrowers from borrowing money from microfinance or mortgage banks, thereby reducing the profits of the

banking institutions and consequently leading to a reduction in the assets of the banking institutions.

Trade Openness (TOPEN): As reported in Table 3, where the dependent variables are expressed as percentages of GDP, the coefficients of TOPEN in the models for MICFBa and MORTBa are -0.011 and 0.034 respectively, with p-values of 0.601 and 0.017. Also, where the dependent variables are expressed in per capita terms, the coefficients of TOPEN in the equations for the MICFBb and MORTBb are -1.514 and 408.971 respectively, with p-values of 0.863 and 0.010. Based on the evidence above, TOPEN has a positive effect on only the MORTB, with no effect on MICFB, irrespective of whether they are expressed as percentages of GDP or in per capita terms. The positive effect of TOPEN on MORTB is in tandem with the postulation of this study in Sub-section 3. The rationale for the lack of an effect of TOPEN on MICFB is due to the fact that the operation of microfinance banks are limited to financing of small scale businesses and not financing international transactions.

Urbanisation (URBAN): From the table, where the dependent variables are expressed as percentages of GDP, the coefficients of URBAN in the MICFBa and MORTBa models are -0.031 and -0.034 respectively. Considering where the dependent variables are expressed in per capita terms, the coefficients of URBAN in the MICFBb and MORTBb models are 5368.620 and -5036.317. Based on the evidence above, urbanisation (URBAN) has no effect on financial depth relating to microfinance banks and mortgage bank, whether they are expressed in relation to GDP or in per capita terms. The finding is not in consonance with the postulation of the study, where a positive effect is posited. The reason for these may not be unconnected with the perception of the people about the mortgage and microfinance banks as unsophisticated financial institutions and, hence, not the darling banks for urban communities.

Conversion Dummy: (CONVDUM): as reported in the table, where the dependent variables are expressed as percentages of GDP, the coefficient of CONVDUM in MICFBa model is 0.161, with a p-value of 0.003 while its coefficient where dependent variables are expressed in per capita terms is 3.916. Based on this evidence, it is concluded that the period of conversion of community banks to microfinance banks has expansionary influence on microfinance bank assets and, by extension, financial depth, irrespective of whether it is expressed as a percentage of GDP or in per capita terms. This is in line with the postulation of the study in Section 3.

Mortgage Warehouse Fund Dummy (MWFDUM): In Table 3, where MORTB is expressed as percentages of GDP, the coefficient of MWFDUM in the model is 0.757, with a p-value of 0.021, while its coefficient when MORTB is expressed in per capita terms, is 0.371. Based on the evidence above, it is concluded that the introduction of mortgage warehouse fund has an expansionary influence on mortgage banks assets and, by extension, financial depth, irrespective of whether it is expressed as a percentage of GDP or in per capita terms. This is in line with the postulation of the study in Section 3.

5. Conclusion and Recommendations

It is concluded that the conversion of community banks to microfinance banks policy and the introduction of mortgage warehouse fund have expansionary effects on microfinance banks and mortgage banks respectively. In the same vein, it is concluded that literacy rate is negative on the microfinance bank assets only. Finally, the study has succeeded in coming up with empirical evidences that meet its specific objectives and provide concrete answers to the corresponding research questions. In the same way, the empirical evidences have refuted each of the null hypotheses put forth.

The finding shows that financial policies and reforms with respect to each segment of financial system (with such policies and reforms being the introduction of mortgage warehouse fund and conversion of community banks to microfinance banks) have positive effects on the targeted financial depth indicators. Thus, for there to be further deepening of the various segments of financial system, the study recommends that policy makers should strengthen such existing policies and also increase the number of similar policies and reforms with respect to each indicator of financial depth. Also, it is shown that literacy rate has negative effect on microfinance bank assets which may be as a result of lack of confidence in educated people in banking services of microfinance banks. The policy makers in banking sector are expected to formulate policies that will strengthen the operations of microfinance banks so as to earn the confidence of the educated people just like deposit money banks.

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