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The Effects of Capital Adequacy Requirements on Banks' Market Share in Tanzania

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Abstract
This study investigated how, in the course of implementing the capital adequacy requirements, particularly the Capital Adequacy Ratio (CAR), might have effects on banks' market share in Tanzania. Specifically, the study investigated the significance and relationship between changes in the CAR to the banking sector's profitability in general and individual bank profitability in particular. The Herfindahl Hirschman Index (HHI) is an independent variable used to measure banks' market share. We obtained a sample of twenty-one banks from the population of sixty-three banks in the Tanzanian banking industry as at December 2016. Main source of secondary data was the Banking Supervision Information System (BSIS) covering the period of fifteen years, from 2002 to 2016. The study used the Pooled Effects Model (Pooled OLS Regression model) and the Fixed Effects Model to analyse the impacts of capital adequacy requirements on banks' market share. Further, the Seemingly Unrelated Regressions (SUREG) were also performed and discussed in order to address problems relating to individual heterogeneity, which were omitted in the model applied. The results revealed that although in general terms capital adequacy requirements have been proved not to influence banks' market share, the individual bank analyses have proved statistically that they do. It is recommended therefore that in addition to the overall capital adequacy requirements prescribed by the BOT in place, banks should be encouraged to develop their internal capital adequacy requirements by developing the Internal Capital Adequacy Assessment Process (ICAAP) as required by Basel II. These are the banks' privately-optimal capital levels whose determination takes into account circumstances and peculiarity of a particular bank including its risk profile. Through this way banks will be able to know at what capital levels their performance might be impacted negatively or positively and thus make informed decisions in as far as banks' capital management is concerned.

Keywords: Capital adequacy, Risk Management and Market Share.

1.0 INTRODUCTION

1.1 Background

A salient feature of banking business is to serve as an intermediary. That is to lend money to borrowers and receive funds from depositors (Cheng-Few & John Lee, 2010). In order to facilitate the intermediation process, a bank must have its capital. Bank capital is part of wealth that is used for production of banking services and minimizes the likelihood of bank failures. Adequate Capital is a critical component in any contemporary banking business. Capital adequacy is a necessary regulatory instrument for ensuring solvency in the financial system. As capital is a key ingredient in the production of banking services, its adequacy invariably results into better bank performance to the satisfaction of not only shareholders and borrowers but also other stakeholders in the

economy including the Government. Shareholders' interest lies with wealth maximization that is mainly attained through profits generation by banks. Capital adequacy makes it possible for banks to enhance their market share as banks will be able to attract more customers (depositors and borrowers) and establish more delivery and lending channels which in turn increase banks' wealth through profitability. At the end of it all, financial development that mobilizes savings thus increased market share helps boost financial inclusion and deepening (Sahay, R., et al., 2015). The increased lending channels particularly opening of branches and agencies to the unbanked population usher in deposits from the public and enhance banks' market share through recruiting more customers in their locality.

The technical challenge on its policies has always been to determine how much capital is necessary to serve as a sufficient buffer against unexpected losses. If capital levels are too low, banks may be unable to absorb high levels of loss. Roggi, O. & Altman, E. I., (2013), assert that low financial leverage, i.e., high equity capital will enhance the positive effects of risk management effectiveness. Impliedly, excessively low levels of capital increase the risk of bank failures, which, in turn, may place depositors' funds at risk. If capital levels are too high, banks may not be able to make the most efficient use of their resources, which may constrain their ability to make credit available. However, capital adequacy has been changing to reflect financial and economic fundamentals of banking industry. For instance, following the 2008 global financial crisis, initiatives were instituted to strengthen the financial regulatory system, which was endorsed by the G20 Leaders culminated into issuance of Basel III by the BCBS. The Basel III capital accord was not meant to replace Basel II instead it was intended to enhance the requirements set out in Basel II by addressing gaps that unfolded during the recent crises relating to two main areas of Capital Adequacy and Liquidity. "Basel III" is a comprehensive set of reform measures, developed by the BCBS, to strengthen the regulation, supervision and risk management of the banking sector. The reforms target two complementary approaches to supervision, namely, bank-level (microprudential) regulation, which will help raise the resilience of individual banking institutions in periods of stress and system-wide risks (macroprudential) that can build up across the banking sector (BCBS 2011).

Similarly, the Bank of Tanzania (BOT) has been regularly reviewing minimum capital requirements for banks to take on board new developments in the industry as well as global practices. For instance, in its Board of Directors' meeting held on 24th September 2009, the Banking Supervision Committee of the Board of Directors that directed to review the Capital Adequacy in line with best practices within EAC member states, Basel II Capital Adequacy Framework, other jurisdictions as well as the recommendations given by Financial Sector Assessment Program (FSAP) done 2009. The Basel standards are silent on what is supposed to be the absolute minimum core capital requirements but they only prescribe minimum regulatory capital ratios. Consequently, after the capital review by BOT, the Government of Tanzania gazetted the new minimum capital requirements for commercial banks and community banks on February 23 and June 22, 2012 respectively. In its implementation, BOT issued a moratorium of three and five years for existing fully fledged commercial banks and community banks respectively to fully comply with the new minimum capital requirements following new regulations. It is the onus of the BOT to prescribe additional capital requirements based on the risk profile of a banking institution. Faten Ben Bouheni, (2014) proved empirically that restrictions on bank capital adequacy decrease risk-taking. Hitherto the BCBS recommends a minimum core and total capital to risk-weighted-assets and off-balance-sheet-exposure ratios of 8 percent and 10 percent, respectively.

Therefore, banks and financial institutions in Tanzania have to comply with all the capital adequacy requirements by maintaining adequate level of capital and standards in order to protect them against the risk of loss that may arise out of their business activities with a view to promote and maintain public confidence in the banking sector. It is in the process of complying with the regulatory capital requirements, banks' market share may be enhanced or decimated. This was the major focus of this study.

1.2 Statement of the Problem

As part of review of the capital adequacy requirements, the BOT changed the legal minimum absolute capital requirements of commercial banks from TZS 1,000.00 million to TZS 5,000.00 million in 2008 (an increase by about 500 percent). About four years later in 2012 the requirement increased by three times the amount to TZS 15,000.00 million. Community banks experienced a more or less similar situation, as they were required to start operations and maintain a minimum absolute core capital of TZS 50.00 million until the year 2008 when the

amount skyrocketed to TZS 250.00 million. It took only about seven years to raise the requirement by about 800 percent to TZS 2,000.00 million in 2012.

There are conflicting views as whether or not the imposition of capital requirements has positive effects on banks' performance as propounded by Barth, et al (2004), Santos (2001) and Gorton and Winton (2003). On the one hand, some scholars supported the views that increase in capital requirement have positive impact and is a necessary evil in order to protect the depositors' funds and they serve as prudential measures that mitigate the effects of economic crises on the stability of the banking system and subsequent accompanying macroeconomic results (e.g. Naceur, et.al. 2009; Eric Osei-Assibey Joseph Kwadwo Asenso, 2015; Kashyap, Rajan and Stein,2008; BIS, 2010; Acharya, Mehran and Thakor, 2011).

On the other hand, other scholars are of the view that existing capital requirements are arbitrary and inadequate, therefore adding more and more layers of arbitrary regulation would be counter-productive to the banking industry (Alan Greenspan, 1998; Oladejo & Oladipupo 2011). Simultaneously, as banks become more constrained, their ability to expand credit and contribute to economic growth through its financial intermediation role will be hampered during normal times (Naceur, et.al. 2009). It is not clear whether or not the practice of BOT to review capital adequacy requirements have positive or negative impact on banks' performance, particularly on market share. It is against this background that this study assesses the effect of capital regulations, namely the capital adequacy ratio, on banks' market share in Tanzania.

2.0 STYLIZED FACTS OF THE TANZANIA'S BANKING SECTOR

2.1 Overview of Tanzania's Banking Sector

The Tanzania's banking system constitutes a large part of financial institutions, which are comprised of commercial banks and deposit taking non-commercial bank financial institutions. A large part of the banking system in the country is composed mainly of commercial banks. Since 1991, financial sector in Tanzania has experienced fundamental changes pertaining largely to economic liberalisation process. Considering the banking sector in particular, some important noticeable changes include privatisation of the previously publicly owned banks, re-establishment of foreign banks in the country, start-up of new domestic banks, and increased competition in the banking service. The process of financial intermediation in the country depends greatly on commercial banks.

As at 31st December, 2016, the number of supervised institutions in Tanzania was 68 with a total number of branches of 728. The branches were concentrated in the major cities of the country namely Dar es Salaam, Mwanza, Arusha and Mbeya. As at the date, the banking sector assets were highly concentrated on only a handful of banks. Out of the 68 banking institutions operating in the country only four of them, namely, CRDB Plc, NMB Plc, Standard Chartered Bank and NBC Limited had asset base which accounted for about 50 percent of the market share. The banks were driving the market with asset base accounting for market share of 20, 17, 6, 6 percent respectively.

The banking sector is characterized by simple balance sheets, with limited or insignificant business in derivative instruments at present and off-balance sheet business mainly takes the form of letters of credit, guarantees and acceptances. The balance sheets are mainly comprised of deposits, and loans and advances, both overdrafts and term loans and the main financial instruments in the trading book were government securities. Ideally, as managers strive for more earnings, it is likely that they would increase the cost of intermediation in terms of charges and fees in order to enhance profits. The ratios in the table above behaved conversely, it is suggestive that managers were investing lesser in earning assets than investments made on non-earning assets.

2.2 Policy Review on Capital Regulations in Tanzania

Section 17 (1) (a) of the BAFIA, 2006 requires banks to commence operations and maintain at all times a minimum of core capital of not less than TZS 5,000 million and ratios of core capital as well as total capital to total risk weighted assets and off balance sheet exposures, of not less than 10 percent and 12 percent, respectively. However, absolute capital for TZS 15.00 billion for commercial banks was reviewed in 2012 as per section 9 of the Financial Laws (Miscellaneous Amendments) Act, 2012. The legal absolute capital requirements

and the capital adequacy ratios have been amplified under the regulation 9 of the *Banking and Financial Institutions (Capital Adequacy) Regulations, 2014*.[1] The same section required banks with core capital of less than the new prescribed amount to be given a moratorium period of three years to increase their core capital to the minimum legal requirement. The three-year period ended in February 2015, the time when the new capital level became effective for all commercial banks. Regulation 18 (1) of the *Banking and Financial Institutions* (*Capital Adequacy) Regulations, 2014* empowers Bank of Tanzania to prescribe additional capital requirements based on the risk profile of a bank or financial institution. Currently, BOT is in process of instituting capital buffers by raising the minimum CAR by 2.5 percent.

However, about a year later in 2015 the BOT amended regulation 9 of the Capital Adequacy Regulations, 2014 through the *Banking and Financial Institutions (Capital Adequacy) (Amendment) Regulations, 2015*. The amendment added a new sub-regulation, which provides that '*Banks and financial institutions shall be given a moratorium of three years from the date of publication of these Regulations to comply with the requirements provided under sub-regulation*'. The regulations with amendments were signed on 27th February, 2015 and they shall be fully enforceable starting March 2018. The amendment also involved changes on the specific Minimum Core Capital Requirements for different categories of all Banks and Financial Institutions operating in Tanzania as shown in the schedule of Minimum Core Capital Requirements for as made under regulation 5 of the primary regulations *(i.e. The Banking and Financial Institutions (Capital Adequacy) Regulations, 2014).* The new schedule is indicated herein as ***Annexure 7***. Regulation 15 of the *Banking and Financial Institutions (Capital Adequacy) Regulations, 2015* require banking institutions to include only fifty per cent of the year to date profits where accounts are unaudited in determining the amount of available capital for the purposes of computing the minimum capital. To observe the conservatism principle of accounting the 100 percent profits are ought to consider only if they are audited.

Section 27 of the *Banking and Financial Institutions Act, 2006* requires that any bank or financial institution should obtain approval of the Bank to establish, relocate or close down the business of a banking unit. BOT shall ensure that the bank or financial institution concerned has complied with all regulatory requirements particularly the minimum capital requirements. Further, BOT restricts incurrence of capital expenditure for establishment banking units and subsidiaries without its prior approval.[2] For example, it is punishable under the regulations to establish a branch, agency or service center without seeking prior approval from BOT and failure to meet the minimum legal capital requirements for establishment of the same and some banks sustained financial penalties for operating agent banking operations without BOT approval against Guideline 5.2 of the *BOT Agent Banking Guidelines 2013.*

The current capital requirements framework of BOT is largely based on Basel I framework for credit risk including the 1996 market risk amendment. The framework uses the Standardized Approach for credit risk which has also been revised early 2016. For market risk the BOT implemented the standardized approach which has however undergone a major revision and the revised standard which becomes effective 2019. After describing the relationship between banks' performance in Tanzania and the regulatory capital requirements and standards, the following chapter provides literature review, where banks' performance indicators in relation to capital adequacy requirements, theoretical and empirical underpinning of the capital adequacy requirements are discussed.

[1] Regulation 9 of the *Banking and Financial Institutions (Capital Adequacy) Regulations, 2014* on Capital adequacy ratios, requires that 'A bank or financial institution shall at all times maintain minimum core capital of not less than twelve and one half per cent of its total risk-weighted assets and off balance sheet exposure; and total capital of not less than fourteen and one half per cent of its total risk weighted assets and off balance sheet exposure.

[2] Regulation 29 of the *Banking and Financial Institutions (Licensing) Regulations, 2014* requires that 'A bank or financial institution shall not invest in capital expenditure for the purpose of opening a representative office, subsidiary, branch, agency or additional office in or outside Tanzania unless it has obtained the prior approval of the Bank'.

3.0 LITERATURE REVIEW

3.1 Theoretical Literature Review

Literature on impact of capital adequacy requirements on banks' market share is relatively scanty. However, there are a number banking theories recently posited which suggest a positive relation between capital and market share (e.g., Allen, Carletti, and Marquez, 2011; Mehran and Thakor, 2011). Allen, Carletti, and Marquez (2011) posit that when good lending opportunities are in short supply, borrowers may demand that banks commit to monitoring by requiring that they use some of their own capital in lending, thus creating an asset market-based incentive for banks to hold capital. Borrowers can also provide banks with incentives to monitor (capital holding) by allowing them to reap some of the benefits from the loans, which accrue only if the loans are in fact paid off. It is further theorized that since borrowers do not fully internalize the cost of raising capital to the banks, the level of capital demanded by market participants may be above the one chosen by a regulator, even when capital is a relatively costly source of funds.

Nonetheless, studies have extensively been done regarding the impact or relationship between market share and profits. Moreover, profits being the major motive for most rational investment of capital can provide a link between market share and capital adequacy requirements. Wind and Mahajan, (1981), hotly debate the relationship between market share and profitability in their study on banks' quest to gain market share for profits. Although it has been proved that an increase in market share is associated, on average, with increased return on investment (Buzzell, Gale and Sultan 1975), the critics raised against their conclusions are overwhelming (Hamermesh, Anderson and Harris 1978; Jacobson and Aaker 1985; Woo and Cooper 1982). A resolution to the tag of war seems to be placing a price tag on the value of a change in market share and evaluating the corresponding changes in the return on investments Cook, Jr. (1985). Further, a change in market share should shift management's attention from internal company performance towards customer needs and competitive positions. Market share is a consequence of interactions between demand and supply (Cook, Jr. 1985). The interactions involve a number of factors including demand factors, supply factors, performance factors and method factors. On the one hand, demand factors determine the extent of the market while supply factors defines the manner in which resources are put at risk. On the other hand, performance factors are the consequence of demand and supply interactions of market share, Net Present Value (NPV) of income and ROI, and method factors influence the validity of conclusions (Cook, Jr. 1985).

When opportunity cost of capital is high, market share is expected to be high too, this is due to the fact that benefits of the foregone alternative course of actions are higher than dividends paid to the shareholders. Ideally, the regulator is more comfortable when banks maintain as much capital as possible to act as armory against probable losses. However, on the part of the bank, maintaining too much capital is so expensive since for every shilling invested, a return on investment is expected to be paid. As more capital is required for banking business implies less deposits will be required in the financing of assets. In other words, a bank will have less leverage as there will be equity deposits trade-offs. Banks will have less incentive to intensify efforts for deposit mobilization as the banks will have adequate loanable funds at their disposal for on lending to the customers. Further, capital adequacy requirements make it mandatory for shareholders to allocate more capital for banking business even if they have other investment ventures wherein they could generate more returns than the returns generated by banks. Meaning that investors are obliged to give up some of the benefits of the foregone alternative investment ventures apart from the banks. This amount to higher opportunity cost of capital on the part of the shareholders.

As the relationship of market share and profits is well researched, investment will be made in a venture, which either make profits or has prospects of doing so. If a bank is making losses or its profitability declining requiring the shareholders to inject capital it may result into two possibilities namely high opportunity cost of capital to the investor and in the short run lessor proportions of deposits vis-à-vis the equity (lower leverage) – it could proportionately lower the market share of the bank. In the end, the injected capital will generate more businesses to the bank through increased delivery channels, enhanced technologies and so on. It is generally accepted that if banks hold more capital at their disposal, they can more easily confront the unforeseeable risks and they are more likely to control the market share, Anwarul Islam (2014). Capital requirements set by the BOT restricts investment in equity of other companies including acquisition of stake in other banks if a bank has capital

deficiencies as per BOT's regulation 27 of the *Credit Concentration and Other Exposure Limits Regulations, 2014.*[1] Impliedly, theoretically the regulation constrained banks to control the market share.

3.2 Empirical Literature Review

The empirical evidence suggests that higher-capital banks are able to compete more effectively for deposits and loans (e.g., Calomiris and Powell, 2001; Calomiris and Mason, 2003; Calomiris and Wilson, 2004; Kim, Kristiansen, and Vale, 2005). On the contrary, the literature on the interaction between a nonfinancial firm's leverage and its product-market dynamics argues that more highly- levered firms compete more aggressively for market share, suggesting that the relation between capital and market share could be negative (e.g., Brander and Lewis, 1986).

Soedarmono, et al (2010), investigated the link between market power (market share) in banking industry and bank risk taking in the Asian context, a region where bank moral hazard becomes one of main concerns for policy makers. Based on a broad set of Asian banks for the period 2001-2007, they estimated a system of three equations that correspond to a translog cost function, to a bank profit maximization revenue function, and to an inverse loan demand function. The investigation indicated that market power increases bank risk. It was also revealed that a higher degree of market power in the banking industry is associated with an increase in bank's total capital ratios. The study findings shown that although banks hold higher capital ratios to absorb losses in less competitive markets - a result which is consistent with Berger et al (2009) who consider a sample of developed economies- the levels of capitalisation are not high enough to offset the impact on default risk of higher risk taking.

In another dimension, Berger and Bouman (2011) investigated how bank capital affect the survival, profitability and market shares of banks during crises and normal times that occurred in the US over the past quarter century using a logit panel regression. The results were two-fold: Firstly, the study show that higher capital increases the survival, market shares and profitability of banks during both normal and crises times. Secondly, capital enhances the performance of medium and large banks primarily during banking crises. These results were achieved in separate panel regressions. It is noteworthy that the study recognized the existence of potential endogeneity between profit and market shares and this was addressed using their lagged values.

Agoraki et al. (2009) in his studies of the 543 banks operating in 13 Central and East European (CEE) countries over the period 1998-2005, using the system GMM estimator, revealed that capital requirements reduce risk in general terms, however the situation may be different for banks with higher market power whereas the impact might be significantly weaker or can be easily reversed. In other words, strict capital requirement should not be imposed in banks with higher market power, since it may erode the bank's goodwill. In a competitive market, there are incentives for banks to keep capital above the regulatory level. In the next chapter, research methodology is presented.

4.0 RESEARCH METHODOLOGY

4.1 Methodological Frameworks

In the banking industry, capital is usually regulated by an apex bank to mitigate bank solvency problems (Bernauer and Koubi, 2002). The theory of capital adequacy is anchored on measures and regulatory requirements towards ensuring that banks have enough capital to take care of their numerous financial obligations. With adequate capital, it is assumed that a bank will be able to not only absorb losses resulting from its business operations but also finance its operations.

Bank's capital therefore depends on a number of factors such as the bank's size, the level of risk involved in its operations, the market forces, the lending policy, its management capabilities, its portfolio, statutory minimum reserves requirement and its growth rate (Bernauer and Koubi, 2002). These are determining factors as to how

[1] Regulation 27 of the *Banking and Financial Institutions (Credit Concentration and Other Exposure Limits) Regulations, 2014* requires that "A bank or financial institution which has a core capital of less than fifteen billion shillings shall not invest in the equity of other companies".

much capital base a bank is supposed to have. For instance, if a bank is to grow (increase market share - with increased deposits and earning assets), it must expand its capital base but at same time keep the risk level constant (Uremadu, 2000). Nevertheless, no matter how many factors and to what extent do they affect the amount of capital of a bank; it must be fully compliant with the legal and regulatory capital requirements.

Adequate capital base of banks provides them with impetus to hire competent personnel hence addressing challenges related to governance, MIS, compliance and risk management and enables acquisition of robust and reliable banking application systems to carry out business operations efficiently. All these aspects are key drivers for increased market share through increased deposits and bank's assets. Requiring banks to have more capital may assure them to generate adequate profits and create value for shareholders and stakeholders. Banks may ploughed back part of their profits into business and retained for further growth. However, prescription of capital requirements may have negative impact on banks' performance due to the facts that attempts to restrict any part of the invested funds to be lent out or invested by the banks renders it unnecessarily costly as no corresponding benefits accrue out of them. In addition, capital adequacy requirements entail making it compulsory for banks to keep more capital in business to comply with regulatory requirements. This means banks will have to incur more cost in form dividend paid for any additional capital and therefore lesser earnings to the banks. Moreover, capital requirements reduce available liquidity for investments. Less liquidity acts as a hindrance for banks to advance more credit to support the growing economy (Heuvel, 2008).

4.2 Model specifications

Theoretical and empirical literature reviewed on market share indicated that market share of a bank is a function of a number of variables including bank's Capital adequacy, Total Assets, Total Deposits. It follows therefore that:

$M = f\{CA, TA, TD\}$ ………………………………………………….……………… (1)

However, it was observed that there were interacting factors which contribute to size of market share of a particular bank which includes bank ownership and size, represented by dummies. The market share variable was represented by two alternatives Herfindahl Hirschman Indices (HHI), namely, Total Assets (HHI^{TA}) and Total Deposits (HHI^{TD}). The equation is specified as:

$$HHI^{TA} = \alpha 0 + \alpha_1 CA + \alpha_2 TA + \alpha_3 TD + \alpha_4 EG + \alpha_5 CAFX + \alpha_6 CABS + \varepsilon_{it} \text{ ……………. } (2)$$

Where:

HHI^{TA} = Market Share Index - A measure of bank's market share;
CA = Capital adequacy (proxy by shareholder's funds);
TA = Total Assets (Bank Size);
TD = Total Deposits;
CAFX = The binary variable which is equal to 1 if bank i is foreign owned, and zero otherwise;
CABS = The binary variable which is equal to 1 if bank i is large bank (member of peer group 1), and zero otherwise;
ε_{it} = Error term that captures other variables not explicitly included in the model.

In equation (2) above ε is the error term that captures other variables not explicitly included in the model. Moreover, it is expected that:

α = intercept
α_1, α_2, α_3 α_4, α_5 and α_6 are the various slope coefficients
α_1, α_2, α_3, α_4, α_5 and α_6 >0

4.3 The Herfindahl Hirschman Index (HHI)

4.3.1 The HHI – As the Measure of Competition

The Herfindahl Hirschman Index (HHI) also known as the Herfindahl Index, is a measurement used to understand the level of competition that exists within a market or industry, as well as give an indication of how

the distribution of market share occurs across the companies included in the index (Hirschman, 1964). Understanding the level of market competition can be important for strategic planning as well as when trying to establish pricing for banks' products or services. The calculation of the HHI differs from the standard Concentration Ratio in that it squares each market share value which places a higher importance on those top banks that have a larger market share. The formula for determining the HHI is as follows:

HHI = MS1^2 + MS2^2 + MS3^2 + MS4^2 …+ MSn^2
Where, HHI = the Herfindahl Hirschman Index;
$MS_{1...n}$ = Market Share of bank 1, 2 …n.

The HHI can have a theoretical value ranging from close to zero to 10,000. If there exists only a single market participant that has 100 percent of the market share the HHI would be 10,000. If there were a great number of market participants with each company having a market share of almost 0 percent, then the HHI could be close to zero.

- When the HHI value is less than 100, the market is highly competitive.
- When the HHI value is between 100 and 1000, the market is said to be not concentrated.
- When the HHI value is between 1000 and 1800, the market is said to be moderately concentrated.
- When the HHI value is above 1800, the market is said to be highly concentrated.

These values are used by the US Department of Justice when evaluating whether to permit a merger of two companies. Using the HHI, we can quickly gain insight into the distribution of market share within an industry.

4.3.2 Developing the HHI for Tanzania's Banking Sector

We used HHI index to measure both the competition and concentration of banks. We carried out the dichotomy analysis of HHI index through looking at two sides of the bank's balance sheet – assets side and liabilities side. On the asset side the index for Total Assets was developed whereas index for Total Deposits was established for the liabilities side. The Herfindahl Hirschman Index (HHI) is a measure used to determine the level of competition in a market or industry. It provides a measure of market share distribution across the banking system. We adopted Herfindahl Hirschman Indices (HHI) as applied by the BOT in its role for scanning the stability of financial system in Tanzania. Guidelines for preparing the same are as follows:

Step 1: We extracted data for the different variables from the BSIS, which are required to prepare the index. The data are amounts of individual banks listed in terms of their Total Assets and Total Deposits;
Step 2: In a separate spreadsheet, we populated the Total Assets and Total Deposits of all banks licensed by the BOT.
Step 3: We established the sums of Total Assets and Total Deposits for all banks.
Step 4: (a) Divide each Total Asset for an individual bank to the Aggregate Assets of the industry.
(b) Divide each Total Deposit for an individual bank to the Aggregate Loans obtained for the industry.
Step 5: Square the amount obtained for individual share of each individual bank and then sum them up.
Step 6: Repeat *(step 5)* the process for Total deposits.
The total amount obtained is the index for particular item.

4.4 Sample Design and Sample Size

The study used purposive sampling techniques for banks which had been in existence in the past 15 years, where 21 commercial banks were covered. Also, the same banks were interviewed using the structured questionnaire.

4.5 Data

4.5.1 Data and Data Sources

Both secondary and primary data were used in the analysis. The panel data was applied for the case of secondary data, where 21 number of commercial banks, which are cross section units and 15 number of observations from 2002 to 2016 in annual settings were used. The main source of secondary data were the Banking Supervision Information System (BSIS) of Bank of Tanzania. The data for this period are available in a well-organized

format with reliable accuracy due to the embedded checks and validation rules in the BSIS and the Electronic Data Interchange (EDI). The EDI is a computer platform supplied by BOT and used by all banks in Tanzania to upload and transmit data to BOT databases particularly to the BSIS. From the data we developed a comprehensive dataset which accommodates all the variables used in the study. Moreover, the series is fairly long enough to reflect the current situation in commercial banking sector in the country. The combination between the cross units and the time dimension forms panel data. In order to achieve triangulation of the research results, we administered questionnaires to get some insights and feelings from practitioners on the capital adequacy requirements.

4.5.2 Logarithmic transformations of Data

Pre-testing of the longitudinal data used in this thesis revealed that a change in the dependent variable is related with percentage change in most of the independent variables. Further, the data were skewed and had excessive kurtosis. In order to reduce this problem, growth rate was obtained and ensured that as much as possible the variables used were squarely fitted in the model. We transformed the data by taking natural logarithm of the variables. Log transformations make positively skewed distribution more normal (Introduction to SAS, 2010), further, taking the natural logarithm greatly reduces heteroscedasticity and therefore impose homoscedasticity (Cameron & Trivedi, 2010). Measurement of market share both in terms of assets and deposits involves determining the concentrations of the same which ultimately tends to affect competition in the market. Logarithmic transformations of data may be needed to improve the fitness of normality of data and homogeneity of variances particularly when the concentrations of something are being measured (Mbogo, S., et al, 2010).

Coefficients on the natural-log scale are directly interpretable as approximate proportional differences, the coefficients can be understood as elasticities of a Cobb-Douglas function. The elasticity term is used to describe the degree of response of a change of a variable with respect to another. The log transformation of data has created a new challenges emanating from observations with missing values. Four observations of PBZ have missing values in respect of one variable – 'the capital adequacy' independent variable. The standard approach to handle the challenge would be to drop observations with missing values. Use of other alternatives than dropping observations including imputation of the missing values have limitations and the norm in micro-econometrics studies is to use only the original data (Cameron & Trivedi, 2010).

4.6 Estimation Techniques

Equations 4 for banks' market share was estimated using STATA version 13 econometric package. Both fixed effects (FE) and random effect (RE) models were estimated using the Hausman Specification tests; and the Random Effect Models Vis-à-vis Pooled Effect Models, known as OLS using the Breusch-Pagan Test. The idea was to find out the appropriate model which fits data for the banks' market share with equation 4. It was found that the data fits for the Pooled Effect Model as indicated in the results presented in Section 5 of this paper under the Empirical Estimation and Discussion of Results.

4.6.1 Pooled OLS Model

The specifications of the pooled model also known as population-averaged model are as follows:

$$Y_{it} = \alpha + X'\beta + \varepsilon \ (u_i = 0)$$

If individual effect u_i (cross-sectional or time specific effect) does not exist ($u_i = 0$), ordinary least squares (OLS) produces efficient and consistent parameter estimates. Pooled models assume that regressors are exogenous and simply write the error as U_{it} rather than using the decomposition:

$v_{it} + \varepsilon_{it}$, then

$$Y_{it} = \alpha + X'\beta + U_{it}$$

4.6.2 Seemingly Unrelated Regression

The estimated Random Effect Model for equation 2, pooled Effect Model for equation 4 and Fixed Effect Model for equation 6 produce average estimates for all 21 banks without indicating the coefficient for each bank. Consequently, heterogeneity problem was imminent in the analysis, from which individual characteristics of

each bank was not captured. In order to address all 3 models were estimated further using the Seemingly Unrelated Regression (SUREG). In this case, individual characteristics of each cross sectional unit (each bank) was captured to indicate dynamics of banks' profitability, market share and lending. More specifically, each bank differs from another due to cultural factors or differences in business practices and models across banks, market niches or variables that change over time but not across banks, e.g. bank's procedures and policies. Therefore, the analysis for each specific bank is important to reflect those factors. For comparison purposes the GLS was estimated to compare its results with the results from SUREG.

Cameron & Trivedi (2010) posits advantages of the GLS estimators, including its ability to handle estimation when one or more of the assumptions of homoscedasticity and noncorrelation of regression errors fails. Further, the GLS estimation is more efficient than OLS estimation, leading to smaller standard errors, narrower confidence intervals, and larger t statistics. The Seemingly Unrelated Regression Equation was based on Zellner, Arnold (1962) specification. The SUREG is more suitable for a panel dataset with small number of cross section units and large time periods. The SUREG estimation possesses some advantages over panel fixed effects estimation. For example, it is much easier to allow the slope coefficients to vary among the cross section units. Further, the SUREG proposes procedures which yield coefficient estimators which are at least asymptotically more efficient than single-equation least square estimators.

The Seemingly Unrelated Regression Equation is specified as follows:

$$y = X\beta + \varepsilon$$

Where,

$$y = \begin{bmatrix} y_1 \\ y_2 \\ y_3 \end{bmatrix};\ X = \begin{bmatrix} X_1 & 0 & 0 \\ 0 & X_2 & 0 \\ 0 & 0 & X_3 \end{bmatrix};\ \beta = \begin{bmatrix} \beta_1 \\ \beta_2 \\ \beta_3 \end{bmatrix};\ \text{and}\ \varepsilon = \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \end{bmatrix}$$

Furthermore, since $E(\varepsilon_i \varepsilon_j') = \sigma_{ij}C$, it follows that $E(\varepsilon\varepsilon') = \Sigma\, \theta\, C$, where

$$\sum = \begin{bmatrix} \sigma_{11} & \sigma_{12} & \sigma_{13} \\ \sigma_{12} & \sigma_{22} & \sigma_{23} \\ \sigma_{13} & \sigma_{23} & \sigma_{33} \end{bmatrix}$$ and the identity matrix P is of order 15x15.

Assuming that, $E(\varepsilon_i \varepsilon_j') = \sigma_{ij}C$ where σ_{ij} defines the contemporaneous covariance matrix for banks i and j, obtain SUREG estimates of the six parameters for each bank.

After describing the research methodology, the next chapter presents empirical results and their interpretation. In the next chapter, banks' market share was estimated using Pooled Effect Model (pooled OLS). Therefore, we drew conclusions and recommendations. Furthermore, empirical evidence on the extent to which meeting the capital adequacy requirements affect the banks' performance indicators above is presented.

5.0 EMPIRICAL ESTIMATION AND DISCUSSION OF RESULTS

5.1 Introduction

This chapter covers the research findings, analysis and discussion of the results from the secondary data analyzed. The diagnostic tests conducted in the preceding sub-sections were meant to determine the likelihood and proposition of the research tests to identify correctly the impact of capital regulation on banks' market share. Further, the tests determined the proportion and the likelihood of positive or negative predictive value of the research test results, i.e. establishes which ones are truly positive or negative. The justifications for choosing appropriate models have been discussed. It is this section which explain the findings pertinent to addressing the research hypothesis. The description of the findings has been expressed based on the results of the descriptive statistics and the major test conducted namely the FE Model regression test.

5.2 Data Diagnostic Tests

5.2.1. Testing for Normality

This is the assumption that the dependent variable and the errors of regression equation are normally distributed. The commonly used numerical methods for testing normality include the Kolmogorov-Smirnov (K-S) D test (Lilliefors test) and Shapiro-Wilk' test. As (K-S) D test (Lilliefors test) is more appropriate for testing data with sample size equal or more than 2000, in this paper we conducted the Skewness/Kurtosis test. The statistic is positive and less than or equal to one; being close to one indicate normality.

***Table 5.2*: Skewness/Kurtosis tests for Normality**

```
. sktest lnhhita lnca lnta  lnta cabs cafx, noadjust

                    Skewness/Kurtosis tests for Normality
                                                              ------- joint ------
    Variable |   Obs    Pr(Skewness)   Pr(Kurtosis)       chi2(2)     Prob>chi2
-------------+-------------------------------------------------------------------
     lnhhita |   315       0.0000          0.8227          37.72          0.0000
        lnca |   311       0.0720          0.6136           3.49          0.1746
        lnta |   315       0.1313          0.0214           7.57          0.0227
        lnta |   315       0.1313          0.0214           7.57          0.0227
        cabs |   315       0.0000          0.0000         259.86          0.0000
        cafx |   315       0.0000          0.0000          83.09          0.0000
```

The Skewness-Kurtosis test produces Chi-squares of 0.17466 ($p>0.05$) and the test do not allow us to reject the null hypothesis that the tested variables are normally distributed and conclude that the data are from a population with normal distribution.

5.2.2 Testing for Stationarity/ Unit Root Tests

In this research we did not dwell on testing for stationarity for the reason that the cross sectional series studied involves relatively underdeveloped market with small number of cross section units observed (only 21 banks) and short time dimension (15 years) and hence it is certainly unlikely to expect change in properties of the variables.

5.2.3 Cointegration Tests

Cointegration tests are natural follow-up to panel unit root tests. The tests attempt to examine long run relationship among variables, this is commonly done by differencing which effectively remove long run relationship. The panel dataset that we have call for no cointegration tests to be performed in this research because the data analysed was micro-panel data characterised by shorter time dimension observed as 'N' (number of cross section units involve only 21 banks) is large but 'T' (number of time periods observed) (time frame from 2002 to 2016, i.e. 15 years) is relatively very small, then unit root and cointegration tests were not estimated. The time dimension should be large enough to allow degree of freedom for the two tests to produce meaningful results. For unit root test results of the panel data to make some sense, time dimension should at least be greater than 30 (Baltagi & Badi, 2001). Therefore, there was no need to worry about panel cointegration hence no panel error correction model is required.

5.2.4 Heteroscedasticity

A Breusch-Pagan/Cook-Weisberg test was conducted to check for heteroscedasticity. We tested whether the estimated variance of the residuals from a regression were dependent on the values of the independent variables. This means the variance around the regression line is the same for all values of the predictor variable (x). ***Annexure 6*** shows the test results**.** The test results indicate that at 5 percent confidence level the Prob>chi2 took the value 0.3363, which means the p-value was insignificant. We therefore we accept the null hypothesis (homoscedasticity) and infer that heteroscedasticity was not indeed present. This means that estimated variance of the residuals from a regression are not constant and are not dependent on the values of the

independent variables. The standard errors are therefore not biased implying that the model so generated would certainly be able to predict some patterns in the data.

5.2.5 Cross-Sectional Dependency

Although cross-sectional dependence (also known as contemporaneous correlation) is more of an issue in macro panels with long time series (over 20-30 years) than in micro panels, substantial cross-sectional dependence in the errors is evidently inherently predominant in panel data models (Hoyos & Sarafidis, 2006). It arises from common shocks and unobserved components which in the end form part of the error term (Hoyos & Sarafidis, 2006). Cross-sectional dependence can lead to bias in panel data tests results. The dependence in the time series dimension particularly in the panel data cannot entirely be ruled out especially when the dataset has many cross section observations covering a relatively a short span of time.

The economic reforms that Tanzania has gone through and the resultant opening up of economy which saw licensing of not only foreign owned banks but also local ones might have resulted into increased integration of banking institutions and hence increased interdependencies between banks (the cross-sectional units). Also, as the case in this thesis, the number of cross section units involves only 21 banks whereas the number of time periods observed is 15 years. On this ground we were therefore obliged to conduct a Pesaran Cross-sectional Dependency test in which we tested whether the residuals are correlated across entities. The Pesaran CD test Results for Cross Sectional Dependency indicates the p-value, Pr = 0.0000. Which means the dependence has been proved to be significant and therefore we failed to reject the null hypothesis at 5.00 percent. Consequently, we can conclude that residuals are correlated which implies that there was cross-sectional dependence among variables. With the presence of cross-sectional dependence among variables, Hoechle (2007) suggests two major estimators that can be used to resolve the problems of autocorrelation, heteroscedasticity and cross-sectional dependence, namely, the FGLS and PCSE.

While the FGLS is an efficient estimator in case where time dimension is greater than cross sections, it is typically inappropriate for use with medium- and large-scale microeconometric panels. This is due to the fact that the method is infeasible if the panel's time dimension T is smaller than its cross-sectional dimension N which is almost always the case for micro-econometric panels (Hoechle, 2007). Further, it is known to underestimate SEs in finite samples. Therefore, to address the challenges brought about using FGLS, Beck and Katz (1995) suggest to rely on OLS coefficient estimates with panel corrected standard errors (PCSE). We employed the PCSE approach to control the cross sectional problems. By default, the PCSE control not only the cross-sectional dependence but also the heteroscedasticity. **Table 5.5** presents the Prais-Winsten Regression Test Results for Control of Cross-Sectional Dependency, particularly it presents results for the Prais-Winsten (PCSE) model estimating the effects of capital adequacy requirements on market share. We find that all independent variables save for dummy variables had large and significant p-values ($p < 0.005$). Both capital adequacy, total assets and total deposits variables had significant effect on market share with p-values of 0.003, 0.001, 0.009 respectively. While two of the three independent variables had positive relationship with market share as anticipated, paradoxically total assets variable was negatively related to market share. Furthermore, we observe that R^2 is consistently and significantly higher predicting market share, which suggests that capital adequacy requirements, total assets and total deposits explain very highly the variations in the Tanzania's market share by 99.68 percent.

Table 5.3: Prais-Winsten Regression Test Results for Control of Cross-Sectional Dependency

```
. xtpcse lnhhita lnca lnta lntd cabs cafx, corr(ar1)

Prais-Winsten regression, correlated panels corrected standard errors (PCSEs)

Group variable:    bank1                          Number of obs      =       311
Time variable:     year                           Number of groups   =        21
Panels:            correlated (unbalanced)        Obs per group: min =        11
Autocorrelation:   common AR(1)                                  avg =  14.80952
Sigma computed by casewise selection                             max =        15
Estimated covariances      =       231           R-squared          =    0.9968
Estimated autocorrelations =         1           Wald chi2(5)       =     13.89
Estimated coefficients     =         6           Prob > chi2        =    0.0163
```

lnhhita	Panel-corrected Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lnca	.0364026	.0124525	2.92	0.003	.0119963	.060809
lnta	-.0820111	.0249128	-3.29	0.001	-.1308393	-.0331829
lntd	.0430816	.0163911	2.63	0.009	.0109557	.0752074
cabs	.0079301	.0114805	0.69	0.490	-.0145713	.0304314
cafx	-.0044228	.0074155	-0.60	0.551	-.0189569	.0101113
_cons	7.21504	.1876819	38.44	0.000	6.84719	7.582889
rho	.506289					

5.2.6 Testing for Serial correlation

As was for Cross-Sectional Dependency and Heteroscedasticity, the serial correlation tests apply mainly to macro panels with long time series (over 20-30 years) and that is not much of a problem in micro panels (with very few years) (Hoyos & Sarafidis, 2006). The gist behind carrying out serial correlation tests is to know whether or not standard errors are serially correlated (Wooldridge, 2002). Pindyck, R., & Rubinfeld, D. L. (1991) propounded that serial correlation causes the standard errors of the coefficients to be smaller than they actually are and higher R-squared. As this paper deals in micro panels with short time series of only 15 years, therefore there was no need to worry about serial correlation in this paper.

5.3 Regression Results for Banks' Market Share

The analyses of the secondary data and the results thereof are covered in this subsection. The modality employed to obtain the data involved sourcing the secondary data from the BSIS and other BOT publications. It is this subsection which explains the findings pertinent to addressing the objective of the research paper in relation to the effects of capital ratio on banks' market share. The descriptions of the findings have had been expressed based on the results of the descriptive statistics, the computed Herfindahl Hirschman Indices (HHI) for bank size and banks' concentration and the related analyses and the Ordinary Least Squares (OLS) models. Justifications for choosing appropriate models have been discussed and the findings pertinent to addressing the second research objective are explained in this subsection.

As at the end of the study period, i.e., 31st December 2016, the largest four banks in terms of total assets held 48.58 percent of the total assets of the banking sector, 47.54 percent of total capital, 49.82 percent of total deposits and 49.40 percent of total loans advances and overdrafts. On the other hand, local banking institutions' share of the total banking sector's assets was 52.65 percent, slightly higher than that of foreign banking institutions at 47.35 percent. **Table 5.7** below depict market share of category of banks in terms of total assets, loans, deposits and capital between the year ended 2014 and 2015; and **Table 5.8** below shows the trend of market share from 2012 to 2016 between local and foreign banking institutions.

Table 5.4: Market Share (as percentage of Total Balance Sheet Components)

Market Share	Assets		Loans		Deposits		Capital	
	Dec-15	Dec-16	Dec-15	Dec-16	Dec-15	Dec-16	Dec-15	Dec-16
Four largest banks	49.48	48.58	50.03	49.40	49.52	49.82	48.23	47.54
Next six largest banks	21.05	20.73	21.70	21.69	22.07	21.89	24.35	22.92
Others	29.47	30.69	28.27	28.91	28.41	28.29	27.42	29.54

Table 5.5: Market Share of Total Assets for Local and Foreign Banking Institutions

Market Share	Dec-12 (percent)	Dec-13 (percent)	Dec-14 (percent)	Dec-15 (percent)	Dec-16 (percent)
Foreign banking institutions[1]	48.88	51.12	47.35	47.25	47.35
Local banking institutions	51.12	52.20	52.65	52.75	52.65

(a) Descriptive Statistics of the Variables

The descriptive statistics of the variables were computed by utilizing the secondary data from the BSIS and other BOT publications using STATA version 13 econometric package. Prior to fitting in the OLS model with the data, the descriptive statistics, namely, mean, standard deviation, minimum, and maximum of the variables and a further detailed descriptive analyses for the dependent variable ''HHI^{TA}' and '$HHI^{TD'}$ were conducted and the resultant statistics are shown in ***Annexure 2.*** The market was moderately concentrated as it recorded index mean value of 1147.44 with as standard deviation of 50.30 over the period under study, banks' market share differs mildly across banks with a standard deviation of 50.30. The median assets stood at 1132.77, which was lesser than the average total deposits maintained by banks during the period at TZS 3,820.00 million. On average banks maintained total assets and capital (shareholders' funds) in their books amounting to TZS 4,720.00 million and TZS 5,690.00 million respectively during the period. The range of capital levels maintained by banks shows the lowest (minimum) and maximum shareholders' funds of negative TZS 4,020.00 million and TZS 682.00 million respectively.

All variables have produced expected range of observations with exception of capital adequacy which was negative. Four capital observations on belonging to one bank were negative in the years 2002 through 2005. Negative capital was a possibility for only one government owned bank which had huge negative retained earnings that eroded all reserves and profits in the year 2005 to 2010 before it became subsequently fully capitalised. The median of 1132.77 was much smaller than the mean of 1147.44 indicating skewness of the data. The kurtosis of 3.24213 is marginally higher value indicating that the tails of the distribution curve were slightly thicker than those of a normal distribution. Therefore, the distribution of the dependent variable was slightly skewed and had thick tails.

Similar to the bank size (HHI^{TA}) analysis, the market was moderately concentrated as it recorded HHI^{TD} index mean value of 1191.75 with as standard deviation of 44.37 over the period under study, looking at the deposit perspective the banks' profitability variability was relatively lower than the asset perspective with a standard deviation of 44.37. The average total deposits maintained by the banking sector during the period was TZS 3,820.00 million. All variables have produced expected range of observations with exception of capital adequacy that was negative. Four observations on capital belonging to one bank both were negative during the years 2002 through 2005. One bank in the sample was an outlier in terms of capital as it recorded a negative amount due to persistent losses. The median of 1191.75 was slightly above the mean of 1187.16 indicating skewness of the data. The kurtosis of 2.34 is marginally higher value indicating that the tails of the distribution curve are slightly thicker than those of a normal distribution. Therefore, the distribution of the dependent variable was slightly skewed and had thick tails.

(b) The Herfindahl Hirschman Indices (HHI) Analysis

We developed the HHI covering the period running from 2002 to 2016 to reflect on both asset base of the banks as well the major financing means of the assets namely the total deposits. The indices developed reflected two scenarios, firstly, a case when all banks (including the big four banks) in the thesis were analysed and secondly, a scenario with analysis without the big four banks. The indices developed are shown in the **Table 5.11**. With the minimum HHI value of 1080.56 in 2011 and the maximum HHI value of 1259.40 in 2002, the Tanzania's market can be said to be moderately concentrated. Further, the market being composed of few number of market participants with some few big banks (not exceed four) enjoying a market share of about 50 percent the market can be said to be not competitive. The assessment of bank credit concentration showed that the banking sector

[1] By definition, a foreign bank is the one that has foreign ownership component exceeding 50% and similarly a local bank is the one where local ownership component exceeds 50%.

was moderately concentrated as of the period under review. Prudential banking regulations limit lending to single borrower with a fully secured credit accommodation at 25 percent of a bank's core capital.

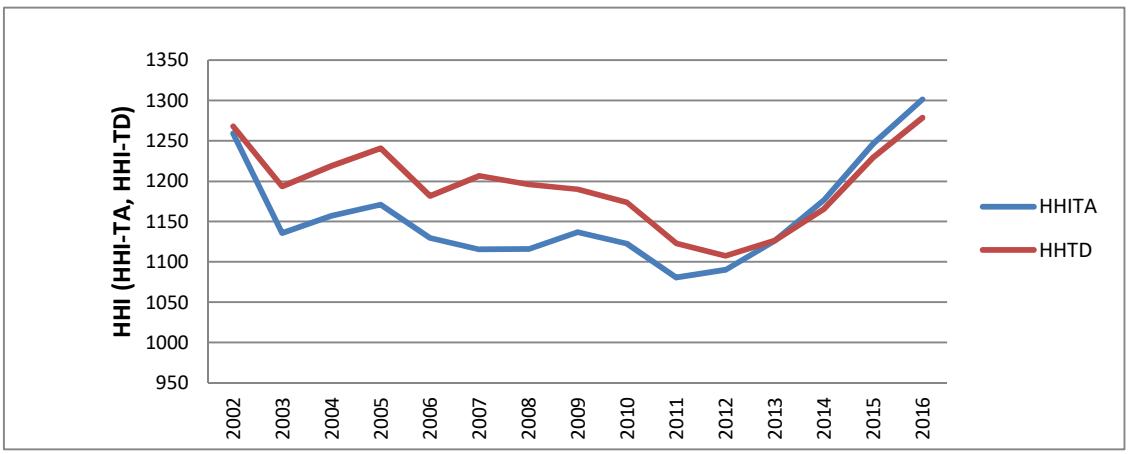
Table 5.6: Herfindahl Hirschman Indices (HHI) from 2002 to 2016

	HHI With Big Four Banks		HHI Without Big Four Banks	
Year	**HHI^{TA}**	**HHI^{TD}**	**HHI^{TA**}**	**HHI^{TD**}**
2002	1259.40	1267.92	1989.62	2065.47
2003	1135.72	1193.52	1506.09	1694.83
2004	1157.08	1218.73	1323.48	1374.80
2005	1170.97	1240.68	1295.86	1378.49
2006	1129.81	1181.56	1319.69	1407.43
2007	1115.48	1206.41	1224.85	1215.40
2008	1115.94	1195.96	1035.63	1064.33
2009	1136.7	1189.99	937.46	935.18
2010	1122.47	1173.63	891.81	866.33
2011	1080.56	1122.78	907.90	876.43
2012	1090.12	1107.59	847.14	807.50
2013	1126.27	1126.46	828.98	806.53
2014	1176.97	1165.79	792.59	778.41
2015	1246.64	1229.15	799.16	784.74
2016	1301.41	1278.80	786.30	775.52

Source: *Author's Computations*
*** HHI without Big Four Banks*

During the period under study, the year 2013 marks a point in time when the Tanzania's banking sector can be said to have reached its equilibrium point in as far as deposits were financing assets of the sector with an *Herfindahl Hirschman Index* of about 1126. As **Chart 5.4** shows, this is the point where the duo indices, i.e. HHI^{TA} and HHI^{TD} are equal. It is at this point where the level of assets equalled the total deposits in the banking sector. Further, the graph of the bank size (HHI^{TA} index) cuts the graph for customer deposit base (HHI^{TD} index) from below at the equilibrium point, indicating that financing of assets by deposits as nears the equilibrium point, became both saturated and economically less beneficial. It is beyond this point the total assets were higher than total deposits and it would be less beneficial for banks to expand financing more assets using deposits rather than other forms of finance including capital and borrowings. Further decipher of the chart, suggests that it is worthwhile for the Tanzania's banking sector to expand financing of its assets by using owners' equity rather than deposits or other forms of financing. Further review of the graph indicates that bank size is not directly related to the customer deposit base as depicted by different levels of total deposits (HHI^{TD} index) as compared to the total assets (HHI^{TA} index). At the beginning of the study period in the year 2002, the indices were too close to each other and the gap between them started expanding and became wider as years went by. During that period, it was economical to expand use of deposits to finance assets and the sector did actual that not until the year 2013.

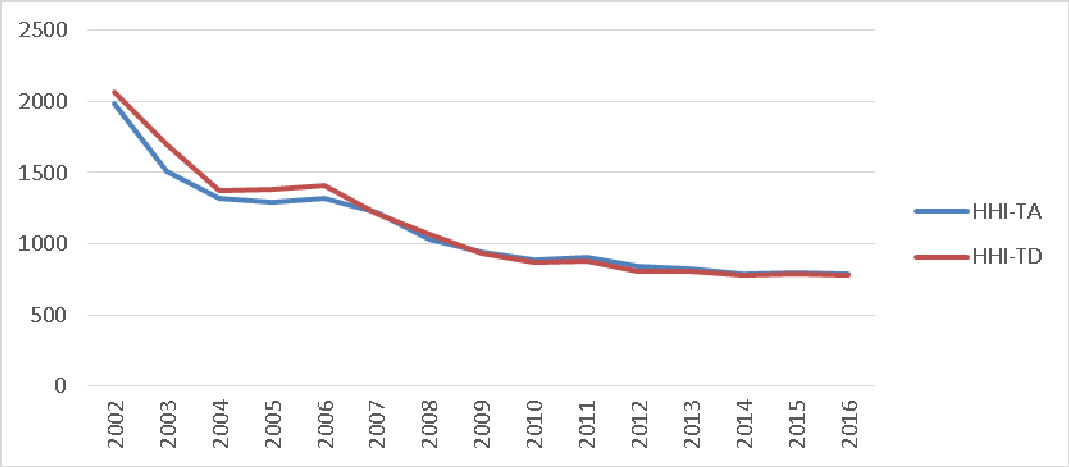
Chart 1.4: Overall Herfindahl Hirschman Indices (HHI) Trend from 2002 to 2016



Source: *Author's Computations*

Both market share indices, i.e. HHI^{TA} (bank size) and HHI^{TD} (customer deposit base), had been declining since the year 2002 with HHI^{TD} being at the top of HHI^{TA} only to pick up in the year 2012 when the duo started ascending as indicated in **Chart 5.5** below. This suggests that banks in Tanzania had been shedding off some of their non-earning assets and embarked on diversification of financing in lieu of deposits over the period. As the trend started soaring, between 2013 and 2014 the index for bank size (HHI^{TA}) overtook the index for customer deposit base (HHI^{TD}) and continued to grow faster and remain above its counterparty until the end of the study period suggesting that traditionally bank balance sheet structure constitute of deposits higher than the assets. From 2013 onwards the reverse was true. This might be the result of alteration in financing patterns, namely, less and less deposits were financing the increased assets in lieu of borrowings and other liabilities.

Chart 2.5: Herfindahl Hirschman Index Trend Without the Four Big Banks from 2002 to 2016



Source: *Author's Computations*

The HHI^{TA} and HHI^{TD} values so computed were indicating a moderately concentrated market with the minimum value of 1080.56 and maximum value of 1259.40. The above notwithstanding, the above situation can camouflage the fact that only four banks out of the 56 banking institutions operating in the country then accounted for about 50 percent of the market share and drive the market in as far as total assets is concern. In the financial data as at 31st December, 2016, the leading banks were CRDB Plc, NMB Plc, Standard Chartered Bank and NBC Limited with market share of 20, 17, 6, 6 percent respectively. Despite that CRDB enjoyed a lion's share of the market in terms of customer deposits base, its deposit structure indicated it had the highest volatility of the four leading banks. Deposits were concentrated among the few four biggest banks with CRDB Plc, NMB Plc, NBC Limited and Standard Chartered Bank, Limited accounting for more than 48.58 per cent of total deposits on average, which constitute a liquidity risk for banks due to putting reliance on sources of funding.

Moreover, the four banks had their top ten (10) depositors accounting for 9.97, 10.86, 11.41, and 16.33 percent of the individual bank market share. The HHI, calculated for the banking sector (**Table 5.11**) suggests that with respect to assets and deposits, the Tanzanian market remains moderately concentrated as of the study period. HHI index for deposits market rose above 1,000 in June 2012, suggesting concentration but quickly pulled back and continued on a downward trend though still above the asset market. However, the overall HHI masks the share of market power held by the four largest banks. Excluding these four banks from the computation of HHI will lead the HHI towards competitive level.

Nonetheless, further dissection of the market share indicates that analysis of HHI without the four banks would result into a different picture. The gap between HHI^{TA} and HHI^{TD} graphs is wider in the graph with the big four banks than that without the big four banks suggesting that banks with low market share have relatively higher leverage levels in their balance sheets. Further, the wider gap in the graph for all banks in the study as opposed to the narrower gap in the counterpart graph indicates that a big chunk of assets of the big four banks were financed by capital and other forms of financing including borrowings rather than deposits. Moreover, the sector was observed to be characterized by competition emanating from assets side of the balance sheet as compared to the

liabilities side. This explains the existence of substitution of deposits by alternative sources of liquidity including borrowings and capital adequacy. The graph without the big four banks depicts a declining trend throughout the fifteen (15) years under the study. Although currently the market is moderately concentrated, this might be a sign that Tanzania is heading towards becoming les and less a concentrated market and should the trend persist with this descent the market might become highly competitive which is healthy for the economy as it will reap from advantages including lower prices (lower interest rates), improved quality of banking services and enhanced innovations among market players.

As the graphs with and without the big four banks indicates, the year 2012 seems to be the point of departure whereby graph for the HHI without the big four banks continue declining whilst the graph for the HHI with the big four banks starts going up. Suggesting that the big four banks were responsible for the upward trend from that year onwards. The two graphs above indicate that without the big four banks the gap between was narrower than the gap in the graph which involves all banks under the study. Further, the narrower gap suggests higher leverage and thicker gap between the HHI indices indicate relatively low level of deposits and hence higher capital adequacy. Should the few four banks continue driving the market, it is suggestive that they may end up promoting monopolistic or duopolistic tendencies. The outcome might be creation of inefficiencies in form of lower lending volumes and higher interest rates within a bank and might be transmitted to the entire market and thereby impeding growth (Sean Severe, 2016).

5.4.2 Regression results from Pooled Effect Model

Before estimation and discussion of the regression results of the model, we determined the appropriate model which would suit the need of this study to be used in analysing the effects of capital adequacy on banks' market share. To that end we conducted one test - the Pooled OLS (simple) Regression test, without carrying out any further necessary test, the above test revealed that the data is poolable, and therefore we had the ground to use OLS Regression model in analysing the effects of capital adequacy on banks' market share.

We conduct appropriate formal tests to examine individual group and/or time effects. While detailed test results are shown as ***Annexures 5 & 6,*** the test results are summarized in **Table 5.13** shows that the null hypothesis of the LM test could not be rejected, which means a random effect model is not better than the pooled OLS. Further, after conducting the F-test the null hypothesis of the F-test is not rejected with a p-value of 0.0000, the pooled OLS is favored over the fixed effect model. In both cases the hypotheses are not rejected, therefore this suggests that since there are neither fixed effects nor random effects, the data are poolable and therefore conclusively the **Pooled OLS** (simple OLS regression) is more appropriate for the data. Therefore, we can conclusively deduce that pooled OLS model fits the panel data for testing impact of capital adequacy on ability of banks to extend credit accommodations.

Table 5.7: Fixed Vs Random Effect and Random Vs Pool Effect Test

F test (Wald Test)	**Breusch-Pagan Lagrange Multiplier (LM) Test**
Null hypothesis: The Coefficients for all years are jointly = 0	Null hypothesis: Variances across banks = 0 (There is no significant difference across banks)
Asymptotic F- statistic: F(5,305) = 17.48	Asymptotic test statistic: Chi-square = 0.0000
with p-value = 0.0000	with p-value = 1.0000

Source*: Author's Computations*

The regression results in **Table 5.14** indicates that none of the five independent variables were observed to be statistically significant. All the independent variables were insignificant with a Prob>|t| = 0.05 and t – value less than 1.96. Therefore, we accept the null hypothesis at 5 percent and thus conclude that the capital (an independent variable) had no significant influence on the HHI^{TA} (dependent variable), thus ***the alternative hypothesis that Capital adequacy ratio requirements had no positive impact on banks' market share in Tanzania, cannot be rejected in this study.*** It is therefore apparent from the regression above that all independent variables, namely, total assets, total deposits, the interacting dummy variables between capital and

banks' ownership and peer grouping category including the Capital Adequacy, were insignificant and had 't' values less than 1.96 and Prob>|t| > 5 percent. This being the case there was no statistically significant evidence that not only in totally, the variables individually had also no influence in the Tanzania's the banks' market share.

The regression findings show that a positive and statistically significant relationship exists between capital adequacy and banks' market share at the 5 percent level. For one-unit increase in capital of banks, *ceteris paribus*, the market share is expected to increase by TZS 20,500 million. Although the total deposits, ownership and peer grouping were statistically insignificant in influencing market share of banks, nevertheless they were negatively related to the same which was not to our expectation. Whereas total assets indicated expected signs as it was positively related to the market share.

Further, the regression result in the table above indicates that the degree of determination as denoted by R^2 stood at 0.0386. Although the low R^2 is not particularly worrisome since this is usually the case when panel data is used in regression analysis (Hun Myoung Park, 2010), the same cannot be relied upon since the Stata software package up to version 13 produces wrong R^2 in the fixed effect model when the. xtreg command is used because the command fits the within model, i.e., running OLS on transformed data with the intercept suppressed without adjusting R^2 (Hun Myoung Park, 2010). In order to get the correct R^2 for the Pooled OLS model we used a different command in Stata (. areg). The correct R^2 obtained was 0.0798 meaning that about 8.00 percent of the variations in the market share (HHI^{TA}) variable was accounted for by capital adequacy, total assets, total deposits, interactions between capital and banks' ownership and interactions between capital and peer grouping, whereas the proportion of 92.00 percent was accounted for by the other factors than the prescribed variables. The value of the standard error of the estimate (the standard deviation of the residuals) was TZS 7.85 e^{-11}, which means on average the fitted values as compared to the observed values in the model are wrong by TZS 7.85 e^{-11}. Further, it is expected that 95 percent of the observations will fall within twice the standard error (i.e. TZS 15.70 e^{-11}) of the fitted values with 5 degrees of freedom.

Table 5.8: Summary of the OLS Test Results for HHI^{TA} (Bank Size)

```
. reg lnhhita lnca lnta lntd cabs cafx
```

Source	SS	df	MS		Number of obs =	290
					F(5, 284) =	2.28
Model	.020485231	5	.004097046		Prob > F =	0.0469
Residual	.510297318	284	.001796822		R-squared =	0.0386
					Adj R-squared =	0.0217
Total	.530782549	289	.001836618		Root MSE =	.04239

lnhhita	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnca	.0069799	.0069193	1.01	0.314	-.0066397	.0205996
lnta	-.0201181	.01862	-1.08	0.281	-.0567687	.0165326
lntd	.007725	.014058	0.55	0.583	-.0199462	.0353962
cabs	.018929	.0126668	1.49	0.136	-.0060038	.0438618
cafx	-.0007261	.0061111	-0.12	0.906	-.0127548	.0113027
_cons	7.200849	.0525148	137.12	0.000	7.097481	7.304217

The OLS regression results of the banks' market share shown above over the years 2002-2016 made it possible to develop a regression equation as follows:

$$\mathbf{HHI^{TA} = 1340.65 + 1.007\ X_1 - 1.020\ X_2 + 1.008\ X_3 + 1.019\ X_4 - 1.001\ X_5 + \varepsilon it}$$

Where, HHI^{TA} = Banks' Market Share Index (Due to Bank Size); B_0= intercept (defines value of leverage without inclusion of predictor variables); X_1= Variable 1 (Capital adequacy); X_2= Variable 2 (Total Assets); X_3= Variable 3 (Total Deposits); X_4= Variable 4 (Bank Ownership); X_5= Variable 5 (Peer Grouping).

Slopes of the above equation, *ceteris paribus*, can be interpreted as follows:

(i) Even in case of zero Capital adequacy, zero Total Assets, and zero Total Deposits, on average each bank is expected to have 1340.65 units of Market Share Index or 7.2009 units of natural logarithm of Market Share Index ($p<.0000$). Which indicates that on average the market was moderately concentrated.

(ii) For one-unit increase in Capital adequacy, the Market Share Index of banks is expected to increase by 1.007 units of Market Share Index or 0.0070 units of natural logarithm of Market Share Index ($p>0.314$). Whenever Total Assets increases by ten units, the Market Share Index will decrease by 1.020 units of Market Share Index or 0.02012 units of natural logarithm of Market Share Index ($p>0.281$).

(iii) If the Total Deposits increases by one unit, a banking institution can earn a Market Share Index on average by 1.008 units of Market Share Index or 0.0077 units of natural logarithm of Market Share Index ($p>0.583$). For one-unit increase in bank size (as banks tend to migrate into peer group number one) the Market Share Index of banks is expected to increase 1.019 units of Market Share Index or 0.0189 units of natural logarithm of Market Share Index ($p>0.136$). Whenever there is a tendency to change bank ownership from locally owned to foreign ownership by ten units, the Market Share Index will decrease by 1.001 units or 0.00073 units of natural logarithm of Market Share Index ($p>0.906$).

(iv) Even when the all independent variables were not taken into (when they are all zero), the regression equation results into market share with HHI^{TA} index of 1340.65 (the constant) which means that against all odds and disregarding all other variables the market was already moderately concentrated (leaning to the highly concentrated market than highly competitive market).Although this model fits the data well, we are convinced that each bank and in each year has a different initial market share and its Y-intercept are significantly different from those of other banks (FE). Further, it is strongly believed that error terms vary across a banking institution and/or a year (RE).

5.4.3 The Seemingly Unrelated Regression (SUREG) for Banks' Market Share

Generalized Least Squares (GLS) method was used to estimate the Seemingly Unrelated Regression (SUREG). This method solves the problem of autocorrelation and heteroscedasticity and removes them from the model automatically. Regression for the SUREG treats equations for each bank as independent but assumed that error terms are related across banks. In this case, external shocks are assumed to affect all banks, for example, when there is economic meltdown NPL ratios of all banks would be affected at different magnitude. Therefore, there is relationship among the cross-section units (banks) while at the same time the units are retaining their coefficients. The Pooled Effect Model analysis done in preceding sections are summaries for the sampled banks which represent the entire banking sector. Analysis of the banking sector in its entirety is half the story, analysis of an individual bank might also be very critical and shed more light on how an individual bank behaves in its own right and enable us to appreciate the diversity of cost structures and other peculiar characteristics an individual bank has. The results of the SUREG for each bank are presented and discussion in the preceding sub-section while detailed results are shown in ***Annexures 3 & 4***.

It is worth noting that in this estimation, the dependent variable is the Herfindahl Hirschman Index (HHI) and a negative coefficient implies an improvement in both concentration and competition. As long as the increased capital requirements results into increased costs of raising additional capital and maintaining capital levels, smaller and domestic banks may be incurring higher costs related to raising and maintaining capital and ultimately passing on the costs to the customers in a form of higher interest rates and other charges levied on the banking products offered. The analysis has indicated that two banks out of 21 under the study had negative coefficients and statistically significant p-values, these were I&M Bank and PBZ with the coefficients and p-value of -0.075786 (0.050) and -0.052082 (0.029) respectively.

The findings from the SUREG analysis for bank's market share revealed although the Pooled Effect Model analysis done proved empirically that capital adequacy ratio requirements do not significantly affect the banks' market share in Tanzania, the analysis proved statistically that generally banks with international orientation particularly in terms of ownership behaved differently. The majority or fully foreign owned banks tend to have variables which behaved in the anticipated manner and they had their market share been statistically significantly impacted by the capital adequacy requirements. Such banks include, Standard Chartered, Exim Bank, Stanbic

Bank, Diamond Trust, Barclays Bank, Citibank, BOA Bank, PBZ, KCB, CBA and I&M as detailed in ***Annexure 3***. On the contrary, the majority or fully locally owned banks had at most two or more of the four independent variables showing the unexpected sign and effects on market share. Examples of such banks include PBZ, Exim Bank, etc. This implies that banks with international orientation coupled with support from the parent banks, robust risk management systems and rigorous compliance requirements, they tend to be more informationally and operationally efficient and therefore respond accordingly to changes in economic fundamentals. ***Therefore, the hypothesis that Capital Adequacy Ratio requirements had no positive impact on banks' market share in Tanzania, was rejected for the case of the majority or fully foreign owned bank in this study***. After carrying out empirical estimation and discussion of results from the analyses done, the next chapter provides summary of the study, conclusion, policy implications, scope and suggestions for further study.

6.0 CONCLUSION AND POLICY IMPLICATION

6.1 Summary of the Study and Conclusion

It has been observed that an average of about 50.00 percent of the banking sector market share based on total assets criterion were foreign owned and the other half was majority domestically owned during the period 2002 to 2016. In 2016, the ownership structure of the banking sector was such that five institutions were majority state-owned and 43 were majority privately owned. Twenty-five banking institutions were locally owned and 23 were foreign owned. The increased number of banks has not addressed the dominance of the same five (5) largest banks neither has it resolved the banks' concentration of banking services in only four big cities which accounted for a total of 53 percent of the country's branch network. The results from analysis revealed that although generally there is no significant evidence to support that capital adequacy requirements have effects banks' market share in Tanzania, the individual bank analyses have proved statistically that they do. ***Therefore, the hypothesis that banks' market share of banks in Tanzania is not significantly related to higher regulatory capital adequacy ratio requirements, was not rejected in this study.***

The SUREG analysis results revealed although the Pooled Effect Model analysis done proved empirically that capital adequacy ratio requirements do not significantly affect the banks' market share in Tanzania, the SUREG analysis conducted revealed that generally banks with international orientation particularly in terms of ownership tend to have variables which behave in the anticipated manner and the majority or fully foreign owned banks had their market share been statistically significantly affected by the capital adequacy requirements. This implies that banks with international orientation coupled with support from the parent banks, robust risk management systems and rigorous compliance requirements, they tend to be more informationally and operationally efficient and therefore respond accordingly to changes in economic fundamentals. Therefore, the hypothesis that Capital Adequacy Ratio requirements had no positive impact on banks' market share in Tanzania, was rejected for the case of the majority or fully foreign owned bank in this study.

6.2 Policy Implications of the Findings

As the analysis has demonstrated that Tanzania's market was moderately concentrated with four biggest bank(CRDB Plc, NMB Plc, NBC Limited and Standard Chartered Bank) driving the market, if remain uncontrolled they may end up killing the healthy competition in the banking business through promoting monopolies. Therefore, the Government should think of implementing measures to tame the imminent continued organic growth of only handful banks, which may end up creating monopolistic banks, which imply promoting competition, and reducing market concentration. Some of the recommended measures include, firstly, make it mandatory for each new branch planned to be opened by the big banks, in addition to the current requirements there should be a supplementary requirement to open a branch in one of the rural areas in Tanzania in order to improve financial inclusion and reduce concentration. Secondly, as part of complying with Basel capital accord, BOT may consider implementing Capital Conservation Buffer (CCB) which will be applied flexibly to banks according to their risk profiles. The CCB, which will not only add cushion for loss absorption but also will help limit further uncontrolled growth – opening up new branch or ability to extend further loans. Thirdly, with the absence of explicit and comprehensive consumer protection laws in Tanzania, which could work as checks and balance, the few banks may behave against the interest of the depositors and other customers. This calls for policy makers and authorities including BOT to consider instituting measures aimed at customer protection.

It was the interest of the BOT as a regulator to ensure banks and financial institutions build the framework which maintains high quality capital and liquidity standards. Review of the BOT framework revealed that quantity of capital base (absolute capital requirements) was observed to be on the higher side especially if gauged in comparison with other EAC member states. Further, regulatory and supervisory tools pay a limited attention to the quality of capital base in such cases as the inclusion or exclusion of different types of reserves, e.g. regulatory reserves, 1.00 percent general provision on loans, advances and overdrafts classified as "current" under regulation 27 of the *Management of Risk Assets Regulations, 2014*. Further, subordinated debts are another example of aspect of capital base quality which are not given enough due weight when computing bank's total capital and core capital, respectively. The regulatory framework requires that for a subordinated debt to be considered as part of capital it must pass a litmus test involving five key prerequisites as provided under regulation 16 of the *Capital Adequacy Regulations, 2014*. Quality of Capital requirement should be an aspect to keep a similar watchful eye in addition to the quantity namely absolute capital and capital adequate ratio.

6.3 Scope and Suggested Areas for Further Research

This research paper was particularly focused on Tanzanian commercial banks for the period covering fourteen (15) years and its post-economic liberalization period (2002-2016). Reference was made to Basel I & II capital adequacy ratio requirements with a glance of Basel III, which is envisaged to be implemented in Tanzania, come December 2018 in relation to the performance of banks. Further research may be pursued to establish the extent to which the Government of the URT decision to withdraw its deposits and be deposited at BOT is seen by many to have led to liquidity squeeze on part of the banks and therefore reducing market share of the affected banks. The magnitude and well-elaborated repercussions emanating from the decision will come to light through carrying out a research.

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ANNEXURES

Annexure 1: DESCRIPTIVE STATISTICS OF VARIABLES AFFECTING BANKS' MARKET SHARE

Statistics	Market Share Index (HHI^{TA})	Capital	Total Assets	Total Deposits	Capital Adequacy i.r.o. Bank Size (CABS)	Capital Adequacy i.r.o. Foreign Owned Bank (CAFX)	constant
Mean	1147.437	5.69e+10	4.72e+11	3.82e+11	0.0578231	0.7278912	na
Median	1132.765	2.33e+10	2.29e+11	1.81e+11	0.0000000	1.0000000	na
Std. Deviation	50.30002	9.81e+10	7.33e+11	5.92e+11	0.2338067	0.4458045	na
Variance	2530.092	9.62e+21	5.37e+23	3.50e+23	0.0546656	0.1987416	na
Skewness	1.034936	3.848034	3.421508	3.324891	3.788864	-1.024125	na
Kurtosis	3.24213	20.75579	17.3486	16.19566	15.35549	2.048832	na
Minimum	1080.556	-4.02e+09	5.00e+09	2.74e+09	0.000000	0.000000	na
Maximum	1259.397	6.82e+11	5.33e+12	4.14e+12	1.000000	1.000000	na
Robust Coefficient	na	2.05e-10	6.83e-11	-1.15e-10	-4.638917	-5.052434	1153.581
Std. Error	na	3.13e-11	5.56e-11	6.75e-11	6.91115	7.216832	7.117049
t	na	6.55	1.23	-1.70	-0.67	-0.70	162.09
P>|t|	na	0.000	0.0220	0.089	0.503	0.484	0.000
[95 percent Conf. Interval]	na	1.43e-10 2.66e-10	-4.11e-11 1.78e-10	-2.48e-10 1.78e-11	-18.24169 8.96385	-19.25686 9.151989	1139.573 1167.589
No.of observations	294	294	294	294	294	294	294
Root MSE	49.686	49.686	49.686	49.686	49.686	49.686	49.686
Total SS	741317.082	741317.082	741317.082	741317.082	741317.082	741317.082	741317.082
Total MS	2932530.092	2932530.092	2932530.092	2932530.092	2932530.092	2932530.092	2932530.092
Total DF	293	293	293	293	293	293	293
Residual SS	710981.835	710981.835	710981.835	710981.835	710981.835	710981.835	710981.835
Residual MS	2,882,468.69	2,882,468.69	2,882,468.69	2,882,468.69	2,882,468.69	2,882,468.69	2,882,468.69
Residual DF	288	288	288	288	288	288	288

Source: *Author's computations*

Annexure 2: BREUSCH-PAGAN/COOK-WEISBERG TEST

```
. reg lnhhita lnca lnta lntd cabs cafx

      Source |       SS       df       MS              Number of obs =     311
-------------+------------------------------           F(  5,   305) =   17.48
       Model |  .188816731     5  .037763346            Prob > F      =  0.0000
    Residual |  .65901234    305  .002160696            R-squared     =  0.2227
-------------+------------------------------           Adj R-squared =  0.2100
       Total |  .84782907    310  .002734932            Root MSE      =  .04648

------------------------------------------------------------------------------
      lnhhita |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         lnca |   .0462029   .0050259     9.19   0.000     .036313    .0560927
         lnta |  -.0928414   .0171254    -5.42   0.000    -.1265404   -.0591425
         lntd |   .0473282    .014024     3.37   0.001     .0197321    .0749243
         cabs |  -.0026873   .012882    -0.21   0.835    -.0280361    .0226615
         cafx |  -.0052931   .0065064   -0.81   0.417    -.0180963    .0075101
        _cons |   7.143992   .0567849   125.81   0.000     7.032252    7.255732
------------------------------------------------------------------------------
```

Annexure 3: 'SUREG' RESULTS WITH DEPENDENT VARIABLE 'HHI^{TA},

No.	Bank Name	Cons.	Total Assets	Total deposits	Capital Adequacy	Capital Adequacy iro Foreign Ownership	Capital Adequacy iro Bank Size	R^2
1	African Banking Corporation (Tanzania) Limited	7.584826 (0.000)	- 0.2158981 (0.109)	0.1062956 (0.261)	0.0982576 (0.094)	omitted	omitted	0.1701
2	Akiba Commercial Bank Limited	7.214805 (0.000)	0.1754468 (0.644)	-0.2223529 (0.541)	0.0414579 (0.220)	omitted	omitted	0.1607
3	Azania Bank Limited	8.422281 (0.000)	- 0.3389577 (0.157)	0.2706839 (0.229)	0.0367559 (0.168)	0.063303 (0.046)	omitted	0.3407
4	Barclays Bank (Tanzania) Limited	omitted	- 0.1450779 (0.212)	0.0274739 (0.817)	0.0690289 (0.000)	8.488562 (0.000)	omitted	0.8026
5	BOA Bank Limited	omitted	0.1318212 (0.305)	- 0.195028 (0.071)	0.0595423 (0.032)	7.231998 (0.000)	omitted	0.7004
6	Citibank (Tanzania) Limited	omitted	- 0.5357093 (0.184)	0.4379046 (0.238)	0.0855615 (0.000)	7.639717 (0.000)	omitted	0.060
7	Commercial Bank of Africa (Tanzania) Limited	6.968688 (0.000)	- 0.1656717 (0.080)	0.1016945 (0.221)	0.0747632 (0.000)	omitted	omitted	0.5940
8	CRDB Bank Plc	9.058326 (0.000)	1.433892 (0.000)	-1.518021 (0.000)	0.0041248 (0.835)	omitted	0.0295296 (0.240)	0.9154
9	Diamond Trust Bank Limited	7.362432 (0.000)	- 0.2754279 (0.481)	0.1795304 (0.642)	0.0924556 (0.000)	omitted	omitted	0.4770
10	Exim Bank (Tanzania) Limited	8.153814 (0.000)	- 0.3681697 (0.123)	0.2212285 (0.347)	0.1179014 (0.000)	omitted	omitted	0.7143
11	FBME Bank (Tanzania) Limited	7.417127 (0.000)	- 0.0571715 (0.118)	0.0318126 (0.156)	0.0127683 (0.322)	omitted	omitted	0.1410

12	Habib African Bank Limited	6.916245 (0.000)	1.316171 (0.018)	-1.369617 (0.011)	0.0548977 (0.012)	omitted	omitted	0.6691
13	I & M Bank (Tanzania) Limited	6.39246 (0.000)	1.83397 (0.000)	-1.751767 (0.000)	-0.075786 (0.050)	omitted	omitted	0.7306
14	International Commercial Bank (Tanzania) Limited	7.585716 (0.000)	- 0.475731 (0.232)	0.3592341 (0.324)	0.1056825 (0.001)	omitted	omitted	0.5127
15	KCB Bank (Tanzania) Limited	6.56638 (0.000)	0.003702 (0.973)	- 0.0693272 (0.437)	0.0903435 (0.000)	omitted	omitted	0.6105
16	National Microfinance Bank Plc	8.888543 (0.000)	1.133988 (0.015)	-1.221949 (0.007)	0.0167859 (0.650)	omitted	-0.0252309 (0.586)	0.4047
17	NBC Bank Limited	8.257982 (0.000)	0.4463795 (0.258)	- 0.5439496 (0.131)	0.0540759 (0.117)	omitted	0.0501651 (0.050)	0.6437
18	NIC Bank (Tanzania) Limited	7.585716 (0.000)	- 0.475731 (0.232)	0.3592341 (0.324)	0.1056825 (0.001)	omitted	omitted	0.5127
19	Peoples' Bank of Zanzibar Limited	4.113798 (0.000)	0.8753136 (0.025)	- 0.720306 (0.043)	-0.052082 (0.029)	omitted	omitted	0.6525
20	Stanbic Bank (Tanzania) Limited	8.047175 (0.000)	- 0.2048279 (0.082)	- 0.1050247 (0.389)	0.0696926 (0.006)	8.047175 (0.000)	omitted	0.3883
21	Standard Chartered Bank (Tanzania) Limited	omitted	- 0.2377704 (0.236)	0.1358796 (0.501)	0.0857203 (0.001)	7.717549 (0.000)	omitted	0.4546

Note: *1. *Significant at 5 percent level of significance.*
2. Numbers in parenthesis are z-statistics

Annexure 4: **F-TEST RESULTS FOR BANKS' MARKET SHARE**

```
. reg lnhhita lnca lntd lnta cafx cabs
```

Source	SS	df	MS		
Model	.188816731	5	.037763346	Number of obs	= 311
Residual	.65901234	305	.002160696	F(5, 305)	= 17.48
				Prob > F	= 0.0000
Total	.84782907	310	.002734932	R-squared	= 0.2227
				Adj R-squared	= 0.2100
				Root MSE	= .04648

lnhhita	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnca	.0462029	.0050259	9.19	0.000	.036313	.0560927
lntd	.0473282	.014024	3.37	0.001	.0197321	.0749243
lnta	-.0928414	.0171254	-5.42	0.000	-.1265404	-.0591425
cafx	-.0052931	.0065064	-0.81	0.417	-.0180963	.0075101
cabs	-.0026873	.012882	-0.21	0.835	-.0280361	.0226615
_cons	7.143992	.0567849	125.81	0.000	7.032252	7.255732

```
. test lnca lntd lnta cafx cabs

 ( 1)  lnca = 0
 ( 2)  lntd = 0
 ( 3)  lnta = 0
 ( 4)  cafx = 0
 ( 5)  cabs = 0

       F(  5,   305) =   17.48
            Prob > F =    0.0000
```


Annexure 6: **LM TEST RESULTS FOR BANKS' MARKET SHARE**

```
. xtreg lnhhita lnca lnta lntd cafx, re

Random-effects GLS regression                   Number of obs      =       311
Group variable: cabs                            Number of groups   =         2

R-sq:  within  = 0.2199                         Obs per group: min =        19
       between = 1.0000                                        avg =     155.5
       overall = 0.2226                                        max =       292

                                                Wald chi2(4)       =     87.62
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

lnhhita	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lnca	.0460264	.0049464	9.30	0.000	.0363316	.0557212
lnta	-.0927751	.0170957	-5.43	0.000	-.1262821	-.0592682
lntd	.0472561	.0139978	3.38	0.001	.0198208	.0746913
cafx	-.0049666	.0063055	-0.79	0.431	-.0173253	.007392
_cons	7.147965	.0534114	133.83	0.000	7.043281	7.25265
sigma_u	0					
sigma_e	.04648329					
rho	0	(fraction of variance due to u_i)				

```
. estimates store re


. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        lnhhita[cabs,t] = Xb + u[cabs] + e[cabs,t]

        Estimated results:
                         |       Var      sd = sqrt(Var)
                 --------+------------------------------
                 lnhhita |    .0027349        .0522966
                       e |    .0021607        .0464833
                       u |          0                0

        Test:   Var(u) = 0
                                 chibar2(01) =      0.00
                              Prob > chibar2 =    1.0000

.
```