Assessment of Competition in Banking Sector of Namibia

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Abstract:

Competition plays a regulatory function in balancing demand and supply, and commercial banks in developing countries take a pivotal role in creating economy growth. They finance trade, industry, agriculture and are the main contributor to capital formation. It is therefore important to measure the competitiveness of commercial banks in developing economies. This paper uses of a modern and more robust analysis technique the Profit Elasticity model, along with the more conventional Panzar-Rosse model, to examine the competitiveness of commercial banks in Namibia. The loan market data from 2002 to 2016 are utilized for this study. Equally, as the contribution of mortgages to bank assets in Namibia is high, the analysis are solely conducted on the home loan market, one of the largest sector of the loan market in Namibia.

Keywords:

Namibia; bank competition; Profit Elasticity model; Panzar-Rosse model.

JEL Classification:

C13; E50; G21.

Introduction:

The banking industry is a crucial element of any economy. Measuring the competition in banking industry helps to regulate demand and supply and inform appropriate policy guidelines. This article analyses the level of competition in Namibian banks from 2001 to 2016. This research area is well defined and prior works such as Molyneux, Lloyd-Williams, and Thornton (1994); De Bandt, and Davis (2000); Mlambo and NCube (2011); Claessens, and Laeven (2004); Northcott (2004); Bikker, Sha_er, and Spierdijk (2012); Bing Xu, Van Rixtel, and Leuvensteijn (2013); Panzar and Rosse (1987); Rosse, and Panzar (1977); Baumol, Panzar, and Willig (1982) among others who have helped to circumscribe the field of analysis. The present investigation focuses on the banking sector of Namibia using the popular conventional Panzar-Rosse model as baseline analysis. Then a more robust and modern approach given by the Profit Elasticity model is also applied, to ascertain or invalidate the results suggested by the Panzar-Rosse model.

Among the four commercial banks that are currently operating in Namibia, Nedbank is the oldest established as Cape of Good Hope Bank in the year 1831. Following successive branding and structural changes, from Nederlandsche Bank voor Zuid Africa to the Netherlands Bank of South Africa (NBSA), to Nedcor Group in the 1980s, Nedbank Group was formed in 2003. The next one was First National Bank (FNB) founded as Deutsche Afrika Bank (DAB) in 1907 and in, 1915 National Bank of South Africa took over the assets of DAB which was in 1926 integrated with Barclays Bank. Barclays Bank changed name of the South African operation to Barclays National Bank Limited in 1971 and later changed to First National Bank of Southern Africa after the shareholding changed in December 1987, First National Bank of SWA/Namibia Limited was

incorporated in February, 1988. Standard Bank Namibia opened its first commercial branch in 19 August 1915 in Luderitz in Namibia. Bank Windhoek was established in 1982, when a group of Namibian entrepreneurs took over eight local branches of Volkskas Bank, the aim was to create a financially independent bank for Namibians in Namibia.

Although, there is a widespread focus on banks in Africa (Abdelkader, Mansouri (2013); Mlambo and NCube (2011); Hauner and Peiris (2008); Ikhide (2000)) there has been no analysis by the research community of the situation in Namibia. Although there is a high potential for new banks in the country, there are only four commercial banks operating, and there seems to be no appropriate policy in place, to attract and allow foreign banks to operate commercially, owning nearly 80% of the total banking assets.

The innovation of the present research is that the competition is measured not only based on the global loan market but also specifically based on home loan market as the concentration of banking assets in mortgages remains high in Namibia. This is done to measure competition of banks in this sector.

Literature Review:

Assessment of bank competition is categorized into two approaches, structural and non-structural. The structural approach adopts the structure conduct-performance paradigm of Mason (1949) and Bain (1956). Based on the traditional Industrial Organization, early research focused on market structure-performance linkages (the Structure-Measures) which stated that the likelihood of collusion increases with market concentration. However, studies by Van Leuvensteijn et al (2007), Claessens, and Laeven (2004) establish that the long existing theory of industrial organization has shown that the competitiveness of an industry cannot be measured by market structure indicators alone such as the number of institutions (being attributed to the
Four firm concentration ratio), HHI or other concentration indexes as the threat of an entry can be a more important determinant of the behavior of market participants. The Herfindahl- Hirschman Index (HHI) has the disadvantage of not distinguishing between large and small countries, for example, China and Namibia.

Market power may also be related to profit, in the sense that extremely high profits may be an indicator of lack of competition. A traditional measure of profitability is the price cost margin (PCM), which is equal to the output price minus the marginal costs, divided by the output price. Theory suggests that performance measures like profitability do not necessarily indicate the competitiveness of a banking system. These measures are influenced by a number of factors such as the degree of taxation of financial intermediation, bank's scale of operations, risk preferences, and the quality of country's information and judicial system. As such these measures can be poor indicators of the degree of competition.
Non-structural approaches draw from the "New empirical industrial organization" framework. These indicators move from specific assumptions on the behavior of banks and generally use micro data. These include the Panzar-Rosse H-statistic, the Lerner index, Elasticity Adjusted Lerner Index (EALI) and the Profit elasticity (PE) indicator. Our work adopts all these methods in order to ascertain the results as the determination of competition may differ depending on the measure chosen to asses it, therefore it may be preferable to consider different measures when assessing

bank competition as stated by Bing Xu, Van Rixtel, and Leuvensteijn (2013). The Lerner index and the Panzar-Rosse model are the conventional approaches. The conventional measures fail to measure loan markets properly due to the system of interest rates regulation. The modern approaches PE and EALI seem to be more robust as they are not very much affected by shortcomings of traditional techniques. The modern approaches are more innovative in the sense that, for instance the profit Elasticity model allows measurements of competition not only for the entire banking market but also for separate product markets such as the loan markets and for single types of banks such as commercial, savings and cooperative banks.

Related to this research project, bank competition in very few African countries such as Tunisia (Abdelkader, Mansouri (2013)), Ghana (Biekpe (2011)), Uganda (Hauner and Peiris (2008)), South Africa (Akinbode, Makina (2010), Molyneux, Altunbas, Gardener (1996)), Egypt (Poshakwale, and Qian (2011)), Angola (Barros, Mendes (2016)) have been done using methodologies primarily Panzar-Rosse H-statistics and in few cases data envelopment analysis (DEA) model to measure efficiency. All these researches have concluded that the banking industry in these African countries are either monopolistic or oligopolistic. This paper extends the competition analysis to
Namibia.

Methodology:

Data and Model specifications:

The four commercial banks First National Bank, Standard Bank, Bank Windhoek and NedBank are considered in this study for the period from 2002 to 2016. The data used for analysis in this paper are for the commercial banks operating in Namibia. The panel data for these banks for the period 2002 till 2016 were obtained through the financial reports of these banks which are available on web. For few years, the reports that were not on web were obtained as hard copies from these banks. For Panzar Rosse model, the dependent variables were used as found in the literature Barros, Qi Bin, and Peypoch (2014); Bikker, and Groeneveld (2000); Bikker, and Haaf (2002); Bikker, Sha_er, and Spierdijk (2012). For the PE model analysis the variables were used as found in the literature Bing Xu, Van Rixtel, and Leuvensteijn (2013); Bikker, and Haaf (2002).

Panzar – Rosse Model:

The Panzar{Rosse model, as popularized by Rosse, and Panzar (1977) and Panzar and Rosse (1987), is an approach to measuring competition that is based on a reduced- form revenue equation. The model is based on the assumption that banks have revenue and cost functions that define profit maximization path with the condition that the marginal revenue must be equal to marginal cost. Then the competition measure, H-statistic, is calculated by summing the elasticities of revenue with respect to input prices. The empirical form of the reduced-form revenue equation is,

$$ln\left(R_{it}\right) = \alpha_{it} + \sum_{i=1}^{n} \beta_i ln\left(W_{it}\right) + \sum_{q=1}^{Q} \gamma_q ln\left(Z_{iq}\right) + \mu_{it} \qquad (1)$$

where, R_{it} is the total revenue of bank i in period t, W_{it} is factor input prices of bank i, Z_{iq} is Q bank specific variables that affect revenue function of bank i and μ_{it}, error term which is normally distributed with covariates being independent and identically distributed random variables. β_i is the price elasticity. Hence the H-statistic, measure of competition, is the sum of input price elasticities, defined as

$$H = \sum_{i=1}^{n} \beta_i \qquad (2)$$

When H < 0, the market structure is a monopoly and if 0 < H < 1, the market is a monopolistic competition and the market is a perfect competition or a natural monopoly if H = 1.

In the equation (1), when credit (C) and total assets (TA) are used as control variables, the following price equation is obtained, a commonly used equation in the literature.

$$TR_{it} = \alpha_{it} + \sum_{i=1}^{n} \beta_i ln(W_{it}) + \gamma_{iq} ln(C_{iq}) + ln(TA_{it}) + \mu_{it} \qquad (3)$$

The Panzar- Rosse model application is based on the assumption that the markets are in a long-run equilibrium when the data are observed. To ensure that banks operate in long-run equilibrium, the prices of the production factors (inputs) should not be correlated with the firm's profitability. To perform a test of long-run equilibrium, the reduced form *R* is substituted with returns on assets (ROA), which should be independent of input prices.

$$ROA_{it} = \alpha_{it} + \sum_{i=1}^{n} \beta_i ln(W_{it}) + \sum_{q=1}^{Q} \gamma_i ln(C_{iq}) + ln(TA) + \mu_{it} \qquad (4)$$

where *TA* represents total assets.
Therefore, the ROA is regressed in the same covariates and the argument is that in a contestable market, market forces should equalize ROA across banks and therefore ROA is independent from input prices.

Profit-Elasticity Model:
The profit elasticity model is based on the relationship between performance in terms of profits and efficiency, measured as marginal costs. It is based on the notion that more efficient firms are with lower marginal costs and gain higher market shares or profits. Further Van Leuvensteijn et al (2007) explain, heavier the competition in a market, stronger the effect is. Theoretically, there is a negative relationship between efficiency measured in terms of marginal costs and profits; the more intense this negative relationship is, the more competitive the markets will be. So, in practice, the PE indicator will have a negative sign when the relationship between marginal costs and profits is estimated, and it will be more negative the higher the level of competition. As stated in Bing Xu, Van Rixtel, and Leuvensteijn (2013), related profit differences and the level of competition have a continuous and monotonically increasing relationship if the firms are ranked by decreasing effciency. The fact that this relationship is both continuous and monotonic is the main advantage

of Related Profit Differences (RPD) over more traditional measures of competition such as the HHI and Lerner index (or PCM approaches). Another advantage is that RPD and the Profit Elasticity (PE) indicator are not dependent on assumptions about the type of competitive model, such as whether this is Bertrand or Cournot competition.

To measure competition using PE model, marginal costs of the Namibian banks need to be measured first. To estimate the marginal costs, a standard solution in the literature is to adopt a Translog-Cost Function (TCF). In this paper, the cost function for marginal costs for all the commercial banks in Namibia have been estimated using the following TCF for a bank i at year t,

$$\ln C_{it} = \alpha_0 + \sum_{t=1}^{T-1} \gamma_t d_t + \sum_{j=1}^{K} \delta_j \ln x_{ijt} + \sum_{j=i}^{K} \sum_{k=1}^{K} \lambda_{jk} \ln x_{ijt} \ln x_{ikt} + \sum_{j=1}^{N} \omega_j \eta_{ijt} + \varepsilon_{it} \quad (5)$$

where C_{it} is the overall cost, d_t are year dummies, x_{ijt} are K variables including K_1 outputs and K_2 input prices which include the squared and cross-products between these K variables, η_{ijt} are control variables and ε_{it} is an error term. Every variable is measured as the log-level.

TCFs are suitable for multi-product firms, such as banks. Based on the literature on the subject, Van Leuvensteijn et al (2007), three output measures are used: the outstanding amount of loans, the outstanding amount of securities, and the income from services and three input factors: share of labour costs, price of funding and external inputs. Further equity ratio has been included as a control variable to capture the loan portfolio risk across banks.

The profit elasticity (PE) indicator can be estimated for bank i at time t by running a regression of profit on the marginal cost. To compute the marginal cost mc_{it}, for each combination of bank i and year t, TCF estimated coefficients are used by differentiating the total costs with respect to the total loans and home loans. The following equation is used for this purpose.

$$\ln(\pi_{it}) = \alpha_i + \alpha_t + \beta_t \ln(mc_{it}) + \sum_{j=1}^{J} \delta_j x_{ijt} + \varepsilon_{it} \quad (6)$$

where $\ln(\pi_{it})$ is the log level of a given bank i net profit at time t, α_i and α_t are respectively bank fixed and time fixed effects, the coefficient β represents the elasticity of profit to costs, x_{ijt} is a vector of J bank-year control variables, and ε_{it} is the error or disturbance term. To estimate this equation, coefficient of marginal cost relative to earnings is estimated using a panel model controlling for bank fixed effects which are time invariant but that could affect bank profitability.

Results and Interpretations:

A. Panzar Rosse Model Analysis for Total Loans and Home Loans

From both equilibrium tests for Home loans as well as for Total loans, we fail to reject the null assumption of long-course equilibrium since E is not less than zero, implying that over the relish duration, the Panzar-Rosse estimation method can be of interest to measure the extent of banking

rivalry in Namibia. Furthermore, both the Panzar-Rosse indexes are positive, dissimilar from other over this relish period, accepting the hypothesis that Namibian loan markets are in a condition of a monopolistic rival-ship as the index lies between 0 and 1. However, the index for Total loans is highly positive thereby showing a highly non-competitive setting but of course with much of the effect coming from Home loans as the difference between the two indexes is slightly small.

B. Profit Elasticity Model Analysis

Profit Elasticity model gives the competition measure year on year basis for all the banks. For the PE model analysis, the first step is to analyze the marginal cost. The analysis of marginal cost for total loans and home loans using the Translog-Cost Function (TCF) given in equation (5) is calculated. Then using equation (6), PE estimates β_t are calculated. The Namibian bank rivalry has shown to be more competitive from 2002 to 2003, it then weakened afterwards up to 2005 and again from 2010 with the period 2013 to 2016 showing a more strongly weak competition. From 2002 to 2003, we see a more competitive market in the industry and a weak rivalry afterwards up to 2006, it then worsened from 2009 up to 2016. The period of 2010 - 2016 shows a highly weak competitive setting in Home loans market which is correlating to the same rivalry setting in the Total loans over the whole sample period.

Table 1. Panzar Rosse model analysis of Namibian banking

	Price Equation		Equillibrium Test	
	LogTR Total loans	*LogTR* Home loans	*LogROA* Total loans	*LogROA* Home loans
Dependent Variables	Coefficient (Standard errors)	Coefficient (Standard errors)	Coefficient (Standard errors)	Coefficient (Standard errors)
Constant	13.297744	-0.408787	9.181181	-0.3395393
	(4.980218)	(0.858980)	(3.858645)	(0.6473399)
PL	0.465762	0.441426	0.365158	0.3297135
	(0.160959)	(0.169667)	(0.124690)	(0.1276572)
PLF	-0.064929	-0.091281	-0.049431	-0.0711797
	(0.040184)	(0.040314)	(0.031147)	(0.0305184)
PCE	0.014136	0.031319	-0.016220	0.0053206
	(0.047672)	(0.050789)	(0.036950)	(0.0383286)
EQTA	0.033259	0.084326	-0.921111	-0.8715550
	(0.099609)	(0.112680)	(0.077249)	(0.0852499)
LOATA	-2.349606	0.065345	-1.697810	0.0236173
	(0.889767)	(0.095105)	(0.689379)	(0.0718337)
LFTA	2.451184	0.232375	1.916862	0.3484916
	(0.808972)	(0.171851)	(0.626757)	(0.1300350)
LDTLD	-15.084471	-0.801830	-10.507337	-0.6587733
	(5.156717)	(0.459320)	(3.995277)	(0.3463763)
H Statistic	0.414969	0.381464	0.299507	0.263854
Statistics of the Model				
R^2	0.46296	0.40154	0.82677	0.82263
R^2 - adjusted	0.39583	0.32673	0.80511	0.80046
Total number of Observations	60	60	60	60
F-statistic	6.89654	5.36754	38.1802	37.1032
p-value <	$6.4504e^{-}06$	$9.6497e^{-}05$	$2.22e^{-}16$	$2.22e^{-}16$

PL - Price of Labour which is personnel expenses divided by total assets. PLF - Price of Loanable Funds which is obtained by dividing the sum of interest expenses by the amount of loanable funds. PCE - Price of Capital Expenditure which is the ratio of capital expenses or expenditure to fixed assets. EQTA - Equity to Total Assets. LOATA - Loans to Total Assets. LFTA - Loanable Funds to Total Assets. LDTLD - The scale factor which represents the individual market share according to loans and deposits. *Standard errors are given in brackets.

Table 2. Marginal Cost Analysis for Home Loans and Total Loans

	Marginal Cost Estimates (MC_{it})	
Year	Home Loans	Total Loans
2002	0.220974 (0.091535)	$1.5501e^{-}01$ ($9.0803e^{-}02$)
2003	0.634581 (0.096791)	$4.3453e^{-}01$ ($1.1404e^{-}01$)
2004	0.582241 (0.105214)	$2.6878e^{-}01$ ($1.3575e^{-}01$)
2005	0.739177 (0.116205)	$3.0108e^{-}01$ ($1.7171e^{-}01$)
2006	0.898000 (0.125106)	$3.8993e^{-}01$ ($1.9205e^{-}01$)
2007	1.070267 (0.129110)	$5.1110e^{-}01$ ($2.0552e^{-}01$)
2008	1.291647 (0.135754)	$6.8001e^{-}01$ ($2.2344e^{-}01$)
2009	1.307579 (0.142991)	$6.4185e^{-}01$ ($2.4212e^{-}01$)
2010	1.246117 (0.151272)	$5.4250e^{-}01$ ($2.5583e^{-}01$)
2011	1.267175 (0.153982)	$5.3368e^{-}01$ ($2.6194e^{-}01$)
2012	1.372003 (0.160608)	$5.9072e^{-}01$ ($2.7993e^{-}01$)
2013	1.412905 (0.166829)	$5.7382e^{-}01$ ($2.9989e^{-}01$)
2014	1.546792 (0.178058)	$6.0331e^{-}01$ ($3.2876e^{-}01$)
2015	1.723193 (0.178058)	$7.4022e^{-}01$ ($3.4214e^{-}01$)
2016	1.925274 (0.165859)	$9.4299e^{-}01$ ($3.4911e^{-}01$)
Statistics for Model		
R^2	0.96610	0.96854
R^2-adjusted	0.94915	0.95821
F-statistic	66.4976	61.5784
p-value <	$2.22e^{-}16$	$2.22e^{-}16$
df	(18,42)	(18,42)

*Standard errors are given in brackets.

Table 3. Profit Elasticity analysis for Home Loans ans Total Loans

	PE Estimates β_t		$Log(MC_{it})$	
Year	Home Loans	Total Loans	Home Loans	Total loans
Constant	15.948711	$1.6334e^{+}01$	0.050852	$6.5223e^{-}01$
	(0.556370)	$(1.8719e^{+}05)$	(0140335)	$(1.6776e^{-}01)$
2002	-0.012820	$1.6279e^{-}01$	0.070771	$5.6176e^{-}03$
	(0.385037)	$(1.7856e^{-}01)$	(0.136686)	$(1.1790e^{-}01)$
2003	0.800115	$3.8938e^{-}01$	-0.095872	$-6.2387e^{-}02$
	(0.445665)	$(1.8686e^{-}01)$	(0.154821)	$(1.3056e^{-}01)$
2004	0.539248	$5.2380e^{-}01$	-0.042890	$-2.1172e^{-}02$
	(0.420376)	$(2.0082e^{-}01)$	(0.169087)	$(1.2339e^{-}01)$
2005	0.383303	$9.6821e^{-}01$	0.080511	$1.1652e^{-}01$
	(0.404957)	$(2.2295e^{-}01)$	(0.169400)	$(1.2604e^{-}01)$
2006	0.364105	$9.9671e^{-}01$	0.150445	$5.4408e^{-}02$
	(0.383227)	$(1.9480e^{-}01)$	(0.159698)	$(1.1569e^{-}01)$
2007	0.501056	$1.0984e^{0}0$	0.142408	$5.0704e^{-}02$
	(0.380152)	$(1.9253e^{-}01)$	(0.157656)	$(1.1551e^{-}01)$
2008	0.709271	$1.2848e^{0}0$	0.125352	$7.3343e^{-}02$
	(0.382964)	$(1.9615e^{-}01)$	(0.156737)	$(1.1741e^{-}01)$
2009	0.832068	$1.3093e^{0}0$	0.063570	$3.6190e^{-}02$
	(0.382701)	$(2.1629e^{-}01)$	(0.165388)	$(1.1975e^{-}01)$
2010	0.697994	$1.3158e^{+}00$	0.098495	$2.5523e^{-}02$
	(0.355357)	$(2.2178e^{-}01)$	(0.154830)	$(1.1656e^{-}01)$
2011	0.584023	$1.3405e^{+}00$	0.147135	$3.5658e^{-}02$
	(0.347693)	$(2.1800e^{-}01)$	(0.148013)	$(1.1494e^{-}01)$
2012	0.567752	$1.4788e^{+}00$	0.204602	$4.9279e^{-}02$
	(0.345199)	$(2.0850e^{-}01)$	(0.139007)	$(1.1396e^{-}01)$
2013	0.463949	$1.6001e^{+}00$	0.289010	$6.0920e^{-}02$
	(0.345756)	$(1.9977e^{-}01)$	(0.133363)	$(1.1503e^{-}01)$
2014	0.368120	$2.1218e^{+}00$	0.395347	$2.1142e^{-}01$
	(0.349460)	$(2.0868e^{-}01)$	(0.127397)	$(1.1450e^{-}01)$
2015	0.277625	$2.3590e^{+}00$	0.5306794	$2.7878e^{-}01$
	(0.354961)	$(1.9156e^{-}01)$	(0.124164)	$(1.1689e^{-}01)$
2016	-0.417380	$2.7038e^{+}00$	0.752449	$4.4764e^{-}01$
	(0.364555)	$(1.8069e^{-}01)$	(0.125261)	$(1.2178e^{-}01)$
Statistics of the model				
R^2	0.93006	0.96002		
R^2 - adjusted	0.86231	0.92129		
F-Statistic	13.7277	24.7868		
p-value	$2.5665e^{-}11$	$5.1334e^{-}15$		
DF	(31,32)	(31,32)		
Number of observations	60	60		

*Standard errors are given in brackets.

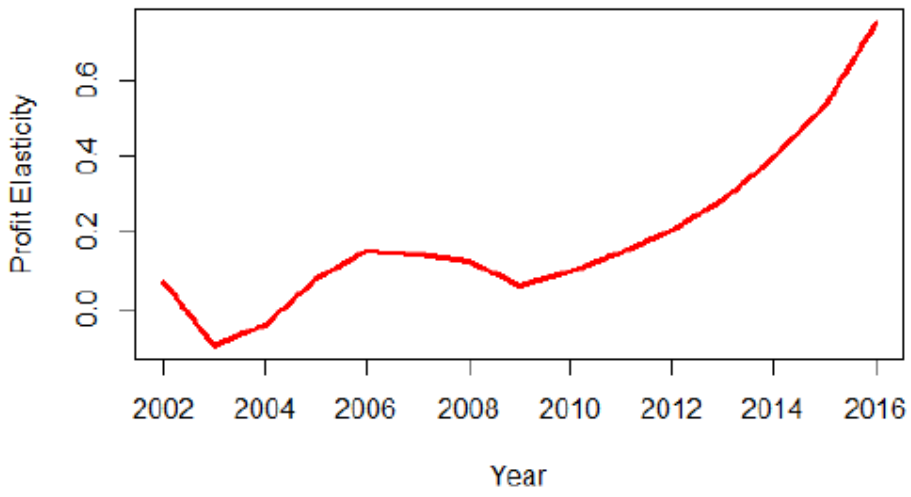

Figure 1. Profit Elasticity for Home Loans for the period 2002 - 2016

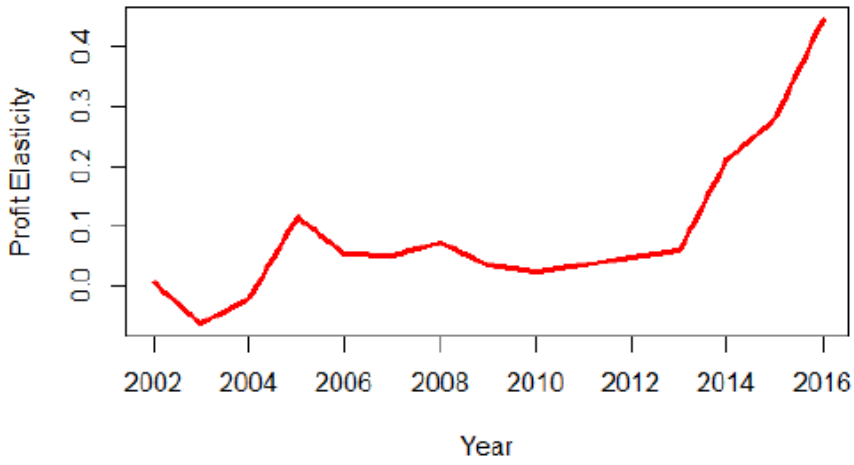

Figure 2. Profit Elasticity for Total Loans for the period 2002 - 2016

Conclusion:

In this paper, we have analyzed the competition measure in the Namibian banking industry using more conventional Panzar-Rosse model, Shaffer (2002) along with modern Profit Elasticity model, Bing Xu, Van Rixtel, and Leuvensteijn (2013). Both models agree on the result that Namibian banks are monopolistic. This is a much needed contribution to the literature that lacks studies on Namibian banking industry. Presently, Namibia is experiencing serious liquidity crisis and the markets are lacking competitiveness due to reduced foreign investment and have become speculative. The data span used in this paper is broader than the data used in Shaffer, and DiSalvo

(1994), Abdelkader, Mansouri (2013), Akinbode, Makina (2010) and Biekpe (2011) studying banking sectors in different African countries. Therefore, this paper provides a robust result on Namibian banking sector. As the theoretical foundation of the models used in this paper are well researched and both conventional Panzar-Rosse model and modern Profit Elasticity models have led to the same conclusion that the Namibian banking industry is monopolistic.

Also the banking assets in Namibia are hugely concentrated on mortgages and the banking sector is not competitive in the home loan markets at all. The existing literature on banking industry of various African countries have not looked at the competition measure in this perspective which is an innovation in this kind of study. The general conclusion is that the results of this paper have suggested that there is a need for more foreign banks in order to maintain a level playing field in the banking sector. This study will also be useful for Namibian Competition commission and Bank of Namibia in policy making and governance of the Namibian banking industry.

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