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Net Interest Rate Margins in Zambia:
The Role of Competition Dynamics

By
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Abstract

Using the Error Correction Model, this paper utilizes quarterly bank-level data to explain the determinants of lending interest rate margins in Zambia. The findings reveal that competition as measured by the HH Index is negatively related to the Net Interest Margin (NIM), favouring the Efficient Structure hypothesis to the Structure-Conduct-Performance hypothesis. The findings also suggest that market contestability and potential competition remains relevant to NIM levels in Zambia. Thus, the banking industry's expectation of the authorities' long term policy stance or posture as regards market contestability matters to NIM levels in the Zambian banking industry. Other factors that influence NIM levels are values of NIM lagged one period and yield rates on government securities. Non-performing loans and CPI were insignificant supporting other studies which argue that qualitative considerations take precedence in the determination of lending interest rates in Zambia.

JEL classification: E43
Key words: Net interest margin; lending interest rate; error correction model

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Contents

1. Introduction
1.1. Background

Since the early 1990s, the Zambian banking sector has been substantially liberalized and interest rate controls discontinued. Particularly in the last decade, the relatively stable macroeconomic outturn and the advent of new technology principally mobile technology in addition to Government's liberal policies has substantially eased barriers to entry for new market participants in the banking industry. It can thus be predicted from standard economic theory that these factors should lead to two important outcomes: improvements in accessibility to financial services and a reduction in the cost of lending due to competitive pressure. However, interest rates seem to remain persistently high and market shares remain concentrated in the largest few firms.[2] As a result, intermediation specifically bank lending is low and interest margins are high compared to the rest of the world.[3]

The widespread concern about the high cost of borrowing prompted monetary authorities under the then newly elected Government in 2011 to institute a series of policy measures aimed at reducing lending interest rates soon after taking over power. The reserve requirements and core liquid asset ratios were both reduced by 200 basis points in the same year. Later in April 2012, corporate income tax for banks was reduced from 40 to 35 percent. Further, in early 2013 it was made compulsory for banks to link their lending rates to the new Bank of Zambia policy rate and in the same year the central bank subjected commercial bank lending rates to a legal maximum of 18.25% in what was seen as the most direct interventionist approach in the post-liberalization era by the Central Bank.[4] However, evidence so far demonstrates that these measures achieved very little if any to rein in the perceived high lending interest rates. As a matter of fact, the average lending rate breached 26% in the first quarter of 2016 rebounding to the pre-cap levels of 2011 before the sweeping measures were taken in the industry. This followed the removal of the legal limit in the last quarter of 2015.

The banking sector plays a fundamental role in economic growth, as it is the basic element in the channeling of funds from lender-savers to borrowers-spenders. Crucially, financial intermediation affects the net return to savings and the gross return to investment. The spread between these two returns mirrors Bank Interest Margins. It could also be interpreted as an indicator of the efficiency of the banking system.[5] Obviously, the lower the

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2 Francis Z.M, Chungu K, Owen M, Tobias R, and Joe S (2014); "Determinants of Bank Lending Rates in Zambia: A Balance Sheet Approach". Bank of Zambia Working Paper No. WP/02/2014

3 Calixte Ahokpossi, Determinants of Bank Interest Margins in Sub-Saharan Africa, IMF Working Paper - African Department (WP/13/34), IMF, 2013

4 Commercial bank circular number 25/2012 capped lending rates at 9 percent above the Bank of Zambia policy rate, which at the time was 9.25 percent.

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Errors and omissions are similarly the authors' own responsibility.

5 Ash Demirgiic, Kunt and Harry Huizinga, Determinants of Commercial Bank Interest Margins and Profitability: Some International Evidence, The World Bank Economic Review, Vol 13, No. 2, P. 379-408

banks' interest margin, the more efficient and the lower the social costs of financial intermediation will be.[6] In this sense, it is important that this work of intermediation by the banks is carried out with the lowest possible cost in order to achieve greater social welfare.

Whether or not different policy approaches succeed in reducing lending rates will depend on an understanding of how banks determine the interest rates that they charge. Several studies have investigated the factors that determine lending interest rates. Some of these factors have been identified as the cost of funds, credit risk, liquidity risk, operational efficiency, government borrowing, macroeconomic stability, etc.

This notwithstanding, relatively few studies have looked on structural factors such as the levels of competition. Two strands of literature try to explain how lending interest rates are determined from the structural point of view. The Efficient Structure (E-S) hypothesis postulates that efficiency gains from a concentrated market structure will have a positive impact on lending interest rates through economies of scale and therefore lower net interest margins. According to this hypothesis, firms possessing a comparative advantage in production become large and, as a natural consequence, the market becomes more concentrated.[7] On the other hand, the Structure-Conduct-Performance (S-C-P) hypothesis predicts higher interest rates from market concentration as a result of both tacit and non-tacit collusion since costs of collusion are lowered. These two diametrically opposed theorems have led to substantial ambiguity in the literature on market structure and interest rate margins. For instance, Federico S. Mandelman found that changes in the market structure do not affect the mark-ups while S. Corvoisier and R. Gropp found only a marginally significant effect at the 15% level. Others such as Calixte Ahokpossi and Ash Demirgiic, Kunt and Harry Huizinga have found statistically significant results.

In practice and perhaps more importantly, policymakers have an interest in promoting banking sectors that are both stable and efficient. Stability clearly requires sufficient banking profitability and hence could call for high net interest margins. On the contrary, economic efficiency requires banking spreads that are not too large. As such, balancing the two equally important aspects (stability and efficiency) is a challenge to monetary authorities.

In view of this dichotomy of both theoretical constructs and empirical results, what model can explain the developments in the financial sector in Zambia? Can the high lending interest rate margins amidst a relatively stable macroeconomic environment, favorable technological improvements and an enabling government policy be explained by the S-C-P model? Is the E-S model appropriate for the Zambian situation? While there are many factors that determine net interest rate margins, this article takes a structural approach as postulated by Michael Porter's S-C-P approach and Paul Samuelson's E-S approach. Thus, the Article aims at bridging the gap in the literature on interest rates determination in Zambia. In so doing, it will provide valuable lessons to both monetary and fiscal authorities in guiding the course of interest rates and by implication net interest margins in Zambia and beyond.

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[6] J. Maudos, J. Fernandez de Guevara, Factors explaining the interest margin in the banking sectors of the European Union, Journal of Banking & Finance No.28 (2004), P. 2259–2281

[7] Federico S. Mandelman, Business Cycles: A Role for Imperfect Competition in the Banking System, Federal Reserve Bank of Atlanta Working Paper Series, Working Paper No.2006-21, November 2006

There is an established link between financial sector development and economic development in general. Based on an analysis of concrete evidence, a World Bank research demonstrates that finance-led economic growth is pro-poor. The more affordable and accessible finance is, the more business ideas and innovative inventions will be realized thereby creating employment and the much needed incomes to households. As a result, both high- and low-income households feel the benefits of financial sector development. The most recent example of finance led growth which has lifted millions out of poverty is in the emerging markets of the Asia pacific region. In these regions, access to affordable finance especially microfinance played a critical role in reducing poverty.

The financial sector in Zambia is generally under-developed with only about 21.4% of adult Zambians reported to be banked and very low use of formal products on offer on the market. It is further reported that levels of access in Zambia are the lowest overall in the Southern African countries where the Finscope survey has been undertaken.[8] With the incidence of poverty estimated at 60%, one way to reducing poverty is to make the much needed finance widely accessible and affordable. By exploring and understanding the influence of structural factors that impact on the lending interest rates, this article is particularly important to policy makers who grapple with poverty reducing policies on a daily basis especially in Zambia and in the sub-region.

1.2. Statement of the Problem

The favorable macroeconomic outturn as shown in table one in the last decade in Zambia is broadly expected to impact positively on the lending interest rates and net interest rate margins but interest rates seem to have remained higher than could be inferred from economic fundamentals. This outcome negates some of the objectives of the monetary authorities in terms of reducing the cost of credit as well as financial inclusion in terms of access to credit.

In a liberalized market dispensation, the cost of money is broadly expected to be indicative of the fundamentals in the economy. Thus, the observed inertia by lending interest rates in Zambia to speedily and fully adjust to the economic fundamentals could be indicative of structural rigidities in the economy. This is the main problem which this article tries to address. This problem is one of the Major policy conundrums confronting policy makers in Zambia as evidenced by the many policy interventions in the recent past which prima facie seem to be sterile. Monetary policy transmission requires a reasonably developed and efficient financial sector. It is therefore of vital significance that this question is empirically examined.

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[8] Finscope Survey, 2015

Table 1. Developments in key macroeconomic indicators

	Real GDP (RGDP)	RGDP per capita(K)	Inflation	GNS (% of GDP)	Lending Rate (Zambia)	Lending Rate (SSA)
1986 - 1995	-0.66	6092	93.0	10.3	55.4	21.4
1996 - 2005	4.5	4909	24.6	9.8	48.9	21.8
2006 - 2015	7.6	7309	9.2	32.7	23.8	15.3

Source: IMF (WEO) 2015, WB (WDI) and BoZ; Author's Calculations.

1.3. Objectives and Significance

The overall objective of the study is to identify the factors that affect the lending interest rate margins in Zambia but with a special focus on market structure. In this regard, the article will attempt to address the effect of market structure on interest rate margins in Zambia although there might be other explanatory variables of lending interest rate margins. Thus, the primary variable of interest is market structure and the specific objective of interest is determining the effect of competition on lending interest rates in Zambia. Other specific objectives are as follows:

(i) To determine the effect of inflation on net interest rate margins in Zambia.
(ii) To determine the effect of Treasury yield rates on net interest rate margins in Zambia.
(iii) To determine the effect of non-performing loans (credit risk) on net interest rate margins in Zambia.

2. An Overview of the Zambian Financial Sector

Alongside the rise in inflation, interest rates short up immediately after the economic reforms of the early 1990s. As inflation rates and other macroeconomic fundamentals eased, lending interest rates generally declined until recently. The developments in deposit rates, however, differ widely according to the type of account and amounts deposited. Typically, large depositors obtain interest rates that are close to those on government Treasury bills as opposed to small depositors. Developments in the other variables of interest namely CPI, Non-Performing Loans and yields on government securities particularly the 91 day treasury bill which is the most liquid security also showed the same trend. Chart 1 below shows the developments in the various types of interest rates namely the Weighted Lending Base Rate (WLBR), Net Interest Margin (NIM), Average Savings Rate and the Average Lending Rate (Lending Rate).

Chart 1: Developments in the nominal interest rates
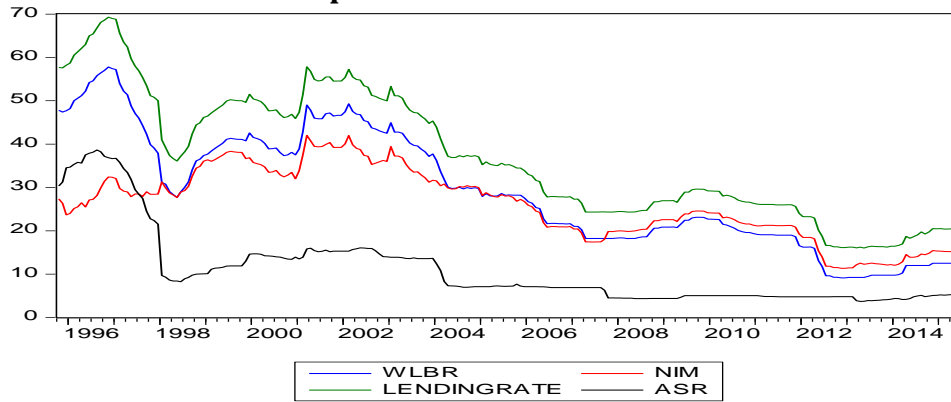
Source: Bank of Zambia; Authors' calculations

On the structural side, the Government embarked on the Financial Sector Development Programme (FSDP) in 2004. The FSDP highlighted the dominance of foreign owned banks with a few locally owned banks. Overally, the FSDP has helped in improving the governance and regulatory infrastructure of the banking sector as a response to the challenges of the 1990s which witnessed the failure of some commercial banks.

In view of these structural changes and the relative stability in the economy, the past decade has seen an increase in the number of commercial banks. Out of 13 commercial banks in 2006, seven were subsidiaries of foreign banks; one joint venture with majority foreign ownership; four domestic private banks and a public sector bank. Post 2006, six more subsidiaries of foreign banks have been registered, bringing the total number of banks in Zambia to 19, with foreign ownership rising to 14. This has raised the competitive landscape as incumbents try to beat competition arising from the new entrants and at the same time protect themselves from potential competition arising from the authorities' seemingly liberal attitude towards new entry.

Chart 2: Competition in the Banking Industry
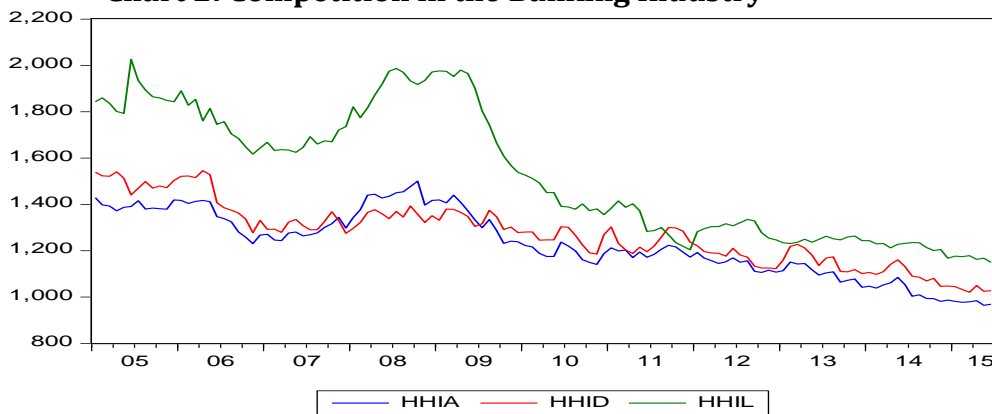
Source: Authors' calculations

Beside the increase in the number of participants, several indicators show a growing banking sector in Zambia. Gross assets, deposits and loans have increased at phenomenal rates. At the end of 2011, the banks' nominal asset size stood at K27.8 trillion (30% of GDP) which was about three times higher than the K10.7 trillion held in 2006 (27.7% of GDP). Yet, the Zambian banking system continues to exhibit monopolistic tendencies with few large banks dominating the sector. The HH Index as shown in table two reveal that the banking industry is moderately concentrated with the largest four commercial banks commanding above 60% of the market share whether in terms of Assets, Deposits or Loans. This is consistent with the findings of Anthony Musonda Simpasa in 2013. Nevertheless, as can be noted in chart 1 above, the dominance of the four largest banks in deposits, loans and total assets has been diluted as a result of market capture by smaller banks and new industry entrants, an indication of growing competitive intensity.

In addition, the banking industry in Zambia is largely profitable and resilient as can be shown by the net interest margin in chart 1. Although the margin has been declining over the years, non-balance sheet items remain an important source of income for commercial banks. These include treasury securities, realized gains on foreign exchange transactions and fee income among others. The 2008 global financial crisis only had a small effect on the local banking industry as a whole. Most commercial banks hold capital balances above the regulatory threshold which is indicative of the relative strength and stability of the Zambian banking sector. To boost the banks' capital position and strengthen their resilience, the authorities raised regulatory capital further and introduced a tiered structure in April 2012. The minimum capital requirement for local and foreign banks was raised from US$2 million to US$20 and US$100 million respectively. It was widely expected that the new capital requirements would boost banks' lending to the private sector.

Table 2: Market structure in the Zambian banking industry

Date	HHIL	HHIA	HHID
Jun-05	2,026.8	1,390.5	1,440.1
Jun-10	1,391.4	1,236.9	1,303.2
Jun-15	1,149.4	968.9	1,027.3

Source: Bank of Zambia, Authors' calculations

3. Literature Review

While the factors that determine net interest margins have been substantially investigated, little attention has been paid to the role of competition especially in the developing world. As such, the literature presented in this part concentrate on the effect of competition on lending interest rate margins and will only touch on the other factors tangentially.

3.1. Theoretical literature

Theoretical literature can be grouped into two broad classes: monetary and non-monetary (real analysis) theories. Non-monetary theories tend to be broad, philosophical explanations of why interest rates exist, and seem only remotely concerned with the actual determination of the rate of interest in the money market. Monetary theories on the other hand are

concerned with the many and volatile forces which move short-term interest rates. Monetary theorists have postulated several frameworks to explain what determines interest rates and indeed interest rate margins in an economy. The classical theorists in particular have proposed that the real rate of interest is determined by the marginal productivity of physical capital in a positive manner. This basic notion has been extended to include other influences in different theories such as the time preference theory, the liquidity preference (or cash balances) theory, the loanable funds theory, and the rational expectations theory.[9]

With regard to market structure, the literature is generally summarized by two opposing hypotheses.[10] One suggests that concentration generally reduces the costs of banks to collude either tacitly or otherwise. Thus banks will use the market power to extract rents. This is referred to as the Structure – Conduct – Performance (S-C-P) hypothesis. According to this model, market performance (profits, price, product quality, etc.) depends on market conduct (pricing behavior, legal tactics, merger, collusion, etc.) that in turn depends on market structure (number of buyers and sellers, barriers to entry, etc.). Thus, this theory predicts a link between interest margins (performance) and market concentration (structure). In this paper, the S-C-P hypothesis implies that a positive relationship between bank interest margins and market structure reflect non-competitive pricing behavior in concentrated markets. In other words, based on this hypothesis the marginal effect of concentration would be to increase interest rates as it is associated with less competitive behavior and, hence, higher margins. However, it is worth noting that higher contestability could result irrespective of the market structure in part be due to recent technological advances which have resulted in an overall increase in competition, irrespective of the level of concentration.[11]

The Efficient Structure (E-S) hypothesis on the other hand suggests that concentration would increase the overall efficiency of the sector. Based on this hypothesis, concentration is due to more efficient banks growing more rapidly than less efficient banks, or more efficient banks taking over less efficient ones. If this is the case, at least up to some point, banks would price their services more competitively, rather than less competitively. Thus, based on the E-S hypothesis, the marginal effect of concentration on the interest rate would be to reduce interest rates because a more concentrated market would be evidence of a more efficient size of banks.

3.2.   Empirical Literature

Empirically, three categories of factors that influence lending interest rates and interest rate margins have been identified. These include bank specific, industry specific and macroeconomic factors. Bank and industry specific factors include market power, operating

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[9] Rose (2003) and Madura (2006). Refer to this paper for a robust explanation of these theories.

[10] Berger, A., Hannan, T., 1989. The price-concentration relationship in banking. The Review of Economics and Statistics 71, 291–299

[11] S. Corvoisier, R. Gropp; Bank concentration and retail interest rates, / Journal of Banking & Finance No. 26 (2002), P. 2155–2189

costs, loan loss provisions, liquidity risk etc. At the macro level, factors such as taxation, inflation and the pace of economic growth have been found to be important.[12]

Although there is a reasonably big volume of empirical literature on determinants of interest rate margins, most of it has been undertaken in western countries. Even in these countries, most of the empirical estimations have used panel data to compare interest rate margins in different jurisdictions. However, in Africa and particularly Sub-Saharan-Africa (SSA), the literature is scanty. This notwithstanding, using an unbalanced panel of 2582 observations in 41 sub-Saharan African countries (including Zambia) covering the period 1995–2008, the IMF concludes that the S.C.P hypothesis holds for the banking sector in SSA.[13] It was however found that the relationship between interest rate margins and concentration depended on bank efficiency. In particular, more efficient banks were able to charge higher margins in concentrated markets compared to inefficient banks after controlling for bank specific factors such as credit and liquidity risk, and country specific factors such as inflation and economic growth. This IMF paper is one of the very few papers that address the aspect of market structure in SSA although it differs in its methodological approach to this paper. The methodological approach of panel data estimation can only be used to make overarching conclusions about the association of market structure to interest rate margins at the national level and the question of whether or not this association can hold within national markets remains unanswered.

The other influential paper is that by S. Corvoisier and R. Gropp (2002) which found a weakly positive effect of concentration on interest rate margins in the Euro-zone area using a sample period from 1993 – 1999. At the 15% level of significance, increasing concentration increased banks' margins by 100–200 basis points, which is in support of the S.C.P hypothesis. The HHI was used as a dummy variable and was the central variable of interest. In addition to other challenges, the weaknesses of using panel data estimations in terms of making overarching instead of market specific conclusions also apply here.

Studying the effect of market structure on bank spreads in Europe and the United States of America from 1988 - 1995, A. Saunders and L. Schumacher found that the effect appeared to vary across countries.[14] The more segmented or restricted the banking system, in terms of geographic restrictions on branching and universality of banking services, the larger appeared to be the monopoly power of existing banks and the higher their spreads. In addition, the regulatory components in the form of interest-rate restrictions on deposits, reserve requirements and capital-to-asset ratios were found to have a significant impact on banks' NIMs. Further, macro interest-rate volatility was found to have a significant impact on bank NIMs.

Similar to the studies cited above, Ash Demirgiic, Kunt and Harry Huizinga concluded that higher concentration resulted in higher interest rate margins in their study covering the

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[12] Supra, Note 1

[13] Supra, Note 2.

[14] A. Saunders, L. Schumacher; The determinants of bank interest rate margins: an international study, Journal of International Money and Finance No. 19 (2000) P. 813–832.

period 1988 to 1995.[15] Banks in countries with more competitive banking sectors were found to have smaller margins and were less profitable. The bank concentration ratio positively affected bank profitability, and larger banks tended to have higher margins. On the other hand, a larger stock market capitalization to GDP ratio was negatively related to margins, suggesting that relatively well-developed stock markets can substitute for bank finance.

In another study, J. Maudos, J. Fernandez de Guevara (2003) shows that the ''pure'' interest margin in the European Union depended on the competitive conditions of the market, the interest rate risk, the credit risk, the average operating expenses and the risk aversion of banking firms, as well as on other variables not explicitly introduced into the model (for example opportunity cost of reserves, payment of implicit interest and quality of management).[16] The study covered the period 1993 – 2000 and concludes that the increase in the degree of concentration of European banks as a consequence of the wave of mergers that took place in the 1990s may have caused a reduction in the pressure of competition, and therefore, an increase in the market power of banking firms, which in turn caused upward pressure on interest rate margins. Nevertheless, the adverse consequences of diminishing competitive rivalry had been counteracted by the effect of the fall in operating costs and credit risk.

Contrary to the findings of the other studies reviewed so far, Federico S. Mandelman found that changes in the market structure do not affect the lending interest rate markups.[17] Instead, the markups change because the threat of entry forces incumbents to set rates that deter entry. He found that bank spreads were thus more countercyclical in concentrated markets. However, including the entry of foreign banks variables exerted a significant negative effect on the margins, but also broke down the independent impact of the "Growth" variable by turning it small and insignificant indicating that foreign competition is also considered in strategic decisions. In summary, the pro-competitive effect of entry in the local banking system was found to be short-lived and vanished after one year. Finally, the study concluded that monopolistic power in the banking system reduced welfare of the household through two different channels. Firstly, the financial markup generated a permanent disintermediation between borrowers and entrepreneurs that resulted in lower steady-state levels of capital accumulation, output, and consumption. Secondly, the countercyclical pattern of such markups increased the volatility of real variables and thus reduced welfare.

The Bank of Zambia (BoZ) conducted a semi-qualitative survey in 2010 in which the central bank analyzed how Commercial Banks determined lending interest rates.[18] The findings revealed that almost all the banks did not consider the interbank rate (a key monetary policy instrument at the time) in their determination of lending interest rates. Rather, qualitative or "judgmental" factors contributed significantly in the determination of commercial banks' base lending rates. It was found that there was only a weak correlation between the Weighted Lending Base Rate (WLBR) and the interbank rate (0.50) while there was a

[15] Supra, Note 4.
[16] Supra, Note 3.
[17] Supra, Note 6.
[18] Supra, Note 8.

stronger correlation between the WLBR rate and the Open Market Operation (OMO) rates (0.72). While it was understood that the interbank rate represented the cost of short-term liquidity, it was evident that all banks, with the exception of one bank, did not take the interbank rate into account while only four banks indicated that they considered the BoZ overnight facility rate in their determination of the base lending rate. It was therefore concluded that the policy rate that was linked to the interbank rate or overnight rate could not have the desired effects on interest rates in the economy, as it would have no bearing on the banks' cost of funds.

Further, it was discovered in the same BoZ study that the ranking of factors depended primarily on the bank's profit motive. For example, the Treasury bill yield rates were considered by all banks, and by implication one was inclined to give them a relatively larger weighting in the lending interest rate calculation method. As such, a fall in the yield rates should commensurately have resulted in a fall in the WLBR. However, this was hardly the case as base lending rates seemed to be sticky downwards in response to declining Treasury bill yield rates. In addition, only half of the banks considered economic conditions. For instance, inflation declined from 16% in 2008 to 9.9% in 2009, but the WLBR rose from 20.8% to 22.6%. It was further noted that although inflation and yield rates tended to be relatively unstable, the banks' base lending rates tended to remain stable for long periods of time, suggesting that there could be other factors that dominated the banks' determination of base lending rates.

The findings further revealed that the margins charged on loans and advances were, in some cases, excessively high while operational costs which were higher than efficiency levels were explicitly included in the calculation of the base lending rate. While efficiency ratios of 60% and below were considered favorable, some banks' operational efficiency ratios were well in excess of 100%. This was coupled with consistently high returns on equity and the highest lending rates as compared to the sub-region.

While the study was semi-qualitative in nature and hence no causal relationships could be inferred, it highlighted what could potentially constitute an underlying structural concern in the Zambian financial system. This study was an eye opener and should motivate analysts and policy makers to look elsewhere for the determinants of lending interest rates in Zambia rather than the traditional "economic fundamentals". Could these findings where economic fundamentals have little or no impact on the lending interest rate be indicative of an underlying structural concern? Could competition dynamics explain this phenomenon?

4. Methods and Results

This paper utilizes simple time series regression analysis in order to measure the impact of competition and other identified variables on the lending interest rate margins in Zambia. Specifically, the Error Correction Model (ECM) was used to measure the marginal effects of the identified variables on lending interest rate margins.

4.1. Theoretical/Conceptual Framework

Because of its simplicity and applicability, this paper uses the model abstracted from Ho and Saunders (Ho, T., Saunders, A., 1981).[19] This basic model assumes that the representative bank is a risk-averse agent that acts as a dealer in a market for the immediate provision of deposits and loans. In view of the liquidity preference theory, savers should be compensated for parting away with some liquidity. Thus, the major portfolio risk facing the bank emanates from interest-rate fluctuations or volatility. In other words, the model focuses on the banks' risk exposure as providers of immediacy to the rest of the economy.

The planning horizon is a single period during which bank rates, which are posted prior to observing the demand for immediacy, are held constant and a single transaction in loans or deposits occurs. Risk-averse banks facing asymmetric arrival time for the demand for loans and the supply of deposits select optimal loan and deposit rates which minimize the risk of excessive demand for loans or insufficient supply of deposits. The rates are:

$R_L = (r + b)$ and $R_D = (r - a)$, where:

R_L is the rate set on loans, and
R_D is the rate set on deposits
r is the expected risk-free interest rate
a and b are fees charged by the bank in order to provide immediacy and to bear interest rate risk.

The logic behind this model can be demonstrated as follows: Suppose a deposit arrives at a different instant in time from a new loan demand, the bank will have to temporarily invest the funds in the money market at the short-term risk-free rate r. In so doing, the bank faces reinvestment risk at the end of the decision period should the short-term rate fall. Similarly, if the demand for a new loan is met by the bank without a contemporaneous inflow of deposits, the bank would have to resort to short-term borrowing in the money market at rate r to fund the loan, thereby facing refinancing risk if the short-term interest rate goes up. As a consequence, the fees a and b have to compensate the bank for bearing this interest-rate risk. The optimal fees a and b and thus the spread (s), are[20]:

$$s = (a + b)$$
$$R_L - R_D = [(r + b) - (r - a)] = (a + b) = s$$
$$s = (a + b) = \frac{\alpha}{\beta} + \frac{1}{2} R \sigma_I^2 Q$$
,

[19] Ho, T., Saunders, A., 1981. The determinants of bank interest margins: theory and empirical evidence. Journal of Financial and Quantitative Analyses 16, 581–600.
[20] For the derivation of the optimal fees, see Ho and Saunders (1981).

Where, the first term α/β, measures the bank's risk neutral spread and is the ratio of the intercept α and the slope β of the symmetric deposit and loan arrival functions of the bank. A large α and a small β will result in a large α/β ratio and, hence, large spread (s). That is, if a bank faces relatively inelastic demand and supply functions in the markets in which it operates, it may be able to exercise monopoly power (and earn a producer's rent) by demanding a greater spread than it could get if banking markets were competitive (low α/β ratio). Consequently, the ratio α/β provides some measure of the producer's surplus or monopoly rent element in bank spreads or margins. The second term is a first-order risk-adjustment term and depends on three factors:

R, the bank management's coefficient of absolute risk aversion;
Q, the size of bank transactions; and
σ_I^2, the instantaneous variance of the interest rate on deposits and loans.

It should be noted that the second term implies that, ceteris paribus, the greater the degree of risk aversion, the larger the size of transactions and the greater the variance of interest rates, the larger bank margins are. This spread equation has an important implication for the micro foundations of financial intermediation since it implies that, even if banking markets are highly competitive, as long as a bank's management is risk-averse and faces transaction uncertainty, positive bank margins will exist as the price of providing deposit–loan immediacy.

The empirical/model specification will allow us to identify the sensitivity of bank margins to bank market structure α/β after controlling for bank specific, market and macroeconomic factors. A number of factors are controlled for in order to focus on the behavior of the "pure" interest-rate spread or margin. The first is the Consumer Price Index (CPI), Non-Performing Loans (NPL) and Government Borrowing.

In sum, at any moment in time, it is hypothesized that the actual bank margins (NIMs) will comprise a pure spread reflecting bank market structure and interest-rate risk plus markups or adjustments for implicit interest expense, and other bank specific, market and macroeconomic factors.

In compact form:

$$NIM = f\{s(\alpha/\beta, R, Q, \sigma), bank\,specific, market\,specific \ \& \ macroeconomic\,factors, U\}$$

From the above equation, as long as banks share similar attitudes to risk (R) and size of transactions (Q) as well as face the same market structure (α/β), interest-rate volatility (σ_I^2), and the same bank specific, market and macroeconomic factors, their pure spread (s) will be the same. However, over time, as market structure and volatility change, so will the optimum pure spread (s).

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4.2. Results
4.2.1. Descriptive Statistics

Graphical analysis of the variables of interest show that they generally trended downwards over the relevant time period. Chart 5 and table 3 below illustrate this.

Chart 5: Trend in the Variables over Time
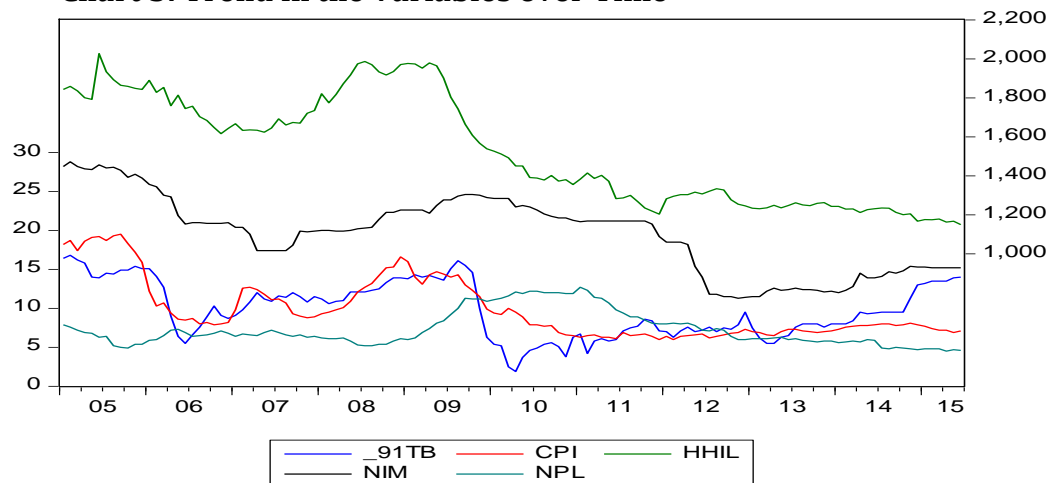
Source: Bank of Zambia; Authors' calculations

Table 3: Descriptive Statistics of the Variables

	NIM	91TB	CPI	HHIL	NPL
Mean	19.54171	9.856753	104.3604	1531.159	719060.8
Median	20.56092	9.445842	106.6967	1470.706	935355.8
Maximum	28.39600	16.47447	150.5800	1967.540	1238688.
Minimum	11.40027	3.398788	62.09667	1159.603	128314.3
Std. Dev.	4.893255	3.478908	26.58323	279.0781	383299.3
Skewness	- 0.122207	0.133775	0.015342	0.214504	-0.359151
Kurtosis	2.087379	1.903149	1.786976	1.475704	1.402879
Jarque-Bera	1.562077	2.230664	2.576644	4.388169	5.366821
Probability	0.457930	0.327806	0.275733	0.111461	0.068330
Sum	820.7518	413.9836	4383.137	64308.68	30200554
Sum Sq. Dev.	981.7018	496.2149	28973.39	3193268.	6.02E+12
Observations	42	42	42	42	42

Source: Authors' calculations

4.2.2. Estimation Results

In obtaining the estimation results of the Error Correction Model (ECM), the standard pre-estimation tests were performed on the data. The data was tested for stationarity using the Augmented Dickey-Fuller (ADF) Test. All the data was stationary at first difference (see

tables A1 and A2 in annexure 1). The variables were then tested for cointegration using the 2-step Engel Granger test for cointegration. The ECM was then run to obtain the results.

4.2.2.1.   Cointegration Tests

Economic theory suggests that certain pairs of economic variables should be linked by a long-run economic relationship. If two or more I(1) variables are cointegrated, they must obey an equilibrium relationship in the long-run, although they may diverge substantially from that equilibrium in the short run. The Error Correction Model (ECM) used in this paper utilizes this principle to link the long-run equilibrium relationship between variables with the short-run dynamic adjustment mechanism that describes how the series react when they move out of long-run equilibrium. The error correction term measures the speed of adjustment of the dependent variable to the long-run equilibrium.

The ADF results showed that all of the variables were non-stationary at level but I(1). The model was then estimated using variables at level and ADF test conducted on the residuals to establish any cointegrating relationship if any among the relevant variables of interest. The results of the cointegration test indicated that the residuals were stationary. This implies that there is a cointegrating relationship among the variables in question. Table 3 below shows the results of the cointegration test.

Table 3: ADF Test Results

Unit-root tests
The sample is: 2006(2) - 2015(2)
residualsn: ADF tests (T=37; 5%=-1.95 1%=-2.63)

D-lag	t-adf	beta Y_1	sigma	t-DY_lag	t-prob	AIC	F-prob
1	-2.927**	0.76556	1.272	3.792	0.0006	0.5345	0.3569

Source: PC Give output

4.2.2.2.   Error Correction Model (ECM) Results

Having established the existence of a cointegrating relationship among the variables of interest, we then proceed to estimate the Error Correction Model (ECM). Table 4 below shows the results of the OLS estimation of the ECM using the Engle Granger Causality methodology.

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Table 4: OLS Results of an ECM Estimation

EQ(3) Modelling DNIM by OLS
        The estimation sample is: 2005(4) - 2015(2)

	Coefficient	Std.Error	t-value	t-prob	Part.R^2
DNIM_1	0.593873	0.1159	5.12	0.0000	0.4431
DLHHIL	-9.75767	4.098	-2.38	0.0232	0.1466
DLCPI_1	-21.0619	14.67	-1.44	0.1604	0.0588
D91TB	0.196237	0.07455	2.63	0.0128	0.1735
ECM_1	-0.208503	0.05333	-3.91	0.0004	0.3166
Constant	0.172890	0.3636	0.475	0.6376	0.0068

sigma	0.888024	RSS	26.0233804
R^2	0.591432	F(5,33) =	9.554 [0.000]**
Adj.R^2	0.529528	log-likelihood	-47.4496
no. of observations	39	no. of parameters	6
mean(DNIM)	-0.325847	se(DNIM)	1.29467

AR 1-3 test: F(3,30)   = 0.16657 [0.9181]
ARCH 1-3 test: F(3,33)   = 0.053988 [0.9832]
Normality test: Chi^2(2) = 3.9780 [0.1368]
Hetero test: F(10,28) = 1.2599 [0.2989]
RESET23 test: F(2,31)   = 0.73941 [0.4856]
Source: PC Give output

5.   Analysis and Discussion of the Results
5.1.   Treasury Yield Rates

Consistent with orthodox economic theory, the model predicts that a rise in the treasury bill yield rates will lead to an increase in the Net Interest Margins (NIM) contemporaneously. Specifically, the model predicts that in the short run, a one percent change in the treasury bill yield rates will lead to about 20 basis points change in the NIM. This is because a rise in the treasury bill yield rates effectively represent an increase in the opportunity cost to private sector lending for the commercial banks. This tends to crowd out the private sector in favor of the government sector as the banking system demands a relatively higher compensation for the relatively higher inherent risk of lending to the private sector. In the long run however, about 20.9% of the contemporaneous effect of the change in the treasury bill yield rates will be offset suggesting that the contemporaneous effect of the change in the treasury bill yield rates will be completely offset in a year or so as the NIM returns to its long run equilibrium average.

5.2.   Effect of Lagged CPI

The Consumer Price Index (CPI) is broadly expected to have a positive effect on the nominal net interest margin as Commercial Banks try to protect their real returns by increasing nominal lending interest rates. In this particular model however, the results go against this economic intuition by suggesting that there is a negative relationship between these two variables in the short run. The possible explanation for this could be price inertia of the banking industry as costs adjust due to an inflation induced general rise in the cost of operations. Hence, as costs rise against constant lending rates, the NIM will tend to shrink in the short run.

It is however worth noting that the coefficient on CPI is not only wrongly signed but also insignificant. That is to say the CPI has no significant effect on the NIM of the banking industry in Zambia. This may not come as a surprise in the Zambian banking industry as other studies have reported that commercial Banks in Zambia infrequently take into account economic fundamentals in their determination of lending interest rates. Instead, most Commercial Banks reported considering qualitative factors as more essential than fundamentals such as the rate of inflation. This may also explain why provision for non-performing loans was rejected by the model as a determinant of NIM and fell out. This renders credence to this observation and also to the importance of competition as propounded above.

This notwithstanding, even though the contemporaneous effect of CPI on the NIM is insignificant in this model, it is broadly expected that macroeconomic instability specifically high levels of inflation has a negative effect on economic activity including in the banking industry. That is, the long run implications of macroeconomic instability is bearish or subdued economic activity which can in turn raise the risk profile of economic actors, both public and private thereby raising the NIM in nominal terms. As has been noted above, other studies have found macroeconomic instability including interest rate volatility to have a significant effect on bank NIMs.

5.3.   Provision for Non-Performing Loans

As has been alluded to in B above, provision for Non-Performing Loans (NPL) was highly insignificant and hence we dropped it from the model. While this was unexpected from the perspective of conventional economic thought, it may not come as a surprise in the Zambian context in view of the findings of the Bank of Zambia survey in 2010 which revealed that NPL was not among the factors that banks considered in their determination of lending interest rates as explained above. This short run analysis may on the other hand be erroneous in the long run. As observed above, a high NPL is symptomatic of an unfavorable economic situation in just the same way as CPI is reminiscent of macroeconomic instability. In this case, it should be expected that in the long run, a high NPL will weigh down on the banking system's profitability and generally expected to cause a rise in the lending rates and consequently the NIM.

5.4. Lagged Net Interest Margin (NIM)

According to the model, the change in NIM in the previous period (last quarter) affects the change in the current NIM in the short run. In other words, past trends in net interest rate margins tend to perpetuate themselves in the current period in the short run. In more specific terms, a one unit change in last quarter's net interest rate margin will result in about 0.6 unit change in the current period's net interest margin. That is to say that almost 60% of the previous period's change in NIM will perpetuate itself into the current period. As revealed by the error correction term however, all the short run imbalance perpetuated by past changes in NIM will have been eliminated by the end of one year.

This behavior of interest rate margins to perpetuate past trends into the current period can have implications on monetary and other policies aimed at reducing lending interest rates. If the level of interest rate margins in the economy are above the levels justified by economic fundamentals, conventional policy tools may not bring the margins to the level desired by the authorities. This is because the higher than expected levels of NIM in the past period will weigh down the contemporaneous effect of policy measures aimed at reducing current net interest rate margins.

5.5. The Effect of Competition

The level of competition in the banking industry is an important factor that can determine the conduct of market participants. Like in other sectors of the economy, there is no consensus on the effect of competition in the banking industry. Both theoretical and empirical works have predicted different outcomes with significant cross-country and even regional differences.

The evidence in our model suggests that there is a negative relationship between competition and net interest rate margins. The model indicates that a one percent decrease in the HH Index results in a 9.76% increase in the net interest margin and vice versa. This observation is consistent with findings from other jurisdictions including Europe. Federico S. Mandelman for instance did not find any evidence of the S-C-P propositions in many countries. Similarly, S. Corvoisier and R. Gropp found conflicting results based on the type of banking product. For instance, comparing Belgium and the Netherlands with moderately and highly concentrated baking markets respectively, it was found that for loans and demand deposits, increasing concentration had increased banks' margins by 100–200 basis points whereas for savings and time deposits, it was found that higher concentration resulted in margins which are 100–200 basis points lower in more concentrated markets. Contrary to the S-C-P hypothesis, the evidence in the model tends to support the E-S model which suggests that efficiencies from economies of scale as a result of market consolidation can lead to lower interest rate margins as commercial banks pass on the efficiency gains to the final consumers, the borrowers.

Theoretically, there are two plausible explanations for this observation. One is the efficiency argument as suggested by the E-S model and as explained above. The alternative view is the

argument of contestability of markets as proposed by Federico S. Mandelman. This argument suggests that contestable markets (free entry and exit) leads to threat of potential competition which leads to entry-deterring pricing by incumbent firms. Thus, the relationship between the HHI and net interest margins can still be negative depending on how strong the incumbents perceive potential competition to be. He also asserted that including the entry of foreign banks variables exerted a significant negative effect on the margins as foreign competition is also considered in strategic decisions.

In the Zambian situation, the most plausible argument is the market contestability proposition. This is because corroborative evidence from other studies has suggested that the Zambian banking industry is relatively inefficient thereby ruling out the E-S argument. Thus, for the Zambian market, the contestability argument is the most reasonable explanation for the observed relationship between competition and net interest margins. Entry or threat of entry induces incumbent banks to charge entry deterring interest rates in order to safeguard or even grow their market shares.

The entry of several commercial banks in the Zambian market in the mid to late 2000s has entrenched commercial banks' perception of monetary authorities as pro-competition. As such, even if the entrants have not been significant or vigorous enough to compete away significant market shares from the incumbents, overall lending interest rates have generally tended to decline especially around the time of heightened entry between 2006 and 2012 when 6 new commercial banks entered the market. The other point to note is that foreign competition also matters as it is also considered in strategic decisions. This is evidently relevant in the Zambian situation since all the six entrants between 2006 and 2012 were subsidiaries of foreign banks. In this regard, it is not only the perception of market contestability that matters but also the perception of foreign competition in the local banking sector. This argument holds whether entry actually materializes or not since what matters is simply the market participants' perception of the monetary authorities' stance on market entry.

Despite this rather rapid entry of new market participants between 2006 and 2012, the effect on the market shares was not significant especially for the largest four banks as was shown under chapter 2. Despite the market shares remaining more or less unaltered, the lending interest rates and more importantly the NIM narrowed down to reflect more competitive pricing by the banking industry as a whole. Accordingly, it is clearly evident that the net interest margin reduced on account of actual and perceived contestability of the local market as perceived by incumbent banks despite insignificant changes in the market structure. In this regard, market contestability can exert competitive pressure on market participants despite an uncompetitive market environment. Since actual and potential contestability has not been separately accounted for in the model, it is collectively shown as a negative relationship between the HH index and NIM.

This result is important in the short run as incumbents try to protect their market shares by trying to price out potential competition out of the market. In the long run however, a concentrated banking industry is generally expected to impact positively on the NIM in support of the S-C-P hypothesis as suggested by the error correction term in our model. This

implies that within a year, all the short run gains from the transient threats of competitive rivalry will have been eliminated. Coincidentally, this finding is consistent with the findings of Federico S. Mandelman who postulated that the pro-competitive effect of entry in the local banking system in the United States was found to be short-lived and vanished after one year[21]. This is evident in the Zambian case where the NIM started registering a gradual rise starting from 2012. In other words, once the incumbents are sufficiently comfortable with the new competition on the market, the NIM is expected to return to its long term equilibrium consistent with oligopolistic pricing and high NIMSs as predicted by the S-C-P hypothesis.

In view of the above, under concentrated market conditions, competitive NIMs can only be sustained if incumbents consistently perceive the market to be highly contestable. In this regard, how the market participants perceive to be the regulators' long term policy stance on market contestability becomes hugely significant. Sustaining this perception may however require periodic actual entry into the market.

This finding has huge implications for policy makers in the banking industry. Firstly, it shows that monetary authorities should be concerned with contestability of the banking industry in just the same manner as they should be concerned with actual competition. Once market participants believe and expect regulators to maintain a liberal attitude with regard to market contestability, it will anchor their expectations of market contestability in the long run thereby imposing a competitive restraint in the midst of high market shares. Since contestability of markets has implications on bank NIMs, monetary authorities may find it important to actively pursue this policy stance if they are interested in aligning bank NIMs to market fundamentals. This may require explicit statements by monetary authorities in support of market contestability.

This policy stance has been ably elucidated in Federico Mandelman of the federal reserve of Atlanta who argued that contestable markets force incumbents to charge markups well below short-run profit maximizing levels to avoid entry. Further, Bain (1956), argues that pricing decisions strongly influence firms contemplating entry and justify limit-pricing strategies which counter short run profit maximization. Consequently, in as much as the competitive pressure of entry is short-lived and only affects markups by triggering limit pricing strategies among incumbents rather than by transforming an existent monopolistic market structure, they can be the only alternative to ensuring competitive pricing and consequently market efficiency in a monopolistic market environment.

In addition, the conduct of limit pricing by incumbents can also explain the observed cyclicality of the markups in the business cycle; i.e. credit is more expensive during recessions when very few firms are expected to enter the market due to the challenging macro-economic situation as firms and households postpone investment decisions as compared to boom periods when economic agents are expected to enter the market. This behavior makes the recessions deeper and booms to overshoot long term equilibrium levels. During recessions, the incumbents' expectation of entry is reduced and therefore can

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[21] Supra note 7.

increase NIMs. This cyclicality can be dampened if incumbents perceive the monetary authorities' policy stance to be that of market contestability in the long term. This is possible since their sense of security in the market during periods of economic downturn will be dampened by the authorities' liberal stance. This will serve as a check on their pricing conduct.

Finally, it should be noted that this analysis complements rather than substitutes the standard version of the credit channel theory that relies on an external finance problem that induces banks to charge a premium to cover the increasing expected default and bankruptcy costs during recessions. While the standard credit channel theory is driven by fundamentals, the market contestability theory is solely the result of imperfect competition in the banking system. This is why it is particularly relevant in developing countries like Zambia where banking industries are relatively more concentrated and bank credit remains the primary source of funds for entrepreneurs.

6.   Conclusion and Policy Recommendations

In summary, the model shows that net interest margins depend on the net interest margins in the previous period (past quarter), government securities yield rates and contestability conditions of the market. The study contributes to existing literature in various directions. Firstly, it introduces into the modelling of net interest margins the direct measures of market power; secondly, the paper introduces the influence of contestability of markets; thirdly, it analyses the determinants of the interest rate margins of Zambian banks using a time series econometric model.

In view of the evidence obtained in this paper, the following policy measures can be recommended:

(i)   Monetary authorities should actively cultivate and maintain a culture of market contestability as a long term policy stance. In other words, monetary authorities should not only be concerned with actual competition (e.g. greater penetration by new entrant banks, new branches or the development of alternative distribution channels for banking services such as internet banking), but also actively inculcating a perception of market contestability. Negating on this important aspect may make other conventional policy measures less effective at aligning NIMs to the fundamentals in the long run, and in turn make the process of financial intermediation costlier for society as a whole. This will negate financial inclusion efforts of monetary authorities.

(ii)   Fiscal authorities should work together with monetary authorities to coordinate their policy interventions in the   market.

(iii)   It is imperative that in addition to conventional policies, monetary authorities use other forms of regulation such as moral suasion and prudential regulation to influence their preferred outcome on the market. This may be necessary to align current net interest margins to fundamentals since past net interest margins have been found to affect the current NIMs.

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There are limitations and areas of future research on this subject. The obvious limitation of the study is the lack of a longer time series data. This had the potential to negatively affect the robustness of the model but enough statistical safeguard measures were undertaken to mitigate the effect. With a longer time series data, more degrees of freedom could have be acquired to include more explanatory variables in the model. Related to the first limitation is the exclusion of what could be important explanatory variables such as operational efficiency, liquidity risk, payment of implicit interest, effect of stock market development and opportunity cost of reserves. The other limitation was lack of disaggregated data to isolate the effects of the explanatory variables in specific product market segments. Finally, it could have been interesting to compare the results for countries in the sub-region and beyond but data challenges made this impossible. These challenges present opportunities for improving on the study going forward.

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Appendix

A. Model Specification

In determining interest rate margins, this paper adopts a simple model by Calixte Ahokpossi (2013). The model takes the form of a simple regression model:

$$NIM_t = \alpha + \beta_0 NIM_{t-i} + \beta_1 HHI_t + \beta_2 91TB_t + \beta_3 CPI_t + \beta_4 NPL_t + \varepsilon_t$$

Where NIM_t represents bank interest margins at time t; NIM_{t-i}, HHI_t, $91TB_t$, CPI_t and NPL_t are respectively NIM lagged by i periods, Herfindahl-Hirschman Index (proxy for market structure), 91-day Treasury bill rate (proxy for opportunity cost), Consumer price index (proxy for macroeconomic stability) and non-performing loans (proxy for credit risk), all at time t. ε_t represents the residuals, also at time t.

B. Measurement of Variables and Expected Signs

Using quarterly data from the Bank of Zambia, the variables in the model will be measured as follows:

- NIM: Lending interest rate minus deposit rate. This will be the explained variable. NIM will be used instead of just the lending rate because we want to net out the possible effect of higher deposit rates on lending interest rates.
- HHI: Market structure which is the main variable of interest is proxied by the HH Index. The HHI is computed as the summation of the squares of individual bank shares in the industry. That is: $HHI = \sum s_i^2$, where s_i^2 is the squared share of bank i. The HHI can be computed using assets, deposits or loans. This paper nonetheless utilized bank loans. According to UNCTAD, an HHI indicator of less than 1,000 signifies a competitive market; an HHI of between 1,000 and 1,800 signifies a moderately concentrated market while an HHI of greater than 1,800 signifies a highly concentrated market.[22] Thus the higher the HHI, the higher the concentration and market power.
- NPL: Credit risk here is measured by provision for non-performing loans. The higher the provision for non-performing loans, the higher the banks' risk assessment, and banks would resort to higher margins to cover this risk.
- Inflation: Inflation constitutes a macroeconomic risk. Inflation can affect bank margins if lending and deposit rates adjust to monetary shocks at different speeds or to different extents. It will be measured by the CPI.
- Government Borrowing: Yield rates on treasury bills and government bonds constitute a risk free return on investments by the commercial banks. If yield rates are high, commercial banks will reduce lending to the private sector in favor of the government (crowding out effect). This will increase the cost of borrowing for the private sector and hence the expected sign on yield rates is positive.

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[22] United Nations (New York and Geneva, 2008), United Nations Conference on Trade and Development, The effects of anti-competitive business practices on developing countries and their development prospects, HASSAN QAQAYA and GEORGE LIPIMILE (Editors).

Table A1: Unit root tests at levels

Variable	ADF	Order of Integration
NIM	0.3432	1
_91tb	0.4075	1
LCPI	0.7425	1
LNPL	0.9422	1
LHHIL	0.3345	1

Source: PC Give output

Table A2: Unit root tests at first difference

Variable	ADF	Order of Integration
NIM	0.0147	1
_91tb	0.0003	1
LCPI	0.0000	1
LNPL	0.0054	1
LHHIL	0.0068	1

Source: PC Give output

Figure A1: The Model

Source: PC Give output

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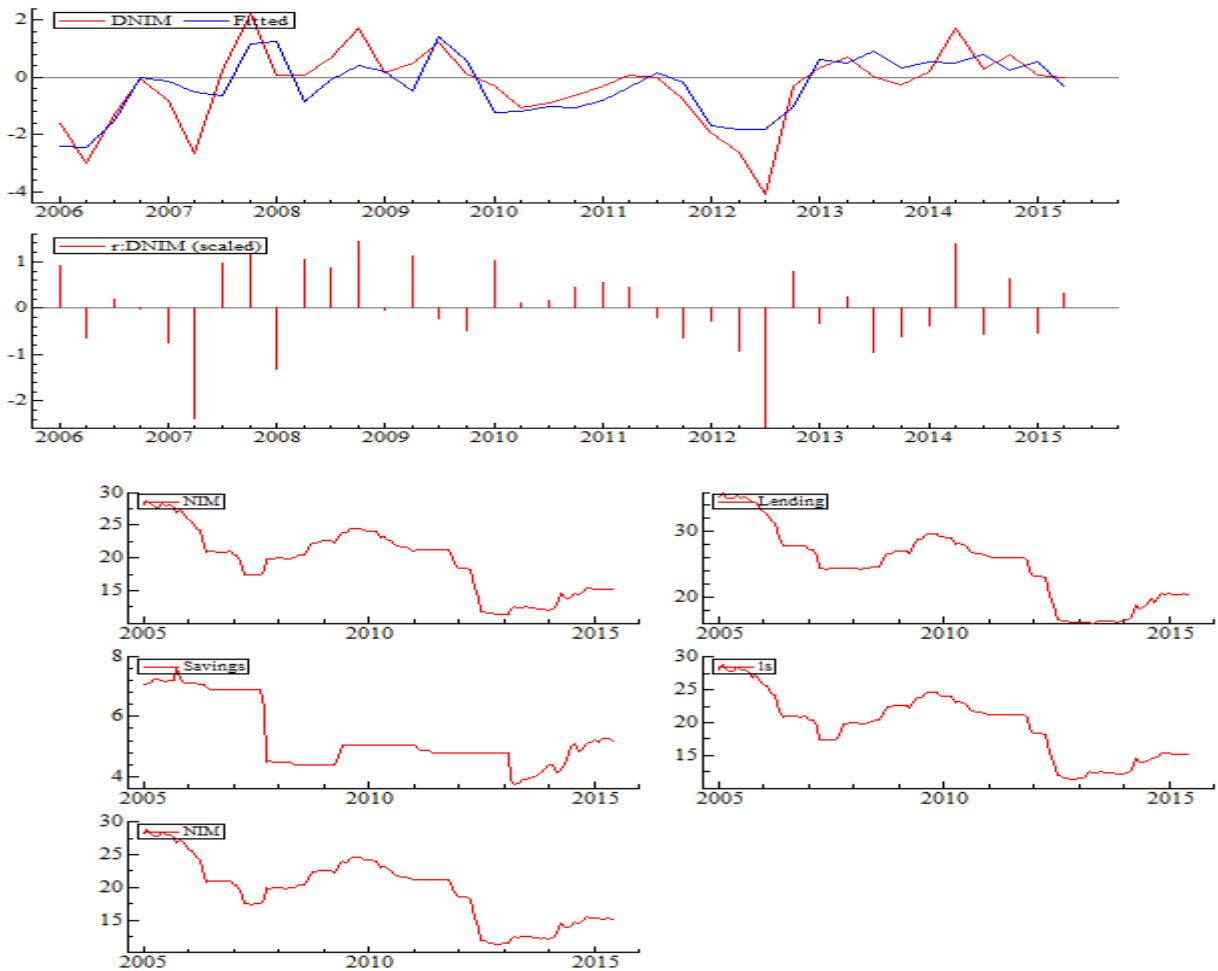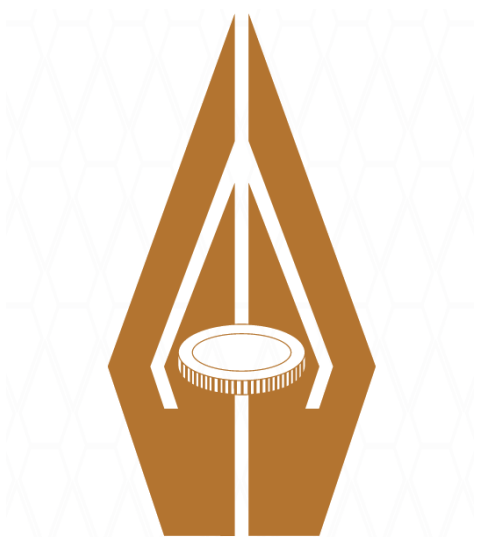
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