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Market Structure and Banks Pricing Behaviour – The Case of Kenya

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Abstract

This study investigates the nexus between market structures on the banks' pricing behaviour in Kenya using the panel VAR model for 2003 – 2018 period. Bank-level annual data sourced from audited financial statements and macroeconomic data sourced from Central Bank of Kenya were used. Estimation results reveal that the market concentration measures all positively shock net interest margin. Further, the Impulse Response Function results indicate the positive shock of the Lerner index is short-lived, but the Herfindahl-Hirschman Index shock is long-lived. The concentration of the top five banks shock was found to be negative at first but immediately reversed, taking a sharp continual rise for the rest of the period. Therefore, policies on enhancing banking industry competitiveness would be appropriate in promoting market – based - pricing in the industry.

Keywords: Behaviour, Pricing, Market Structure, Kenya

JEL Classification: D43

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1.0 Introduction

The debate of market consolidation in so far as the banking industry has of recently taken centre stage because of the increased level of market competition from both the banking industry market players and non – bank market players. This has seen the banking industry move toward a more concentrated market structure. Despite a vast literature both theoretical and empirical literature focusing on the banking and financing, in the attempt of linking the market structure of banking industry and its performance as well as other aspects of the economy a dual problem does exist whose discussion remains muted at best. The dual pertains to two prominent views about market concentration: - the monopoly view and the efficiency view of market structure.

This presents a gap especially on the efficiency view of banking industry market concentration given it possible effects on the banks pricing, financial resources allocation among other economic aspects which have a bearing on the banking and socio-economic development at large. This, therefore, motivates the research on how the banking industry structure affects the banks pricing behaviour in Kenya in an attempt to inform discussions and policy pronouncements on matters of optimal financial resource allocation and market consolidation.

An interplay between the banking market structure and banks pricing behaviour has been at a centre of policy discussions owing to several dimensions associated with their nexus. To start with, the negative dimension of the market structure – bank pricing behaviour nexus is that high level of competition in the banking industry may be a catalyst for excessive risk-taking behaviour as the banks seek to retain their market power. This dimension has an adverse effect on the stability of the industry and the financial sector at large especially in the bank-led financial sector such as Kenya (Allen and Gale, 2004; Carletti and Hartmann, 2002). However, the positive dimension of the banking market structure - banks pricing behaviour interplay is that increased competition in the banking industry as evidenced by the

industry market structure over time has a welfare gain through a reduction in the price of the financial products and services primarily if banks work on their cost – inefficiencies. Notably, from the antitrust policies point of view, there has been a topical issue as to whether a concentrated banking industry is a contributory factor to banks exercising their monopoly power via anticipative pricing behaviour. This has led to the need for an inquiry into banks pricing in behaviour in the context of the prevailing banking industry market structure in different markets.

Regarding the banking industry market structure – pricing nexus, empirical studies' findings have been mostly inconclusive. From the theoretical perspective, debate on which theory holds when it comes to market structure – pricing nexus remains unresolved as well; - debate on traditional frameworks namely: structure conduct performance (SCP) hypothesis, efficient structure (ES) hypothesis, relative market power (RMP) hypothesis and quiet life (QL) hypothesis.

Demsetz (1973), for instance, argues that other variables such as cost efficiency and/or product quality can be driving the relationship between concentration and profitability. Furthermore, Tirole (1988) also argues that the causal relationship from bank concentration to anti-competitive pricing and then to the profitability cannot be identified by merely regressing profitability on concentration. An array of other studies tends to control for bank efficiency by incorporating cost efficiency measures in the empirical model (Amindu, 2013; Zhang, Jiang, Qu, and Wang, 2013 and Mirzaei et al. (2013). However, except for explicitly controlling the cost efficiency, the approach of these studies is not any different from the traditional frameworks of market structure – bank performance nexus. Also, there have been developments in the bank industry market structure and bank performance, specifically bank profitability (Turk Ariss, 2010; De Bandt and Davis, 2000; and Coccorese, 2009). Nonetheless, these studies remain mute on the question of monopoly pricing; - whether the concentration in the banking industries is an opportunity for commercial banks to collude and charge higher loan prices. His calls for the need for a study that seeks to directly model the relationship between banking industry market structure and banks' pricing behaviour hence the endeavour of this study.

1.1 Banking Industry Structure in Kenya

In the Kenya context, the Central bank of Kenya categorises commercial banks in three tiers. The determination of the tier within which the banks falls is majorly dependent on the bank's Weighted Composite Market Share Index (WCMSI). Therefore, based on the WCMSI, the central bank of Kenya categorised the bank to fall in tier 1 of large if it's respective WCMSI greater than 5%. However, if the bank's WCMSI is between 1% and 5%, then the bank is categorised as being medium or tier 2. Lastly, if the bank's WCMSI is below 1%, then it's categorised as being a small bank or tier 3.

Based on this classification, as at the year 2017 the banking industry in Kenya comprised of 40

commercial banks out of which 9 were large, 10 were medium, and 21 were small (CBK, 2017). However, a review of the respective banks' category or tier reveals that share the Weighted Composite Market Share Index has significantly changed over 2003 – 2018 period. Similarly, is the change in the number of commercial banks classified as large tier banks. The weighted composite market share index for large tier banks has increased from 56.10 percent in 2010 to 70.28 percent in 2018 with the number of banks in top tier rise from 6 in 2010 to 9 in 2018. However, looking at the WCMSI of the large banks, it is evident that the banking industry in Kenya manifest an oligopolistic market structure given that the large tier accounts for a substantial share of the total market share (Table 1).

Table 1. Weighted Composite Market Share for Large Tier banks for 2010 – 2017 Period

Year	Weighted Composite Market Share	Number of Commercial Banks
2003	80.80%	13
2004	77.00%	13
2005	77.50%	13
2006	82.00%	13
2007	80.11%	13
2008	83.34%	14
2009	88.13%	19
2010	56.10%	6
2011	54.60%	6
2012	53.70%	6
2013	52.40%	6
2014	49.90%	6
2015	58.21%	7
2016	65.32%	8
2017	65.98%	8
2018	70.28%	9

Source: Central Bank of Kenya- Bank Supervision Reports (2003 – 2018).

1.2 Problem Statement

The proponents of the monopoly view of banking industry market concentration predict that higher concentration implies a lower level of competition; therefore, banks that hold more market share can collude and charge higher loan rates, pay lower deposit rates and earn monopoly profits (Smirlock, 1985; Berger, 1995; Amidu, 2013). On the contrary, efficiency view suggests that concentrated markets allow large banks to exploit managerial, technological and scale efficiencies, and as a result, banks earn higher profits (Demsetz, 1973; Peltzman, 1977; Homma, Tsutsui, & Uchida, 2014). Both these views have contradictory but essential implications for antitrust policies. Going by this fact, it is evident that if a monopoly view is valid, then anti-concentration policies are favourable. However, if efficiency view is accurate, then anti-concentration policies may seize the opportunities from banks to exploit the efficiencies, thus creating a policy dilemma.

Notably, though vast literature exists on the market structure banking industry, its linkage to pricing behaviour remains handful. In addition, even the existing studies on market concentration concerning the banking industry have not adequately focused on the aspect of bank consolidation debate. This, therefore, presents a research opportunity about how the banking industry's market structure influences banks pricing behaviour. Of the fundamental research, the problem is: Do bank interest rates in more competitive markets adjust faster to changes in market interest rates than in less competitive markets? In other, once do the market structures of the banking industry matter when it comes to banks' setting their prices? Seeking for answers to this problem calls for bank-level analysis. This would be crucial in contributing to the current debate on bank consolidation in Kenya as well as shedding light on monopoly view versus the efficiency view of market concentration in the Kenyan banking industry context. The study sought to examine the effect of the banking industry market structure on the bank's pricing behaviour at a bank-level

1.3 Significance of the Study

The study finding has a two-fold significance. First of the contribution to the policy-making bodies such as the Central Bank of Kenya and the National Treasury and the key stakeholders such as the Kenya Bankers Association. Knowledge on the how the industry market structure affects the bank pricing would inform policy pronouncements on the enhancement of industry competitiveness to tap on the welfare effects of a competitive market in terms of fair pricing of banks loans, efficient allocation of financial resources through a seamless financial intermediation process. Secondly is the contribution to the existing body of knowledge. The study combines both the structural and non-structural measures of market structure. The inclusion of the two in the empirical model is not only a robustness check but also sheds empirical evidence on how the two indicators impacts of loan pricing and which measure would be more ideal for decision making.

2.0 Literature Review

2.1 Theoretical Literature Review

2.1.1 Structure–Conduct–Performance (SCP) Theory

The Structure – Conduct – performance Theory by Bain (1959) is one of the major hypotheses that relate to the firm's market structure and its behaviour. The theory is considered as a pillar of industrial organisation theory and has widely been applied in economics for analysing markets. The theory asserts that specific industry structures are suitable for monopolistic conduct, allowing firms to augment prices beyond marginal costs, thereby making unusual profits. The theory posits that the firm's market structure determines the conduct of the firm, which in turn determines the firm's performance. According to the hypothesis, the market structure can be measured by several yardsticks such as the number of industry competitors, product heterogeneity as well as entry and exit costs. On the other hand, the theory describes the firm's conduct/behaviour as the specific actions taken by a firm which included but not limited: price taking, product differentiation, tacit collusion, and market power exploitation. On the other hand, the theory defines firm performance as being measured by a number of indicators such as productive efficiency, allocative efficiency, and profitability.

The SCP theory is, however, cognizant of the fact that though the market structure largely informs the firm's behaviour, this does not happen in the absence of some constraints. Therefore, the range of behaviour options available to the firm in the prevailing market structure context always does have constraints. According to the theory, in industries facing high competition, implying a less concentrated market structure, firms are faced with very few options and many constraints. As such, the options undertaken by the firm barely seeks to maximise social welfare in the long run with the earned returns only covering the cost of capital. On the other hand, the firms operating in a lower competitive industry environment, implying a more concentrated market structure have a greater range of conduct options at their disposal and a limited number of constraints. Such firms can therefore utilise the options available to obtain a competitive advantage. For instance, the firms

in these industries can use market power to set prices that generate significant economic value. However, the sustainability of their advantages is determined by one of the attributes of industry–structure; which is the barriers to industry entry. If there are no barriers to entry, the competitive advantages of the firms in the industry disappear when new competitors enter the market. Therefore, industry structure has an important effect on firm conduct and performance even though firms in these industries can sometimes have competitive advantages (Barney and Clark, 2007). Based on this theory it can be intuitively be concluded that in highly concentrated banking industry, large banks collude to charge higher prices and earn higher profits; thus there is a positive relationship between concentration and profitability.

2.1.2 Relative Market Power Hypothesis

The Relative Market Power hypothesis claims that firms with large market shares and well-differentiated products can exercise market power (Monopolistic Competition). According to the theory, firms' mergers could be motivated by the ability to affect prices unfavourably for borrowers (by applying higher loan interest rate) and/or for depositors (by applying lower deposit interest rate): as a result, the market experiences increased margins (the difference between active and passive interest rate, henceforth spread). Further, the theory asserts that only banks with large market shares, irrespective of market concentration, can exercise market power and earn abnormal profits. Therefore, according to this theory, uniquely the banks with a large market share and diversified products might exert their market power to determine prices and make profits. Consequently, it could be concluded that the individual market shares accurately determine market power and market imperfections.

2.1.3 Efficiency Hypothesis

The efficiency hypothesis was pioneered by Demzets (1973). The theory states that there is an inappropriate relationship between concentration and profitability because of the factors that cause a company to gain market power and profit is efficiency. There are two efficiency hypotheses proposed by Berger (1995), namely the efficiency factor using the X-efficiency variable and the efficiency scale. Both of these variables have become determinants of profitability in addition to concentration and market share until the last twenty-first-century study was conducted by Gajurel and Pradhan (2007) and Chortareas *et al.* (2011). There are two types of efficiency hypotheses that Berger (1995) introduced, namely the relative efficiency hypothesis (RES) and scale efficiency hypothesis (SES). RES hypothesis assumes that the profits obtained by the company are due to cost pressures caused by management having superior capabilities and having robust technology for production. Whereas in the condition of the SES hypothesis, it is assumed that the company gets profit because there is a cost pressure with the cause of the company operating on an optimal scale. The Efficient Structure claims that size matter for profits because

they are scale-dependent. The efficient structure permits higher profits because a firm can produce at a lower cost in comparison to their competitors.

2.1.4 Quite Life Theory

Hicks developed the Quite Life hypothesis in 1935. According to the theory, a bank management unit with a large market share is less centred on efficiency as the exploitation of market power in terms of fixing prices allows deriving benefits automatically. Therefore, according to this theory, firms with market power incur inefficiencies rather than reap monopolistic rents. An increase in market power comes with a deterioration of efficiency, which makes banks unable to earning higher profitability. The Quite Life hypothesis puts forward an explanation in the case of the absence of a presumed relationship between profitability and market structure since the higher market power, the lower the effort of managers to maximise operating efficiency, a negative correlation thus existing between market power and efficiency.

2.2 Empirical Literature.

Early seminal works by Berger and Hannan (1989) was the first to offer a comprehensive empirical study of the relationship between consumer deposit rates (price) and market concentration. Using a reduced form price equation, they estimate the relationship between consumer deposit rates and market concentration while controlling for a wide array of market-specific and bank-specific variables. Six different consumer deposit rates at 470 banks over ten quarters are used in the analysis. Using a variety of modelling assumptions, Berger and Hannan (1989) conclude that in general there exists a negative relationship between concentration and price (except for longer-term CDs) consumer deposit rates tend to be negatively (and significantly) related to market concentration. The finding of the negative relationship between concentration and price, indicative of accepting the SCP explained by banks paying lower deposit rates to consumers.

According to the seminal papers by Klein (1971) and Monti (1972) on banks' interest rate setting behaviour, banks can exert a degree of market pricing power in determining loan and deposit rates. The Monti-Klein (1972) model indicate that on bank product-wise pricing, the products whose demand is relatively inelastic, their pricing is less competitively thus their respective interest rates are relatively higher than the ideal market price. Therefore, going by this finding, it is evident that bank interest rates and their respective changes over time are reliant on the degree of competition.

According to Maudos and Fernández de Guevara (2004), an increase in a bank's market power results in higher interest margins. Earlier, a study by Corvoisier and Gropp (2002) sought to explain the difference between bank retail interest rates and money market rates by the bank's product-specific concentration indices. Their study concluded that in concentrated markets, retail lending rates are substantially higher,

while deposits rates are lower. Hannan and Berger (1991) found that deposit rates are significantly more rigid in concentrated markets. The study further elucidates that as the monetary policy rates rise, banks operating in consolidated markets tend not to raise their deposit rates, indicating a tacit or collusive behaviour among banks. In a cross-country analysis, both Cottarelli and Kourelis (1994) and Borio and Fritz (1995) find a significant effect of constrained competition on the monetary transmission mechanism. Thus, lending rates tend to be stickier when banks operate in a less competitive environment, due to among other things, the existence of barriers to entry. This finding was confirmed in an Italian setting by Cottarelli et al. (1995).

Leuvensteijn, Christoffer, Bikker and Rixtel (2008). Examined impact of loan market competition on the interest rates applied by euro area banks to loans and deposits during the 1994-2004 period. Using the Boone indicator to measure the banking industry competition, the study found evidence that stronger competition significantly lower spreads between the bank and market interest rates for most loan market products. The results for ECM applied to estimate the effect of industry competition on the pass-through of market rates to bank interest rates revealed that banks tend to price their loans more in accordance with the market in countries where competitive pressures are stronger. Further, where loan market competition is stronger, larger bank spreads (implying lower bank interest rates) on current account and time deposits were observed. These findings suggest that the competitive pressure is heavier in the loan market than in the deposit markets so that banks compensate for their reduction in loan market income by lowering their deposit rates. We also observe that bank interest rates in more competitive markets respond more strongly to changes in market interest rates. Okeahalam (2001) reveal that due to high saturation in the banking industry, the retail customers in the South African nation are paying high prices and a likelihood that the bigger may collude, thereby inferring that SCP model applies in South Africa.

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3.0 Research Methodology

The study employed quantitative analysis in examining the banks market structure and pricing. The study adopted the empirical model analysis in the SCP (Structure-Conduct-Performance), RMP (Relative-Market-Power) and the ES (Efficiency-Structure) models. The four theoretical models seek to model the relationship between bank concentration and bank's pricing behaviour hence informing the empirical conceptualisation of the nexus.

In modelling the linkage between banking industry market structure and bank pricing behaviour, the Panel Vector Autoregressive (PVAR) model was adopted. To start with, the market structure was measured by two sets of variables, namely: structural and no –structural measures. For the non-structural measures of market structure /competition, which are more practical, given that they have a microeconomic foundation by linking pricing to marginal costs, the Lerner index was used. The advantage of using the Learner index in measuring the market power of a bank, in this case, lies in the economic principle as opposed to using market share (bank's assets to total industry assets ratio). The index is capable of illustrating how and whether imperfectly competitive markets depart from the perfect competition benchmark hence its economic strength. Berger et al. (2009) assert that Lerner Index is a direct measure of competition because it focuses on the pricing power apparent in the difference between price and marginal cost thereby capturing the degree to which a firm can increase its marginal price beyond marginal cost.

The Lerner index was computed as follows:

$$LI_{it} = \frac{P_{it} - MC_{it}}{P_{it}} \quad \text{..... (1)}$$

Where: P_{it} is the price of banking outputs for bank i at time t,
MC_{it} is the marginal costs for bank i at time t.

P_{it} is the price of total assets proxied by the ratio of total revenues (interest and non-interest income) to total assets for bank i at time t. MC_{it} is derived from the translog cost function. The cost function is specified as follows:

$$LnTc=\alpha_0+\alpha_1 lnTA+1/2\alpha_2(lnTA)^2+\sum_{j=1}^{3}\beta_j lnx_j+\sum_{j=1}^{3}\sum_{k=1}^{3} lnx_j\ lnx_k+\sum_{j=1}^{3}\gamma_j\ lnTA\ lnx_j+\varepsilon \quad \text{..... (2)}$$

Where: TC denotes total costs, TA bank's total assets, xjk ($x1$, $x2$ and $x3$) indicate three input prices (labour, capital and funds). x_1 is the price of labour, which is the ratio of personnel expenses to total assets, x_2 is the price of physical capital, which is the ratio of other non-interest expenses to fixed assets and x_3 is the price of borrowed funds, which is the ratio of interest expenses to total funds. Total cost is the sum of personnel expenses, other non-interest expenses and interest expenses. The estimated coefficients of the cost function are then used for computing the marginal cost. Therefore, marginal cost is equal to the first derivative of the logarithm of the total cost function with respect to output multiplied by the ratio of the total cost to output. The derivative of the logarithm of the total cost with respect to the logarithm of output is computed using the cost function specified in Equation 4. The marginal cost is based on the estimation of the cost function. We estimate a translog cost function with one output and three input prices. The estimated coefficients of the cost function are then used to compute the marginal cost using the function below:

Lerner index closer to one indicates more market power for the firm. Generally, an index equal to 0 it indicates perfect competition, while an index equal to 1 indicates monopoly. Thus, the greater the Lerner index, the lower the market competition. In addition to the non-structural measures of market structure /competition (Learner Index), structural measures were also used for robustness check purposes. The study used two concentration indices, namely: the Herfindahl-Hirschman Index (HHI) and the five-bank concentration (CR5) and. The CR5 is the ratio of total assets held by the five largest banks in a country to the total assets of the banking industry in a particular year. On the other hand, the HHI is as the sum of squared market shares of all the banks in a country in a particular year. Higher concentration indices indicate a higher level of concentration, implying lower competition levels. The Hirschman-Herfindahl Index was computed using the formula in Equation 4 where (ta) is the market share of each bank and (TA) is the entire banking industry assets.

$$MC= TC/TA\ (\alpha_1+\alpha_2\ lnTA+\sum_{j=1}^{3}\gamma_j\ lnX_j \quad \text{.....(3)}$$

$$HHI_t = \sum_{i=1}^{n_{jt}} S_{it}^2 = \sum_{i=1}^{n_{jt}} ((ta_{it})/(TA_t))^2 \quad \text{.....(4)}$$

3.1 Sources of Data and Variable Measurement

Commercial banks specific data was obtained from the audited financial statements over the years from the Kenya Bankers Association database. Data on the macroeconomic control variables were sourced from the Central Bank of Kenya statistical reports. The market power measure using the Learner Index was computed from the bank related data as defined by Equation 1, 2 and 3. The study covered the period 2003 to 2018. The variables to the model were defined and measured as presented in Table 2 as follows:

Table 2. Definition and Measurement of the Variables

Variable	Definition	Measurement
Net Interest Margin	Is the possibility of a loss resulting from a borrower's failure to repay a loan or meet contractual obligations	The ratio of non – performing loans to total loans and advances
Lerner index	Is the percentage mark - up that a bank can charge over its marginal cost.	The difference between price and marginal costs expressed as a proportion of price in a year( )
Hirschman-Herfindahl Index	Are the markets share of every bank by its assets l relation to total industry assets in a particular year	Sum of squared market shares of all the banks in a country in a particular year
Five bank concentration	Is the concertation ratio for the top five banks in the banking industry	The ratio of total assets held by the five largest banks in a country to the total assets of the banking industry in a particular year.
Operational efficiency	The ability of the firm to produce more output at least cost possible	The ratio of a bank's total operating expenses to total income in a given year
Bank liquidity	The ease of converting an asset into the nearest liquid form mainly cash	The ratio of loan to deposit in a given year
Bank size	The asset base of the bank	Log of the total assets of the bank in a specific year
Inflation rate	The short-term risk-free interest rate	12 months moving average 91-day Treasury Bill rate
GDP growth rate	The market value of all goods and services produced within a country in a given period mainly one year	The annual GDP growth rate
Treasury Bill rate/ interest rates	The increase in the general price levels in an economy for a given period	12 months moving average inflation rate

3.2 Econometric Approach

To estimate the nexus between market structure and bank pricing behaviour, the study adopted the Panel Vector Autoregressive (PVAR) model. The application of the PVAR model in this study is justified for the fact that the PVAR methodology combines the traditional VAR model approach with a panel data approach. This is advantageous in allowing for the unobserved individual heterogeneity (Grossmann, Love, and Orlov, 2014). This is advantageous of PVAR compared to GMM approach is that it imposes homogeneous dynamics across individuals.

Previous studies in this field have measured the bank pricing behaviour using the deposit rates, lending rates and net interest margin. However, it's notable that in this study data on deposit rates, lending rates for individual banks has a challenge in obtaining given that banks have different lending rates for different financial products. Also, the lending rates for one financial product can differ from one customer to another. Furthermore, obtaining the average lending rate for the bank was a challenge, and only the industry average lending rate was available. Given this scenario, the study employed the Net Interest Margin (NIM) as a measure of a bank's pricing behaviour. The Net Interest Margin was computed as follows:

$$NIM=(\text{"Loan Interest Income- Deposit Interest Income"}/\text{"Total Assets"}) \ldots (5)$$

On the other hand, the market structure was measured by two sets of variables, namely: structural and no –structural measures. For the non-structural measures of market structure /competition, which are more practical, given that they have a microeconomic foundation by linking pricing to marginal costs, the Lerner index was used. The advantage of using the Learner index in measuring the market power of a bank, in this case, lies in the economic principle as opposed to using market share (bank's assets to total industry assets ratio). The index is capable of illustrating how and whether imperfectly competitive markets depart from the perfect competition benchmark hence its economic strength. Berger et al. (2009) assert that Lerner Index is a direct measure of competition because it focuses on the pricing power apparent in the difference between price and marginal cost thereby capturing the degree to which a firm can increase its marginal price beyond marginal cost.

For the non-structural measures of market structure / competition, the study used two concentration indices, namely: the Herfindahl-Hirschman Index (HHI) and the five-bank concentration (CR5) and. The CR5 is the ratio of total assets held by the five largest banks in a country to the total assets of the banking industry in a particular year. On the other hand, the HHI is as the sum of squared market shares of all the banks in a country in a particular year. Higher concentration indices indicate a higher level of concentration, implying lower competition levels.

The general representation of the econometric PVAR model was defined as follows:

$$\text{Pricing beh} = f(\text{market power, bank specific variables, Marcoeconomic variables}) \quad \ldots\ldots (6)$$

The general econometric representation of PVAR model of the form in Equation 7 is adopted:

$$Z_{it} = \mu_{it} + \varepsilon_{it} + \tau z_{it} - 1 \quad \ldots\ldots (7)$$

Where: Z_{it} is the vector for bank pricing behaviour, τ is an $m \times m$ matrix of coefficients, μ is a vector of m individual effects and ε_{it} is a multivariate white-noise vector of m residuals. Within the model, the bank-specific variables included: Operational efficiency measured by bank's total operating expenses to total income ratio (TE/TI), Bank liquidity measured by loan to deposit ratio (LCD), Bank size measure by the natural logarithm of total assets (Log TA) and Bank Capitalization measured by equity to total assets (T Equity/TA). The Macroeconomic controls included Inflation rate, GDP growth rate, risk-free Treasury Bill rate.

The specific economic model was defined as follows:

$$NIM = \alpha + \beta_1 \text{Lerner Index} + \beta_2 CR5_t + \beta_3 HHI_{it} + \delta \text{Bank Variables}_{it} + \gamma \text{Macro Variables} \quad \ldots\ldots (8)$$

Where NIM is the Net Interest Margin, HHI is the Herfindahl-Hirschman Index

4.0 Empirical Findings

The results indicate that the mean net interest margin was 0.051, with a minimal deviation of 0.047. The market structure indicators reveal that the banking industry is highly concentrated. The learner index was found to have a mean value of 0.981, which is very close to 1, reflecting the industry remain less competitive. Similar findings are supported by the mean value of the concentration share of top 5 banks whereby the top 5 banks were found to on average account for 68.3 percent of total banking industry market share. Similarly, is the HII of a mean value of 2.74 still denoting less competitive banking industry.

Table 3. Descriptive Statistics

Variable	Obs	Mean	Std. dev	Min	Max
Net Interest Margin	450	0.05	0.05	-0.16	0.37
Lerner index	450	0.98	0.01	0.92	1.00
cr5	450	0.68	0.13	0.50	0.88
HHI	450	2.74	3.31	0.00	14.10
Operating Efficiency	450	0.29	0.22	0.00	0.98
Loan – to - Deposit ratio	450	1.20	4.74	0.07	71.14
Bank size	450	16.95	1.49	13.10	19.96
Bank liquidity	450	0.19	0.36	0.00	7.38
inflation	450	10.25	5.13	4.10	26.20
Tb - rate	450	7.66	2.56	1.46	12.76
GDP	450	4.83	1.56	1.50	7.20

4.1 Pre-estimation Diagnostic Tests

4.1.1 Maximum Lag Selection Results

The maximum lag order selection test results present that the first-, second-, third-, and fourth-order Panel VAR models using the first four lags of the endogenous variables as instruments. For the fourth-order Panel VAR model, only the CD is calculated because the model is just-identified. Based on the three model-selection criteria by M. R. M. Andrews and Lu (2001), the first-order panel VAR is the preferred model because this has the smallest MBIC, MAIC, and MQIC statistics. While we also want to minimise Hansen's J statistic, it does not correct for the degrees of freedom in the model like the MMSC. Note that the second-order panel VAR models reject Hansen's over-identification restriction at the 5% significance level, indicating possible misspecification in the model; thus, it should not be selected. Therefore, we select the first lag as the maximum lag (Table 4).

4.1.2 Correlation Matrix

The correlation coefficient matrix indicates that market structure, as measured by the Lerner Index, has a positive relationship with bank pricing behaviour. Similar results are reported for the structural measures of market structure, namely: the HHI and the CR5 concentration ratio. However, the correlations were found to be mostly weak at best. The correlation coefficient matrix further indicates that correlations among the model variables are generally weak, thus ruling out any possible multicollinearity problem when running the pooled OLS model. All the relationships among the variables are below the 50 percent level (Table 5).

Table 4. Maximum Lag Selection Results

Lag	CD	J	J p-value	MBIC	MAIC	MQIC
1	0.999727	247.712	0.004	-847.414	-136.288	-420.881
2	0.999905	186.825	0.001	-543.259	-69.175	-258.904
3	0.999968	72.875	0.209	-292.167	-55.125	-149.99
4	0.999948	.	.	.	.	.

Table 5. Correlation Matrix Coefficient

	NIM	Lerner index	CR5	HHI	E/A	L/D	Bank size	Bank Liquidity	Inflation rate	TB rate	GDP
NIM	1.000										
Lerner index	0.277	1.000									
CR5	0.013	0.221	1.000								
HHI	0.121	0.230	0.018	1.000							
E/A	0.051	-0.202	0.056	0.174	1.000						
L/D	0.042	-0.043	-0.052	0.078	-0.015	1.000					
Bank size	0.083	-0.247	-0.359	-0.034	-0.053	-0.07	1.000				
Bank liquidity	0.361	-0.041	0.091	-0.081	-0.114	-0.002	-0.053	1.000			
Inflation rate	0.013	0.105	0.531	0.053	-0.003	0.053	-0.205	0.019	1.000		
TB Rate	0.051	-0.169	-0.441	-0.018	-0.06	0.02	0.243	-0.019	0.06	1.000	
GDP	0.033	0.012	-0.392	-0.032	-0.02	-0.018	0.123	-0.062	-0.577	0.224	1.000

4.1.3 Panel Unit Root Test

Before running the regressions, unit root test was conducted to determine the order of integration among the model variables. The Levin-Lin-Chu, unit-root test, was applied to conduct the unit root test with the Harris-Tzavalis unit-root test being applied for robustness check. The results of the unit root test are presented in Table 6. The results indicate that under the Levin-Lin-Chu unit - root test based on the adjusted t – statistics, all the variables are stationary at a 5 percent significance level. Similar conclusions are arrived at upon the application of the Harris-Tzavalis unit-root test.

Table 6. Unit Root Test Results

	Levin-Lin-Chu unit-root test			Harris-Tzavalis unit-root test	
Variables	Unadjusted t-statistic	Adjusted t* statistic	P - value	Z statistic	P-value
Net Interest Margin	-7.7497	-3.0573	0.0011	-2.6048	0.0046
Lerner index	-12.4414	-5.5533	0.0000	-14.6685	0.0000
cr5	-8.3346	-3.4106	0.0003	-2.4283	0.0076
HHI	-10.0167	6.5173	0.0000	0.0076	0.0013
Operating Efficiency	-11.7736	-5.9881	0.0000	-6.5652	0.0000
Loan – to Deposit ratio	-12.0883	-7.2178	0.0000	-25.2726	0.0000
Bank size	-11.8731	-10.7203	0.0000	3.6025	0.0098
Bank liquidity	-7.5074	-3.1413	0.0008	-24.0862	0.0000
inflation	-12.9738	-5.5913	0.0000	-18.2363	0.0000
Tb - rate	-16.8753	-8.6564	0.0000	-21.5498	0.0000
GDP	-19.6390	-11.0236	0.0000	-21.0672	0.0000

4.2 Regression Models Results

A PVAR model was employed in estimating the effect of market structure on the banks' pricing behaviour. The bank pricing behaviour was measured by the net interest margin, which is the loan interest income net of deposit interest expense as a proportion of total assets. On the other hand, two measures of the market structure were used, namely: structural measures and non – structural measures. For structural measures, the HHI and CR5 were used while for the non – structural measure the Lerner index was applied. Regression model results indicate that banking industry market structure has a positive and significant effect on the bank pricing behaviour. The results of the PAR model found that the Lerner Index positive effect on bank pricing behaviour is significant at 5 percent significance level. The positive effect on the structural measures of market structure, namely the HHI and the CR5 was found to be significant at a 10 percent significance level[2]. Further, the PVAR mode results found that though the net interest margin has a positive effect on the market structure concentration indicators as revealed in the Lerner Index model, HHI index model and the CR5 model the effect was not significant at all. The finding, therefore, implies that the market structure matters when it comes to determining the banks' pricing behaviour. The

2 Results of the Panel Vector Auto-Regression model can be obtained upon request.

finding of the study resonates with the findings by Maudos and Fernández de Guevara (2004) who found that an increase in bank's market power results into higher interest margins. Earlier, a study by Corvoisier and Gropp (2002) sought to explain the difference between bank retail interest rates and money market rates by the bank's product-specific concentration indices. Their study concluded that in concentrated markets, retail lending rates are substantially higher, while deposits rates are lower.

Further, the findings agree with Quresh, Ghafoor and Khan (2017) who investigated the market structure and bank pricing behaviour in Pakistan. Applying different measures of banks' pricing behaviour namely banks' lending rates, banks' deposit rates and banks' net interest margins and by employing the GMM in the panel data found that higher level of bank concentration is related to lower deposit rates, higher loan rates and higher net interest margins. Also, Hussain (2014) examined the effect of bank concentration (along with other determinants) on net interest margins and finds that higher bank concentration leads to higher net interest margins. Further, the findings of the study are in harmony with the findings by the Monti-Klein (1972) model indicate that on bank product-wise pricing, the products whose demand is relatively inelastic, their pricing is less competitively thus their respective interest rates are relatively higher than the ideal market price. Therefore, going by this finding, it is evident that bank interest rates and their respective changes over time are reliant on the degree of competition

In terms of the theory, the positive effect of the market structure on the bank pricing behaviour from the Lerner index perspective support the Structure – Conduct – performance Theory by Bain (1959) that asserts that specific industry structures are suitable to monopolistic conduct allowing firms to augment prices beyond marginal costs thereby making unusual profits. The positive effect of an increase in market concentration of bank pricing behaviour concludes that in highly concentrated banking industry, large banks collude to charge higher prices and earn higher profits; thus there is a positive relationship between concentration and profitability.

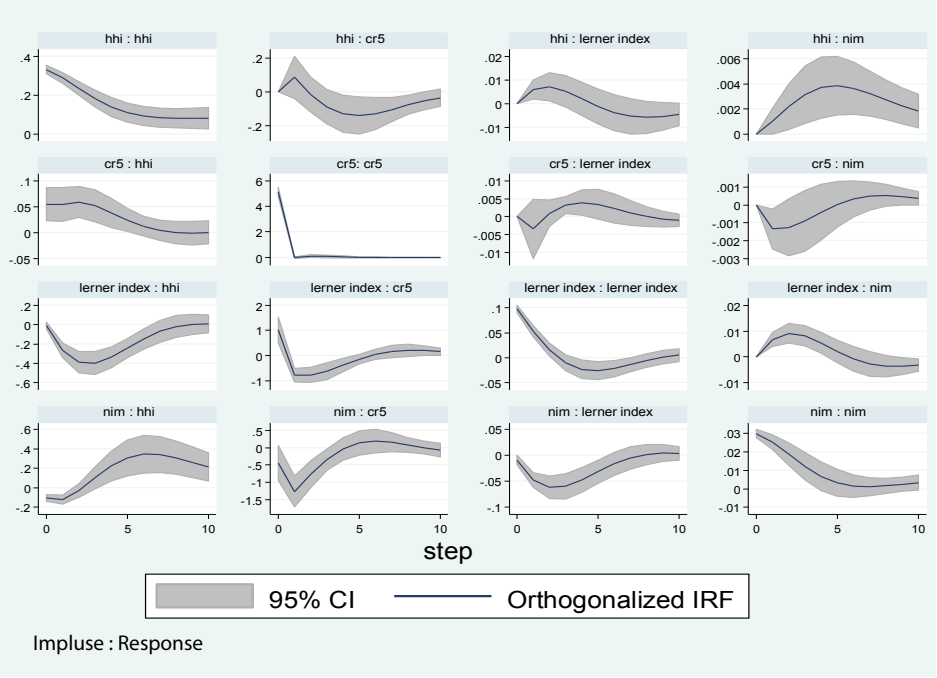
Further, the effect of CR5 on the bank pricing behaviour support the Relative Market Power hypothesis which asserts that only banks with large market shares, irrespective of market concentration, can exercise market power and earn abnormal profits. Therefore, according to this theory, uniquely the banks with a large market share and diversified products might exert their market power to determine prices and make profits. Consequently, it could be concluded that the individual market shares accurately determine market power and market imperfections.

4.3 Impulse Response Function Analysis

Upon PVAR estimation using a Cholesky decomposition, the Impulse Response Function were obtained to determine the effect of market structure on the bank pricing behaviour. The IRF for Lerner index on the bank's net interest margin indicates that one

standard shock in the Lerner index causes a sharp increase in the bank's net interest margin with the increase reaching a peak of 0.01 units in the first 3 periods but immediately decays before stabilising in the 7th period. The shock of HHI on bank's net interest margin reveals that one standard shock in the HHI causes a sharp increase in the bank's net interest margin with the increase reaching a peak of 0.004 units in the first 5 periods. After the 5 periods, shock decays continuously to a low of 0.001 by the 10th year period. Concerning the concentration index CR5, the IRF reveals that one standard shock in the CR5 causes a sharp decrease in the bank's net interest margin of 0.001 units in the first 1 year's period, but the \ shock is reversed faster afterwards taking a sharp continual rise for the rest of the period before stabilising at 6th period.

Figure 1. Impulse – Response Functions Graphs



5.0 Conclusion and Policy Implications

The empirical analysis results indicate that banking industry market concentration indeed matters when it comes to the determination of the bank pricing behaviour in the Kenyan context. On the industry market structure, the market structure indicators applied in the study posit that the Kenyan banking industry includes significant heterogeneity in the banks' market powers and is characterised by oligopolistic competition. Given that the banking industry in Kenya portrays characteristics of an oligopolistic market, the tiers on banks are more likely to signal the direction of the market pricing behaviour by virtue of them being market leaders. This conclusion could be inferred from different angles of the credit market in Kenya. To start with, the interbank market in Kenya could be concluded to contribute to the high market concentration given that large banks are capable of accessing funds from the interbank market at cheaper rates compared to small and medium-sized banks. This, in turn, has a positive effect on their Net Interest Margins. In addition, the current developments of acquisition of small banks by large banks is a clear indication of the possible increased levels of concentration in the industry that has a likelihood of raising the lending rates in the wake of interest rates caps removal. Further, it can be concluded that the different bank pricing mechanisms proposed by the government such as the Kenya Bankers Reference Rate (KBRR) seeking to standardise the base rates; the development Annual Percentage Rate (APR) seeking to standardise the third-party costs and of the latest interest rate capping are bound not to achieve the desired goals if they fail to focus on the role the banking industry market structure plays in informing the bank's pricing decision.

From the impulse – response analysis, the paper elicits some interesting findings with regard to the effect of market structure on the banking pricing behaviour, especially on the measure of the market structure employed in the analysis. The finding that the effect of the structural measure of market structure on the banking pricing behaviour being different from the effect of structural measure of market structure is worth a note. The positive shock of Lerner index; - a non-structural

measure of markets structure seems to decay faster compared to that of HHI, which is a structural market structure measure. However, another interesting scenario is reported in that though the effect of the positive shock of Lerner index decays faster, the decay is gradual but though the effect of HHI sets in after a long time, the decays, once it sets in, is very swift. In addition, the third measure of market structure which is the simplistic measure of all; - cr5 has a different shock on the banking pricing behaviour whereby it has a very short negative shock that reverses quickly taking an upward trajectory trend. This finding leads to a crucial conclusion caution should be taken when analysing the effect of pricing behaviour by using a simplistic measure such as CR5 which is a structural measure. Notably, the under the SCP hypothesis, the use of the structural measure of the market such as CR5 could infer that a rise in concentration is regarded as increasing collusive opportunities between firms, and hence would lead to higher prices and profitability when its not the case. As such use of measures such as the Lerner index which considers the firm behaviour with regard to not only profit maximisation through higher pricing but rather, profit maximisation through cost minimisation; - the duality problem would be more plausible in informing policies. In addition, the non-structural measures of market structure go beyond the competition aspect to measure the market power of every market player, and this would be ideal for relating to players' pricing behaviour.

Based on the findings, several policy pronouncements can be postulated. First, is the need for the development of financial policies that promote banking industry competition. With the current debate of bank consolidation in the advent of the effects of the global financial crisis in the developing economies need to be objectively thought of. Promotion of bank consolidation policies like in the Kenya context ought to though in the context such policies have in exacerbating the high market consolidation levels which would be retrogressive to the already achieved milestones in fostering market competition. In addition, such policies on banking industry consolidation should be articulated well be extending the analysis to not only the market structure – pricing nexus but also market structure - financial system stability nexus.

References

1. Allen, F and Gale, D. (2004). Competition and financial stability. *Journal of Money, Credit and Banking* 36(3): 453 – 480.
2. Amidu, M. (2013). The effects of the structure of banking market and funding strategy on risk and return. International Review of Financial Analysis, 28,143-155.
3. Berger, N., and Hannon, T. (1989). The Price-Concentration Relationship in Banking, *Review of Economics and Statistics*, 71 (May 1989), 291-299.
4. Berger, A. N., & Hannan, T. H. (1989). The price-concentration relationship in banking. *The review of Economics and Statistics*, 71(2), 291-299.
5. Berger, A. N., & Hannan, T. H. (1997). Using efficiency measures to distinguish among alternative explanations of the structure-performance relationship in banking. *Managerial Finance*, 23(1), 6-31.
6. Berger, A.N., Klapper, L.F., Turk-Ariss, R., (2009). Bank competition and financial stability. Journal of Financial Services Research. 35, 99–118.
7. Berger, A. N. (1995). The profit-structure relationship in banking--tests of market power and efficient-structure hypotheses. Journal of money, credit and Banking, 27(2), 404-431.
8. Borio, C., and Fritz, W. (1995). The response of short-term bank lending rates to policy rates: a cross-country perspective, BIS Working Papers 27, Bank for International Settlements.
9. Chortareas, G., Garza-Garci, J., and Girardone, C. (2011). Banking Sector Performance in Latin America: Market Power versus Efficiency, *Review of Development Economics,* 1, 5, 9 – 5.
10. Coccorese, P. (2009). Market power in local banking monopolies. *Journal of Banking & Finance*, 33(7), 1196 -1210.
11. Corvoisier, S. and Gropp, R. (2002). Bank concentration and retail interest rates, *Journal of Banking and Finance*, 26, 2155 - 2189.
12. Cottarelli, C., Giovanni, F., and Andrea, G (1995). Bank lending rates and financial structure in Italy. *International Monetary Fund Staff Papers*, 42,3.
13. Cottarelli, C., and Kourelis, A. (1994). Financial Structure, Bank Lending Rates, and the Transmission Mechanism of Monetary Policy, IMF Working Paper No. 94/39.
14. De Bandt, O., & Davis, E. P. (2000). Competition, contestability and market structure in European banking sectors on the eve of emu. *Journal of Banking &Finance*, 24(6), 1045 -1066.
15. Demsetz, H. (1973). Industry structure, market rivalry, and public policy. Journal of Law and Economics, 16(1), 1-9.
16. Gajurel, D., and Pradhan, R. (2007). Concentration and competition in Nepalese banking, *Journal of Business, Economics and Finance,* 1 (1), 5-16
17. Grossmann, A., Love, I., & Orlov, A. G. (2014). The Dynamics of Exchange Rate Volatility: A

Panel VAR Approach. Journal of International Financial Markets, Institutions and Money. 3, 1-27.

18. Homma, T., Tsutsui, Y., & Uchida, H. (2014). Firm growth and efficiency in the banking industry: A new test of the efficient structure hypothesis. Journal of Banking & Finance, 40, 143-153.

19. Klein, M. (1971). A theory of the banking firm. *Journal of Money, Credit and Banking,* 3, 205-218.

20. Maudos, J., and Fernandez de Guevara, J. (2004). Factors explaining the interest margin in the banking sectors of the European Union, *Journal of Banking & Finance*, 28(9), pages 2259-2281

21. Monti, M. (1972). Deposit, credit, and interest rate determination under alternative bank objectives, Mathematical methods in investment and finance, Amsterdam, North-Holland.

22. Leuvensteijn, V., Christoffer, M., & Bikker, J., and Rixtel, A. (2008). Impact of bank competition on the interest rate pass-through in the euro area. Working Paper Series 885, European Central Bank.

23. Peltzman, S. (1977). The gains and losses from industrial concentration. Journal of Law and Economics, 20(2), 229-263.

24. Quresh, F., Ghafoor, A. and Khan, H (2017). Market Structure and Bank Pricing Behavior: Fresh Evidence from Pakistan, *International Journal of Business & Management,* 12 (1), 89-108

25. Smirlock, M. (1985). Evidence on the (non) relationship between concentration and profitability in banking. Journal of money, credit and Banking, 17(1), 69-83.

26. Turk Ariss, R. (2010). On the implications of market power in banking: Evidence from developing countries. *Journal of Banking & Finance*, 34(4), 765-775.

27. Tirole, J. (1988). The theory of industrial organisation. Cambridge, Mass: MIT press.

28. Zhang, J., Jiang, C., Qu, B., & Wang, P. (2013). Market concentration, risk-taking, and bank performance: Evidence from emerging economies. *International Review of Financial Analysis*, 30, 149-157.

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