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Market Power and Intermediation Efficiency in Kenya: Blind Spots and Empirical Clarity[1]

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May 2020

Abstract

This paper seeks to examine the nexus between market power and intermediation efficiency in the Kenyan banking system. Using bank-specific, annual balance sheet and profit and loss data for the period 2003-2018, we construct three measures of efficiency; overall efficiency, allocative efficiency and cost efficiency, deploying the non-parametric Data Envelopment Analysis (DEA) approach with a variable return to scale input minimization orientation. Consequently, we estimate a panel Tobit regression with random effects estimator, to establish the nexus between intermediation efficiency and market concentration as represented by the Herfindahl-Hirschman Index (HHI). At the industry level, market concentration has a significant positive influence across all measures of efficiency implying that economies of scale play into the cost and technical efficiency and consequently allocative efficiency. Considering the heterogeneous nature of the industry's clusters, concentration positively influences allocation efficiency amongst big banks and cost efficiency and overall efficiency amongst small banks. Our inference is that economies of scale underpin allocation efficiency amongst big banks. Further, without the benefit of economies of scale manifested amongst big banks in the influence of cost efficiency on the return on assets (ROA), the middle-sized and small banks have seen their ROA influenced by efficiency across all the three measures. Therefore, the determination that amongst big banks market concentration is associated with allocation efficiency and not overall or cost efficiency is a pointer to the slack in optimal performance of big banks that can only be bridged if economies of scale result in both cost and overall efficiency being influenced by market structure. Based on these findings any arrangements that could influence the level of market power such as mergers and acquisitions are better assessed on how they relate to intermediation efficiency. The implicit policy of a marked-based adjustment of market power in contrast with consolidation activism not hinged on intermediation efficiency is justifiable.

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1.0 Introduction

There is an ongoing debate on the subject market consolidation in the context of the Kenyan banking industry. The debate, often championed by market analysts for instance presented in Oxford Business Group (2018) and Chaudhry and Smith (2018), has seldom been about the implication of the consolidation on market power and intermediation efficiency.

Instead, it leans heavily towards banks' performance from a financial standpoint, in the process introducing blind spots as to the essence of financial intermediation and how the underpinning market structure supports any adjustment towards the optimal intermediation process.

The consolidation debate fits into two linked lines of thought. First is the economies of scale angle where the argument is for the creation of banks with strong financial muscle and an extensive deposit gathering capability that will give market players an edge in an intensely competitive sector. The implicit inference from this line of argument is that consolidation is meant to save small banks from themselves; after all, goes the argument, the economy has a large number of banks and therefore consolidation will ensure individual bank's long-term survival.

Second is the postulation that organic growth is untenable, therefore banks should pursue growth through consolidation. The argument is hinged on the postulation that market shocks are more disruptive to smaller banks than to big banks. The example often sighted is the policy shock in the form of the Banking (Amendment) Act 2016 that introduced a 4-percentage points cap above the Central Bank Rate (CBR) on banks' lending rates. Analysts espouse the argument that the law has resulted in reduced profitability due to lower net interest margin, contending that the case for banks to form strategic partnerships through mergers aimed at leveraging on synergies will enable market

share growth, pricing power, and consequently ensure business sustainability.

Besides the trigger of the Banking (Amendment) Act of 2016, the high frequency of calls for the banking industry consolidation is associated with at least four developments. The first one was the period soon after the global financial crisis of 2007 – 2009. This period was characterized by enhanced regulation that underpinned de-risking which has seen an increase in capital requirements, in addition, stringent know-your-customer (KYC) guidelines as well a possibility of high costs of compliance associated with Anti-Money-Laundering and Combating-the-Financing-of-Terrorism. Consequently, several global banks exited from cross-border relationships, especially in the correspondent banking business (International Finance Corporation, 2016; International Monetary Fund, 2016).

The second one was the period in 2015 when Kenya's National Treasury proposed in the Finance Bill to increase fivefold the minimum core capital for banks from KES 1 billion to KES 5 billion over three years. Many analysts read the proposal as a signal for consolidation. The third one is the 2015 – 2016 period when the Kenyan banking system experienced shocks in the form of three banks being put under receivership by the Central Bank of Kenya (CBK). As argued in Osoro and Mureithi (2017), the showcased the disruption in liquidity flows at the interbank market to the disadvantage of small banks.

The fourth one was the periods when Kenyan domiciled banks made an entry into other markets in the East African market, prompting views that such expansion reflects economies of scale in their operations in the primary market and therefore an entrenchment of their market share that could squeeze small market operators. But studies such as Kodongo, Natto and Biekpe (2015) contend that the drivers of Kenyan banks into the rest of East Africa reflects institutional quality at the planning stage of seeking entry to a foreign market with relatively low competition. While this points to such banks' desire to exploit the benefits of their relative efficiency as could be derived from their economies of scale, we argue that there are cases where such expansion is in pursuit of scale.

This paper seeks to put a spotlight on the aspects of market power and intermediation efficiency as could be influenced by the push for consolidation. The motivation of the focus is that the arguments for consolidation have been banks' centric and therefore do not appropriately sit with the strategic role of banks as intermediating agencies and not merely profit machines. We, therefore, hinge our focus on the intermediation efficiency in the argument by Berger, Demirgüç-Kunt, Levine and Haubrich (2004) that the primary responsibility of banks is to mobilize, allocate and invest society's savings, therefore their performance as could be influenced by concentration and competition have consequences on economic performance.

Kenya's banking system can be characterized as largely concentrated. As block **A** of the figure below shows, over the period 2003 – 2018, the share of net assets for the top 10 banks in the economy has consistently exceeded 60 percent of the entire industry while that of the bottom 10 banks has consistently been below 4 percent. The middle pack, consisting more than 20 intermediaries takes up the rest of the share. This indicates how small the average assets' size is for the nearly three-quarters of the market players that account for about one-third of the entire banking system. Block **B** tracks the extent of market concentration as measured by the Herfindahl-Hirschman Index (HHI) and indicates that its decline trend from 2003 to 2014 reversed in the subsequent period.

Market Concentration

A. Share of Net Assets
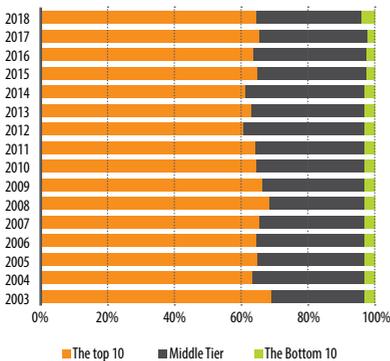
B. Herfindahl-Hirschman Index
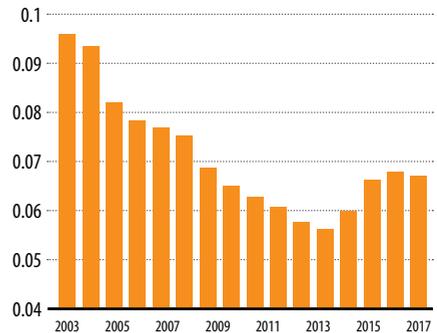
Source: Computed based on KBA Database

The above figure makes the small banks-big bank's dichotomy obvious but says nothing about how the observed structure is influenced by or indeed has an influence on, intermediation efficiency. That is an empirical question. It is obvious too that the segmented market often underpins shifts in financial resources allocation amongst market players in the event of a shock that calls for the invoking of the classic Bagehot (1873) prescription – so-called Bagehot conditions – impose liquidity management considerations with implication on efficiency at a general level, and allocation efficiency specifically. These conditions, meant to assure market stability, are that central banks should be disposed to (i) lend without limit (ii) to solvent but illiquid market players (iii) against good collateral (iv) at higher than the

market rates. Under stable market conditions, the extent of intermediation efficiency based on varied measures could *a priori* be influenced by the extent of market concentration.

This paper's broad objective is to examine the market power - intermediation efficiency nexus as a basis for inferences by both market players and policy markets with regard to, respectively, positioning and regulatory policy options. Specifically, we undertake an empirical investigation of the link between market power and banks' resource allocation efficiency as could be enabled by cost and overall efficiencies.

This paper contributes to this subject at two levels. First, while acknowledging that the subject of

intermediating efficiency has received empirical attention in the case of Kenya (for instance Kamau 2011), the market power angle is an obvious omission even as inferences that touch of advantages of size are drawn. Second, the paper injects empiricism on the banking industry consolidation debate that is now dominated by definitive inferences based on anecdotes at best, otherwise, superficiality anchored in computations such as banks per capita.

The rest of the paper is structured as follows. Section 2 reviews relevant literature. Section 3 discussed data issues and specifies the models for empirical analysis. The findings of the empirical analysis are reported in Section 4. Section 5 concludes.

2.0 Literature Review

The empirical attention that the subject of intermediation efficiency in the context of developing and emerging markets has often taken the traditional price, technical, scale and allocative efficiency without an assessment of the implication of the underlying market structure.

This approach has for instance been taken by Kamau (2011) for the case of Kenya, Ncube (2009) for the case of South Africa, and Aikeli (2008) for the case of Tanzania. In the case of cross-country analysis such as Kiyota (2009) that looks at banks in Sub-Sharan Africa, the assessment of intermediation efficiency is encumbered with the limitation of not taking into account the aspect of heterogeneity in the form of depth and structure of the banking systems amongst the countries assessed.

The subject of market power and scale on the other hand often leans towards economies of scale and market power, and how the two influence overall economic performance especially during downturns (Cubbillas and Suarez, 2018; and Bremus, Buch, Russ and Schinitzer, 2018). Their determination is that the higher the level of monopoly power of banks during the global financial crisis period of 2007 – 2009 fostered a lower reduction in the amount of credit provided by the banking system. That, however, is by no means an indication that market power necessarily leads to efficient credit allocation.

A case in point is the Nigerian experience where July 2004 the Central Bank of Nigeria (CBN) initiated a 13-point reform programme that led to the consolidation of the economy's banking industry. The aspects of the reform programme were a sharp increase in the minimum core capital requirement from 2 billion Naira to 25 billion Naira within a short period of 18 months, the inevitable mergers and acquisitions, the phased withdrawal of public sector funds from banks, and zero tolerance for

weak corporate governance, misconduct and lack of transparency. Ezeoha (2007) observes that the *a priori* expectations of the reforms were that they will address the problem of bank distresses and failure, and to reposition the industry for national and global economic challenges. With some of the operational difficulties facing the banks before consolidation being exogenous and prevalent even post the reform period, the study notes that policy move alone could not be a panacea.

Adelou (2014) and Ezeoha (2011) confirm the validity of the argument that it takes more than consolidation for the banking system to align itself to efficient intermediation, contending that the asset quality of the system remained on the deteriorating path as the increased credit crisis in the Nigerian banking industry between the periods 2004 and 2008 were exacerbated by the inability of banks to optimally use their huge asset capacity thereby exhibiting excess liquidity syndrome.

The clamour for big banks is confronted by the inconclusive assessment of the benefits associated with the market power that they command. Beck, Levine and Levkov (2010) undertake an assessment of the winners and losers of increase in market power using a political economy lens that focuses on labour aspects of bank employees. It determines that the balance between labour demand increase and wages pressure is beneficial to bank workers and that the possibility large banks entering a new market helps of breaking local monopolies to the benefit of customers. It is however not clear whether such benefits are in the form of service quality or access.

While mergers and acquisitions are a common avenue for increased market power, how beneficial they are to customers is still questionable (Focarelli and Panetta (2003). Even as they lead to the market being more concentrated, the nexus between concentration and competition remains tenuous (Berger, et. al, (2004). Those who examine the reasons underlying mergers or acquisitions [for instance Focarelli, Panetta and Salleo (2002)] point to the inconclusiveness of their analyses. While *ex-ante* the benefits in the form of cost reduction and growth opportunities are emphasized, empirics do not convincingly confirm these advantages although mergers are seen to be motivated by revenue expansion while acquisitions are underpinned by the desire to improve the quality of the loan portfolio of the parties and the system.

3.0 Methodological Issues and Data

3.1 Data

This paper uses bank-specific, annual balance sheet and profit and loss data for all commercial banks for the period 2003-2018.

The sample period sufficiently covers the key milestones upon which arguments for the banking industry consolidation can be mapped. The data source is the Kenya Bankers Association Financial Database of audited financial statements of all banks, thus more reliable than unaudited quarterly data. The contextual variables namely real GDP growth and inflation data are sourced from the Kenya National Bureau of Statistics.

3.2 Measurement of Intermediation Efficiency

We construct three measures of intermediation efficiency namely overall efficiency, allocative efficiency and cost efficiency following the theoretical work of Debreu (1951), Koopmans (1951), Shephard (1953) and Farrell (1957) which is estimated for each bank in each year such that a bank lies on or below the frontier. The essence of this approach is that it enables the evaluation of the efficiency of the banking system's ability to produce financial earning assets (loans and investments) using inputs as financial liabilities, labour and physical capital, thus addressing the allocation issue that is at the center of intermediation. The cost efficiency, while supportive of the allocation aspects of intermediation, is aligned more to the profitability of the banking system.

Drawing on existing literature (Grosskopf 1996; Kneip et al. 1998; Wheelock and Wilson 1999; Cooper et al. 2000; Banker and Natarajan, 2008), we deploy the non-parametric Data Envelopment Analysis (DEA) approach with a variable return to scale input-minimization orientation. The choice of non-parametric DEA over parametric Stochastic Frontier Analysis (SFA) is based on three considerations. First, unlike SFA, DEA does not impose a specific functional form, as a result, the estimates obtained are invariant to specification errors (Wheelock and Wilson 1999) while allowing for multiple inputs and outputs. Second, unlike in the parametric approach, the DEA parameters are equivalent to estimating a maximum likelihood function given that it is a non-parametric monotone and concave function (Banker, 1993). Third, it is efficient even with a smaller sample and thus presents an advantage over parametric-estimation approaches that require a larger sample. Banker and Natarajan (2008) observe that the non-parametric approach of frontier estimation yields consistent estimators for environmental/contextual variables especially in the second-stage where the scores are used as dependent variables.

The input orientation approach that we deploy in this paper assumes that during periods of regulatory changes and increased competition, market participants strategically focus on cutting costs. We, therefore, would expect changes in inputs used to be closely associated with the changes in market structure, assuming that bank management has more control over costs rather than over outputs. We use the Variable Returns to Scale (VRS) assumption since it fits well with the environment in which banks evolves, and thus makes it possible to have scores robust to misspecification. These attributes make it advantageous to the Constant Returns to Scale (CRS) assumption which allows for the comparison of the largest banks with smallest ones, with the possibility of the bigger bank appearing to be artificially more efficient which could be as a result of differences in their production technologies.

Acknowledging the challenge of the estimation of efficiency in banking as the inputs and output measures, we navigate the empirical implementation by adopting the intermediation approach of Sealey and Lindley (1977), Berger and Mester (1997) and De Young and Nolle (1998) we adopt the intermediation approach. Under this approach, there are three inputs: (i) (i) personnel expenses, (ii) the book value of fixed assets (i.e.capital), and (iii) loanable funds (i.e. the sum of deposits and borrowed funds). As for outputs, we considered two outputs: (i) total loans and (ii) noninterest income. To obtain the input prices we use the approach of Schaeck and Cihak (2010) where the price of loanable funds (W_1) is computed as the ratio of interest expenses to total deposits, the price of capital (W_2) is computed as the ratio of operating to fixed assets and price of labour (W_3) is computed as the ratio of personnel expenses to the number of staff.

3.3   Measurement of Bank Concentration

Several measures of market concentration measurement exist including the percentage share of the total assets held by the three largest banks, total assets held by the five largest banks and the HHI. With the arbitrary nature in which the proportionality of assets is used as a measure of concentration, this study utilizes the HHI in the empirical analysis.

3.4   Empirical Models

Following from the existing literature we explain the effect of concentration on banks intermediation efficiency with bank-specific and macroeconomic variables and estimate the following baseline regression model takes the form:

$$IE_{i,t} = \gamma_0 + \gamma_1 Conc_{i,t} + \gamma_2 X_{i,t} + \gamma_4 Y_t + \varepsilon_{i,t}$$

$$........ (1)$$

where $IE_{i,t}$ is intermediation efficiency of bank i at year t, which is obtained in the first stage by estimating the input-orientated variable returns to scale DEA model. $Conc_{i,t}$ is bank concentration, $X_{i,t}$ is a vector of bank-specific variables and among them we the cost-to-income ratio, loan-to-asset ratio, the ratio loan loss reserves to total loans, the ratio of loans to deposits, revenue diversification index, return on assets, real GDP growth and the inflation. The

choice of these control variables is informed by the literature. Y_t is a vector of bank-specific and country control variables. $\varepsilon_{i,t}$ is the error term.

To establish whether there is a heterogeneous effect across bank size of bank concentration on allocative efficiency equation (1) is re-estimated as follows:

$$IE_{i,y,t} = \gamma_0 + \gamma_1 Conc_{i,y,t} + \gamma_2 X_{i,y,t} + \gamma_1 Y_t + \varepsilon_{i,y,t}$$

$$........ (2)$$

Where the notations are as earlier defined in equation (2) and

$$\gamma = \begin{cases} 1 = \text{Top 10 Banks} \\ 2 = \text{Middle Tier Banks} \\ 3 = \text{Bottom 10 Banks} \end{cases}$$

We use estimate equation (1) and (2) using the panel Tobit regression with random effects estimator. The Tobit regression model is useful when the dependent variables are limited by a specific threshold.

Given that the intermediation efficiency proxies fall between the interval 0 and 1 makes it a limited-dependent variable. Under such circumstances, estimating the regression using the ordinary least square leads to biased parameter estimates, as it assumes a normal and homoscedastic distribution of the disturbance (Maddala, 1983).

04
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4.0 Results and Discussions

4.1.   Descriptive Statistics

Table 1 shows the mean and standard deviation of inputs and outputs used in Data Envelopment Analysis (DEA).** As the standard deviations shows, the inputs and outputs for the DEA model which are expressed as a ratio of total assets are stable with the average price of borrowed funds being 0.051, price of labour being 0.04 and price of physical capital being 0.061.

Table 1. Descriptive statistics for DEA input and output variables

	No. of Obs	SD	Mean	Min	Max
Price borrowed funds	600	0.061	0.051	0.001	1.344
Price labor	600	0.038	0.040	0.003	0.676
Price physical capital	600	0.053	0.061	0.003	0.907
Total Loans & Advances (KES billion)	600	1.637	3.216	0.004	434.36
General Administrative Expenses (KES billion)	600	55.16	0.204	0.334	24.82
Total Deposits (KES Billion)	600	3.6277	41.173	0.001	48.661
Total Operating Expenses (KES Billion)	600	65.606	3.050	0.0004	33.530

Table 2 reports the distribution of the variables used in the Tobit regression framework. On average, the level of overall efficiency in intermediation is 57.5% for the period 2003-2018 while allocative efficiency and cost efficiency are at 65.3% efficiency and 44.3% respectively. On the other hand, the average concentration 0.002 with the highest concentration value being 0.045.

Table 2. Dependent and Independent variables used in Tobit regression analysis

	N	mean	SD	min	max
Overall Efficiency	595	0.575	0.272	0.00	1.00
Allocative Efficiency	595	0.653	0.283	0.00	1.00
Cost Efficiency	595	0.443	0.321	0.00	1.00
Concentration	600	0.002	0.005	2.02E-12	0.045
Total Cost to Total income ratio	600	0.999	11.290	0.551	276
Loan to Total Assets	600	0.867	0.572	0.119	9.303
Loan loss reserves to total loans ratio	598	0.063	0.120	0.003	1.697
Total loans to deposits	600	0.787	0.475	0.027	0.880
Revenue Diversification	592	0.404	0.248	-0.662	4.578
Return on Assets	600	0.022	0.042	-0.226	0.589
Real GDP Growth	600	5.284	1.665	1.500	8.400
Inflation	564	8.443	3.921	3.670	18.31

4.2 Regression Estimates

4.2.1 Industry-level effect of concentration on Intermediation Efficiency

Table 3 reports the regression results explaining intermediation efficiency as a function of concentration as specified in equation (1). The results in column (i), (ii) and (iii) show intermediation efficiency is influenced by the extent of market concentration as measured by the HHI. The positive sign of the concentration coefficient across all measures of efficiency implies that economies of scale play into

the cost and technical efficiency and that leads to allocative efficiency at the industry level.

Cognisant that size influences banks' attitude towards liquidity, especially during times of market shocks, we note that the link between overall efficiency and cost efficiency on the one hand and loans to deposits ration on the other is positive. This points to the fact that the banking system's ability to convert deposits to loans as an indication of liquidity management has both a cost efficiency dimension as well as overall

efficiency because of the costly trade-offs between holding more liquidity at the expense of loans and consequently profitability.

The Kenyan case is therefore empirically assessed to be the opposite of the Nigerian case post-consolidation (Adelou (2014) and Ezeoha (2011) where banks have exhibited an inability to optimally use their huge asset capacity thus manifest excess liquidity syndrome. Further, there is a positive relationship between return on assets (ROA) and intermediation efficiency Finally, macroeconomic factors, in particular, real GDP growth and inflation rate have a significant positive influence on operating efficiency.

Table 3. Regression effect of Bank Concentration on Intermediation Efficiency

	(i)	(ii)	(iii)
	Overall Efficiency	**Allocative Efficiency**	**Cost Efficiency**
Concentration	0.020***	0.029***	0.022**
	(2.65)	(3.12)	(2.40)
Cost to income ratio	−0.004	−0.015	−0.004
	(−0.34)	(−1.19)	(−0.30)
Loan to assets ratio	−0.071**	−0.063**	−0.085**
	(−2.29)	(−1.97)	(−2.48)
Loan loss reserves to total loans	−0.182*	−0.086	−0.156
	(−1.81)	(−0.83)	(−1.41)
Total loans to deposits	0.070*	0.050	0.076*
	(1.81)	(1.27)	(1.79)
Revenue diversification	0.128	0.024	0.070
	(1.63)	(0.29)	(0.79)
Return on Asset	0.347	0.859***	0.615*
	(1.12)	(2.66)	(1.78)
Real GDP Growth	0.070***	0.056***	0.061***
	(10.34)	(8.03)	(8.14)

	(i)	(ii)	(iii)
	Overall Efficiency	Allocative Efficiency	Cost Efficiency
Inflation	0.010***	0.009***	0.008***
	(3.37)	(2.92)	(2.62)
Constant	0.272***	0.591***	0.243**
	(2.77)	(5.17)	(2.07)
sigma_u	0.134***	0.197***	0.197***
	(6.47)	(6.83)	(7.08)
sigma_e	0.240***	0.244***	0.262***
	(28.00)	(25.78)	(27.98)
No. of observation	553	553	553

t statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

4.2.2. Heterogenous effect of concentration on Intermediation Efficiency

Table 4 reports the regression results of concentration on intermediation efficiency by bank clusters based on their total assets. In this categorisation, we classify the banks as top-10, bottom 10 and middle-sized banks. The intuition the tests is that concentration may affect intermediation efficiency among banks different. From the results in **Table 4**, Panel (1)-(3), the tiering of banks into different clusters reveals the heterogeneity in the effect of concentration on intermediation efficiency which the industry-level analysis conceals.

We establish that concentration is positively associated with intermediation efficiency amongst big banks and small banks, and interesting not in the middle cluster. The extent of influence, however, is on the allocation efficiency amongst big banks and cost efficiency and overall efficiency for small banks. Our inference is that economies of scale underpin allocation efficiency amongst big banks, an attribute that is supported by fact that they can book large ticket loans that are not feasible for small banks due to the latter's caution when it comes to exposing a large share of their loan portfolio to a single large borrower (Kenya Bankers Association, 2019).

Smaller banks are predisposed to making many small loans, each for no more than they respectively could readily absorb in the event of default. Further, large banks have additional non-deposit funding avenues

in the form of specialised lines of credit and capital markets that, while in principle could be available to smaller banks, are not readily accessed by smaller bankers. That small banks manifest cost and overall efficiency on the influence of concentration as they make necessary market adjustments to balance liquidity and profitability.

Finally, without the benefit of economies of scale, which manifests itself amongst big banks in the influence of cost efficiency on ROA, the middle-sized and small banks have seen their ROA influenced efficiency across all the three measures. The determination that amongst big banks market concentration is associated with allocation efficiency and not overall or cost efficiency is a pointer to the slack in optimal performance of big banks that can only be bridged if economies of scale result in both cost and overall efficiency being influenced by market structure.

Table 2: Heterogeneous Effect of Bank Concentration on Intermediation and Cost efficiency

	Panel 1: Top 10 Banks			Panel 2: Middle-Level Banks			Panel 3: Bottom 10 Banks		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
	Overall Efficiency	Allocative Efficiency	Cost Efficiency	Overall Efficiency	Allocative Efficiency	Cost Efficiency	Overall Efficiency	Allocative Efficiency	Cost Efficiency
Concentration	0.012	0.122***	0.015	0.012	0.003	0.010	0.029**	0.012	0.025**
	(0.45)	(3.86)	(0.50)	(0.99)	(0.25)	(0.65)	(2.21)	(0.88)	(1.96)
Cost to income ratio	0.410*	-0.204	0.347	-0.014	-0.026	-0.017	-0.235***	-0.253***	-0.209***
	(1.94)	(-0.84)	(1.34)	(-0.92)	(-1.63)	(-1.01)	(-3.85)	(-4.12)	(-3.49)
Loan to assets ratio	-0.771**	-0.126	-0.906**	-0.055	-0.052	-0.064*	-0.855***	-1.000***	-0.943***
	(-2.36)	(-0.29)	(-2.50)	(-1.63)	(-1.44)	(-1.70)	(-3.47)	(-4.04)	(-3.90)
Loan loss reserves to total loans	-0.255	1.264*	0.222	-0.264	-0.149	-0.204	-0.216**	-0.177*	-0.225**
	(-0.44)	(1.93)	(0.35)	(-1.49)	(-0.80)	(-1.03)	(-2.22)	(-1.81)	(-2.35)
Total deposits to total assets	0.617**	0.031	0.630*	0.119***	0.107**	0.137***	0.176	0.276*	0.175
	(2.07)	(0.07)	(1.90)	(2.60)	(2.22)	(2.69)	(1.08)	(1.68)	(1.09)
Revenue diversification	0.183	0.138	0.142	0.047	-0.102	-0.059	0.048	0.025	0.024
	(0.67)	(0.47)	(0.45)	(0.36)	(-0.71)	(-0.39)	(0.57)	(0.30)	(0.29)

	Panel 1: Top 10 Banks			Panel 2: Middle-Level Banks			Panel 3: Bottom 10 Banks		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
	Overall Efficiency	Allocative Efficiency	Cost Efficiency	Overall Efficiency	Allocative Efficiency	Cost Efficiency	Overall Efficiency	Allocative Efficiency	Cost Efficiency
Return on Asset	2.623	1.769	4.477*	2.380***	2.850***	3.098***	-1.462***	-1.135**	-1.285**
	(1.15)	(0.75)	(1.70)	(3.58)	(3.95)	(4.06)	(-2.58)	(-1.99)	(-2.31)
Real GDP Growth	0.086***	0.041***	0.080***	0.076***	0.077***	0.067***	0.042***	0.044***	0.030***
	(6.60)	(3.15)	(5.45)	(7.42)	(7.07)	(5.79)	(4.16)	(4.39)	(2.92)
Inflation	0.009	0.012**	0.009	0.011**	0.009*	0.008*	0.007*	0.008*	0.006
	(1.54)	(1.98)	(1.51)	(2.51)	(1.90)	(1.75)	(1.66)	(1.84)	(1.41)
Constant	-0.073	1.336***	0.102	0.156	0.147	0.085	1.130***	1.013***	1.034***
	(-0.30)	(5.23)	(0.37)	(1.01)	(0.87)	(0.46)	(3.87)	(3.46)	(3.61)
sigma_u	0.053	0.105***	0.095**	0.150***	0.188***	0.223***	0.000	0.000	0.000
	(1.30)	(2.65)	(2.28)	(4.74)	(5.00)	(5.27)	(0.00)	(0.00)	(0.00)
sigma_e	0.242***	0.221***	0.269***	0.252***	0.263***	0.278***	0.173***	0.173***	0.169***
	(14.35)	(11.13)	(14.42)	(18.83)	(18.11)	(18.83)	(15.63)	(15.74)	(15.64)
No. of Observation	148	148	148	265	265	265	140	140	140

t statistics in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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5.0 Conclusion and Policy Inferences

This paper seeks to examine the nexus between market power and intermediation efficiency in the Kenyan banking system. **Whereas a popular view is emerging that the Kenyan banking system ought to consolidate, its proponents neither base their perspective on the empirical investigation nor anchor their argument on its link to market power and consequently influencing intermediation efficiency.**

This paper argues that the consolidation debate so far is banks' centric, leaning more toward what consolidation could mean to the financial performance of the lower segment of the market. We contend that such focus introduces blind spots at two points.

The first one is that it steers the conversation away from the indisputable notion the primary responsibility of banks is to mobilize, allocate and invest society's savings, therefore their performance as could be influenced by concentration and competition have consequences on economic performance. The second one is that it barely espouses the notion that so long as the existing market structure does not compromise liquidity flows and consequently the stability of the system, the focus should be on how market power supports intermediation efficiency.

Our empirical investigation uses bank-specific, annual balance sheet and profit and loss data for all commercial banks for the period 2003-2018. We first construct three measures of efficiency namely overall efficiency, allocative efficiency and cost efficiency, deploying the non-parametric DEA approach with a variable return to scale input-minimization orientation. Using the panel Tobit regression with random effects estimator, we estimate two empirical models that relate the measures of intermediation efficiency with market concentration as represented

by the HHI. The first model is at the industry level and the second model at three industry clusters to take into account possible heterogeneity in the effect of concentration on intermediation efficiency which the industry-level analysis could conceal.

The key finding from the industry level analysis is that market concentration has a positive and significant influence across all measures of efficiency implying that economies of scale play into the cost and technical efficiency and that leads to allocative efficiency at the industry level. We also establish that banking systems deploy liquidity management tools that feed into positive cost efficiency and overall efficiency of the system. In that regard, the structure of the Kenyan banking system is contrasted with that of Nigeria post-consolidation which has been observed to be characterized by the inability to optimally utilize its huge asset capacity thus manifest excess liquidity syndrome.

Considering heterogeneity attributes of the banking industry clusters, we establish that concentration positively influences allocation efficiency amongst big banks and cost efficiency and overall efficiency

amongst small banks. Our inference is that economies of scale underpin allocation efficiency amongst big banks. We further observe that without the benefit of economies of scale, which manifests itself amongst big banks in the influence of cost efficiency on the ROA, the middle-sized and small banks have seen their ROA influenced by efficiency across all the three measures.

Therefore, the determination that amongst big banks market concentration is associated with allocation efficiency and not overall or cost efficiency is a pointer to the slack in optimal performance of big banks that can only be bridged if economies of scale result in both cost and overall efficiency being influenced by market structure.

Based on these findings we argue that any arrangements that could influence the level of market power such as mergers and acquisitions are better assessed on how they relate to intermediation efficiency. The implicit policy of a marked-based adjustment of market power in contrast with consolidation activism that is not hinged on intermediation efficiency is justifiable.

References

1. Adeolu, A. M. (2014). Asset Quality and Bank Performance: A Study of Commercial Banks in Nigeria. *Research Journal of Finance and Accounting, 5(18), 39-44.*

2. Aikaeli, J. (2008), *Commercial Banks Efficiency in Tanzania, A Paper Presented in a CSAE Conference on Economic Development in Africa*, Oxford, 16th - 18th March.

3. Bagehot, W. (1873). Lombard Street – *A Description of the Money Market.* Henry S. King & Co, London.

4. Banker, R. D. (1993). Maximum Likelihood, Consistency and Data Envelopment Analysis: A Statistical Foundation. *Management Science, 39(10), 1265-1273.*

5. Banker, R. D., & Natarajan, R. (2008). Evaluating Contextual Variables Affecting Productivity Using Data Envelopment Analysis. *Operations Research, 56(1), 48-58.*

6. Beck, T., Levine, R., and Levkov, A. (2010). *The Journal of Finance. LXV (5). 1637-1667.*

7. Berger, A. N., & Mester, L. J. (1997). Inside the Black Box: What Explains Differences in The Efficiencies of Financial Institutions? *Journal of Banking & Finance, 21(7), 895-947.*

8. Berger, A. N., and DeYoung, R. (1997). Problem Loans and Cost Efficiency in Commercial Banks. *Journal of Banking and Finance, 21(6), 849-870.*

9. Berger, A.N., Demirgüç-Kunt, A., Levine R., and Haubrich G.H. (2004). Bank Concentration and Competition. *Journal of Money Credit, and Banking.* 36(3). 433-451.

10. Bremus, F., Buch, C. M., Russ, K. N. and Schinitzer, M. (2018). Big Banks and Macroeconomic Outcomes: Theory and Cross-Country Evidence of Granularity. *Journal of Money, Credit and Banking. 50(8), 1785-1826.*

11. Chaudhry, S. and Smith, M. (2018), Kenyan Banks, Under Pressure to Lend More, Set for Consolidation. *S&P Globa Intelligence,* August.

12. Cihak, M., & Schaeck, K. (2010). How Well Do Aggregate Prudential Ratios Identify Banking System Problems? *Journal of Financial Stability, 6(3), 130-144.*

13. Cooper, W. W., Seiford, L. M., & Tone, K. (2000). Data Envelopment Analysis. Handbook on Data Envelopment Analysis, 1st ed.; Cooper, WW, Seiford, LM, Zhu, J., Eds, 1-40.

14. Cubbillas, E. and Suarez, N. (2018). Bank Market

Power and Lending During the Global Financial Crisis. *Journal of International Money and Finance, 89, 1-22.*

15. Debreu, G. (1951). The Coefficient of Resource Utilization. *Econometrica: Journal of the Econometric Society, 273-292.*

16. DeYoung, R., & Hasan, I. (1998). The Performance of De Novo Commercial Banks: A Profit Efficiency Approach. *Journal of Banking & Finance, 22(5), 565-587.*

17. Ezeoha, A. E. (2011). Banking Consolidation, Credit Crisis and Asset Quality in a Fragile Banking System. *Journal of Financial Regulation and Compliance, 19 (1), 33-44.*

18. _____(2007). Structural Effects of Banking Industry Consolidation in Nigeria: A Review. *Journal of Banking Regulation, 8(2), 159-176.*

19. Farrell, M. J. (1957). *The Measurement of Productive Efficiency. Journal of the Royal Statistical Society: Series A (General), 120(3), 253-281.*

20. Focarelli, D., and Panetta, F. (2003. Are Mergers Beneficial to Consumers? Evidence from the Market of Bank Deposits. *American Economic Review. 93(4) 1152-1172.*

21. Focarelli, D., Panetta, P. and Salleo, C. (2002). *Why do Banks Merge? Journal of Money, Credit and Banking. 34 (4). 1047 -1066.*

22. Grosskopf, S. (1996). Statistical Inference and Nonparametric Efficiency: *A Selective Survey. Journal of productivity analysis, 7(2-3), 161-176.*

23. International Finance Corporation [IFC]. (2016). De-Risking by Banks in Emerging Markets – Effects and Responses for Trade. *EM Compass Note* 24, November.

24. International Monetary Fund [IMF]. (2016). The Withdrawal of Correspondent Banking Relationships: A Case for Policy Action. *IMF Staff Discussion Note SDN/16/07, June*.

25. Kamau, A. W. (2011). Intermediation Efficiency and Productivity of the Banking Sector in Kenya. *Interdisciplinary Journal of Research in Business 1 (9), 12 – 26.*

26. Kenya Bankers Association (2019). *State of the Banking Industry Report, June.*

27. Kiyota, H, 2009). *Efficiency of Commercial Banks in Sub-Saharan Africa: A comparative analysis of domestic and foreign banks, A Paper Presented in a CSAE Conference on Economic Development in Africa, Oxford, 22nd to 24th March.*

28. Kneip, A., Park, B. U., & Simar, L. (1998). *A Note on the Convergence of Nonparametric DEA Estimators for Production Efficiency Scores. Econometric Theory, 14(6), 783-793.*

29. Kodongo, O. Natto, D,. and Biekpe, N. (2015), *Explaining cross-border bank expansion in East Africa. Journal of International Financial Markets, Institutions and Money. 36, 71-84, May.*

30. Koopmans, T. C. (1951). An analysis of production as an efficient combination of activities. Activity analysis of production and allocation.

31. Kwan, S. H. (2003). Operating performance of banks among Asian economies: An international and time series comparison. *Journal of Banking and Finance, 27(3), 471-489.*

32. Maddala, G. S. (1983). *Limited-dependent and qualitative variables in econometrics (No. 3). Cambridge university press.*

33. Ncube, M. (2009). *Efficiency of the Banking sector in South Africa,* University of the Witwatersrand.

34. Osoro, J. and Muriithi, D. (2017). The Interbank Market in Kenya: An Event-Based Stress Analysis Based on Treasury Bill Market. *European Scientific Journa*l, 13 (16), 127 – 145.

35. Oxford Business Group. (2018). *Banking Overview. The Report – Kenya 2018.*

36. Schaeck, K., & Cihak, M. (2010). Competition, efficiency, and soundness in banking: An industrial organization perspective. *European banking Center discussion Paper,* (2010-20S).

37. Sealey Jr, C. W., & Lindley, J. T. (1977). Inputs, outputs, and a theory of production and cost at depository financial institutions. *The Journal of Finance, 32(4), 1251-1266.*

38. Shephard, G. C. (1953). Unitary groups generated by reflections. *Canadian Journal of Mathematics, 5, 364-383.*

39. Wheelock, D. C., & Wilson, P. W. (1999). Technical progress, inefficiency, and productivity change in US banking, 1984-1993. *Journal of Money, Credit, and Banking, 212-234.*

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