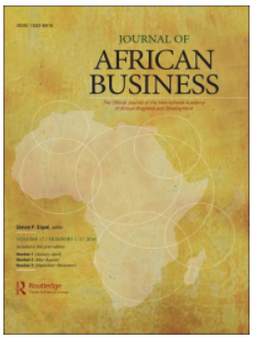

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Market Power and Bank Lending in Africa: The Role of Regulatory Policy

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ABSTRACT

The paper investigates how regulatory policy modulates the complex relationship between market power and bank lending. The empirical evidence is based on the seemingly unrelated panel regressions by employing a dataset of 52 African countries for the period, 2006–2018. The study finds a U-shaped relationship between market power and bank lending. The study shows that the estimated thresholds fall within the range of -4.38 to 9.67 of market power. It observes that the thresholds of market power in countries with stringent regulatory policies are relatively greater than countries operating in low regulatory policy regimes. The study shows a negative and direct effect of market power on lending. In the light of interactions, the conditional effects are estimated to provide meaningful interpretations. This is relevant to policymakers because our established conditional effects, imply that regulatory policy is a sufficient complementary condition for reducing the negative effect of market power on bank lending.

KEYWORDS

Market power; regulations and bank lending

1. Introduction

Most studies have devoted much attention to the linear relationship between market power and bank lending but did not consider the non-linear relationship between them. For instance, earlier studies in Africa show that banks with greater market power exhibit less competitive behavior by charging high loan rates, lowering deposit rates, and reducing lending (see, Clerides et al., 2015; Fosu, 2013; Léon, 2016). This leads to a negative impact of market power on bank lending. Other studies established that a less competitive banking environment, characterized by greater market power, reduces bank lending or restricts access to credit by firms at the micro-level, which may inhibit economic growth (Fernández et al., 2013; Liu et al., 2014; Love & Martínez Pería, 2015). Further, Amidu and Wolfe (2013) posit that banks increase their lending capacity depending on the degree of market power and the nature of market structure (Amidu & Wolfe, 2013). However, this assertion has not been tested empirically from the African context. This calls for an investigation into the degree of bank market power that may influence the level of bank lending, especially in Africa.

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The present study differs from earlier studies because the market power-lending nexus may be non-linear and indirect. First, the study argues that market power reduces credit expansion in a monopolistic competitive market. However, additional increase in market power forces banks to lend more to the best clients in order to make profits. Thus, market power negatively impacts bank lending, but there is a level at which additional increase in market power tends to positively impact bank lending. The current study posits that just establishing the linkages between the degree of market power and bank lending is less informative for policymakers, especially in the context of Africa which has undergone several changes in financial-sector reforms (Senbet & Otchere, 2006), unless thresholds at which market power increases lending are clearly established. Thus, introducing some quadratic terms, providing estimations and establishing a threshold at which market power positively influences an outcome variable – provides policymakers with a more actionable and practical approach compared to establishing a direct link. Therefore, contrary to previous studies that are based on direct linear estimations, the modeling exercise in this study is based on quadratic estimations.

Second, the model which explains the non-linear relationship between market power and bank lending may be influenced by regulatory framework. Consequently, the study also investigates the conditions under which market power reduces lending as well as the inflexion points for which market power increases bank lending under different regulatory policy frameworks. Over the past, many economies have experienced a revolution in the extent and nature of the mechanisms used by government to regulate the behavior of the financial sector (Joskow, 2010). The operations and structures of the banking sector and of their regulations have changed greatly and rapidly (Wilcox, 2005). Moreover, instabilities and market imperfections in the banking system have led to several adjustments to the African regulatory framework (Petriček, 2019). This makes regulatory policies effective for achieving a stable banking system. For this reason, there may be certain conditions under which policymakers find these regulatory policies informative; an example is the presence of regulatory environment or regimes. Thus, establishing the thresholds of the non-linear relationship (between market power and lending) at different regulatory environment may be informative to monetary authorities in their quest to achieve the set objective of competitive pricing and appropriate lending policies across different regulatory environments. Therefore, the study examines the threshold levels at which market power increases lending in different regulatory environment.

Third, it is obvious that regulatory policies are essential channels for market power and bank lending (Capgemini Financial Services Analyisis, 2014). However, the unanswered question is whether regulatory policy modifies the relationship between market power and the lending behavior of banks? Joskow (2010) argued that competitive markets are a powerful mechanism for allocating scarce resources efficiently. Thus, competitive markets should be combined with regulatory frameworks to enhance market performance and all market imperfections should be fixed by the regulator. Further, not only have regulatory policies and market power been recognized to be appropriate for the entire financial system (Akande & Kwenda, 2017; Brei et al., 2020; Canta et al., 2020; Oduor et al., 2017) but also they force banks to look for ways to optimize market-power and bank lending relationship in the presence of stringent regulatory policies. This suggests that regulatory frameworks are needed for market power to have a more desirable effect on bank lending. This study provides empirical support to policymakers and researchers by examining the impact of market power on bank lending when interacted with different regulatory policies.

The contribution and position of this present study is motivated by the fact that the non-linear relationship between market power and bank lending as it applies in the African context may be relevant to policymakers and researchers, especially the extent to which the degree of market power and its impact on lending is relevant in countries with different regulatory policy environments. On the methodological and empirical front, most studies (Agoba, et al., 2020; Agoba et al., 2017) which are based on mean values of the moderating variable are complemented with an empirical approach for investigating a conditional distribution of independent variables in interaction models. The intuition for this methodological improvement is that empirical strategies based on mean values of the moderating variable produce blanket policy outputs that are ineffective unless the modeling exercise is tailored to account for low and high levels of the moderating variable. Accordingly, the estimations used in this study enable the assessment of the market power and bank lending nexus at different values of regulatory policies (monetary policy, capital requirement, capital buffer, and reserve requirement), using plots or graphs. Again, policymakers in Africa may want to understand how these regulatory policies shape the relationship between market power and bank lending in Africa. The study fills this gap and contributes to the literature by establishing both the net effect at which regulatory policy shapes the direct impact of market power on lending behavior.

Finally, the study provides key empirical contributions by establishing a U-shaped non-linear relationship between market power and bank lending. It found that initial levels of market power reduce bank lending but additional levels of market power induce a positive impact on bank lending. Thus, beyond a threshold of 4.88, market power increases bank lending behavior. We found that the thresholds of market power at which bank lending increases are relatively greater in countries with high regulatory policy environments compared with countries operating in low regulatory policy environments. The study provided evidence that the negative impact of market power on bank lending is reduced when interacted with monetary policy rates, capital requirement, capital buffer, and reserve requirement.

2. Literature review: theories, empirics, and hypothesis development

It is evident in the finance and economics literature that two interrelated characteristics of the banking sector have received increasing attention by scholars and policymakers, namely bank market power and bank lending behavior (Al-Khouri et al., 2019; Amidu, 2014; Tabak et al., 2012; Wang et al., 2022). Bank lending is critically important for the aggregate economy, and reliance on it (between borrowers and lenders) can give banks a substantial degree of market power and potentially cause insufficient provision of credit (Drechsler et al., 2018). Despite the many determinants of bank lending, one key indicator in the banking system that affects the behavior of bank lending is market power. Banks increase their lending capacity depending on the degree of market power and the nature of market structure (Amidu & Wolfe, 2013). For that reason, the relationship between market power and lending can be argued subject to several constraints. These include the magnitude (degree/level) of market power, imperfect, or perfect competition in the banking market structure and regulatory constraints (Wang et al., 2022).

In terms of magnitude, the effects of bank market power on lending depend on the level or degree at which banks set their prices. Market power of a bank explains the extent to which the bank can set its price above marginal cost, which may lead to lending cuts. In a banking market that is characterized by perfect competition, price is determined through the mechanism of supply and demand. Thus, an increase in price (interest rate) by banks gives banks a greater market power. This is because banks make high margins by increasing interest rates, reducing default, and lowering lending volumes, which leads to a negative relationship between market power and bank lending as supported by Pruteanu-Podpiera et al. (2007). However, this argument may not always be the case for a competitive banking system where a bank can lend as large a quantity as it wishes, as long as it accepts the prevailing market price that maximizes revenue. Similarly, excess demand for loans by the public may cause prices to rise, and banks may be willing to lend more to meet the demand, thereby increasing output. From an imperfect banking market perspective, where prices and quantities are set by price makers, banks may have some degree of market power, exhibit monopolistic, and monopoly power and may obviously influence the supply of loans (Vayanos & Wang, 2013). For instance, banks may lend more by charging different interest rates to different borrowers. Thus, greater market power may not necessarily lead to lower lending as argued earlier. Some studies have examined the direct effect between market power and lending behavior of banks from developed economies (Bachas & Liu, 2019) and developing economies (Abel & le Roux, 2017; Amidu & Wolfe, 2013; Canta et al., 2020) but ignored the non-linear relationship between them.

In the literature, the level of bank market power in Africa is higher than any other region (World Bank, 2017; Clerides et al. (2015); Mirzaei and Moore (2014); Amidu and Wolfe (2013)). Due to capital accumulation, the behavior of banks with market power can either induce or restrict lending levels or access to finance by firms that rely on external sources of funds. Again, a more concentrated banking system that provides capital assistance to new firms and banks with some degree of market power have incentives to establish long-lasting relationships with borrowers (De Guevara & Maudos, 2007) and hence increase lending. Nguyen et al. (2012) show that by specializing in relationship lending, banks with market power can leverage their information advantage and expand more credit in order to increase profits. The empirical evidence shows that banks with greater market power will probably reduce their lending because they have a greater ability to hedge against a temporary drop in loan losses or margins (Cubillas & Suárez, 2018). However, the non-linear market power-lending nexus has not been tested empirically from the African context. Based on that, the current study formulate the following hypothesis:

H_1: *Market power has a U-shaped relationship with bank lending*

The above hypothesis can be argued that initial levels of market power reduce bank lending but additional level of market power may lead to greater lending behavior of banks. Just establishing a non-linear market power-lending nexus may not be informative to policymakers, unless thresholds are established – which have been ignored in existing literature. Following the hypothesis formulated above, the current study contributes to existing literature by estimating the threshold points of market power at which banks may increase the level of lending.

In relation to regulatory constraint, the effect of market power on bank lending can be explained in line with regulatory policy framework (Akhtar et al., 2019; Amidu, 2014; Wang et al., 2022). For instance, tightening monetary policy causes a shift in the supply of loans and it impacts the marginal costs (interest paid on bank liabilities) (Wang et al., 2022). Tight monetary policy is used to control the excessive risk taking of banks through lending (Drechsler et al., 2018). This suggests that banks with greater market power may reduce bank lending behavior in a tight monetary policy environment. The effect of bank competition on bank lending channel following changes in monetary policy has been explained in the literature (Brissimis & Delis, 2009). For instance, Adams and Amel (2005) explained that a concentrated bank structure hinders monetary policy transmission by using aggregate regional US data of small businesses of small businesses for 1996–2002. Olivero et al. (2011b) studied the impact of bank competition on bank lending channel of developing countries in Asia and Latin America from 1996 to 2006. They found that bank market power influences the response of banks to changes in monetary policy. Thus, it can be argued that the non-linear impact of market power on bank lending is conditioned on different regulatory environment. In addition, the threshold points at which the degree of market power will lead to a change in bank lending may differ across different regulatory framework. Yet, earlier studies have not empirically examined the threshold impact of this relationship. In view of that, the current study formulates the following hypothesis:

H_2: *The threshold point of market power is greater in countries with high regulatory policy environment compared with countries in low regulatory policy environment*

Empirically, studies have shown that the linear relationship between market power and banking crisis is conditioned on regulatory policies (Schliephake, 2016; Cao et al, 2021). For instance, Olivero et al. (2011a) found that central banks are able to alter the volume of reserves available to banks through regulatory policy. Olivero et al. (2011b) explained that stringent capital requirements put pressure on banks to maintain higher capital – forcing banks to increase lending rates by shifting the burden to their customers (mostly safe borrowers). This in turn reduces access to funds by clients, while banks lower their lending volume. Thus, banks with greater market power reduce lending capacity in a stringent capital regulatory environment. Schliephake (2016) investigated the role played by bank market power on the trade-off between the creation of a buffer to absorb losses and the rising cost of funding associated with capital regulation. There is evidence that monetary policy rates, market power and the combination of capital and reserve requirements, as well as capital buffer are tools for reducing possible credit crunch (Mishkin, 2011; Ciccarelli, Maddaloni & Peydro, 2015). Thus, policies or regulations interact strongly with other policies including market power to reduce bank lending and enhance banking system stability (Aikman et al., 2019). However, evidence of these interactions is scant in the literature.

Based on this review, it is clear that research on the interaction effect of market power and regulatory policy on bank lending in Africa is still developing. Apart from analyzing the non-linear market power-landing nexus, we also show that this relationship depends on certain thresholds across countries with different regulation policy environments in

Africa. Moreover, given that African countries have made several adjustments in their regulatory policies, the study finds out the linear impact of market power on bank lending when interacted with different regulatory policies. Thus, the study consequently formulates the following hypothesis:

H_3: *The negative impact of market power on bank lending is reduced at increasing levels of regulatory policies*

3. Data and methodology

The study constructs a panel dataset of 52 countries in Africa. The sample covers 13 years from 2006 to 2018, a period spanning different economic conditions, a wave of consolidation, reforms/regulatory framework, and the Great Financial Crisis. Data panel technique reports more convincing and conclusive results than the traditional cross-sectional and time series (Baltagi, 2015; Baltagi & Baltagi, 2008), and it possesses the strengths of both cross-sectional and time series that correct for any weaknesses. It captures both time and entity dimensions that control, and it is able to control for omitted variables (Imbens and Wooldridge, 2009). To ensure that the dataset was not mismatched, the study relied on country-level data due to large number of observations that were missing at the bank level. The selection of variables, countries, and study period is based on data availability at the time of the study. In addition, the estimations use information at country-level data so, some bank-level regressors are not included due to no existence of similar variable as a country-level information. The study utilized the baseline model, which is expressed as:

$$\text{Bank Lending} = \text{f}(\text{Market Power}, \text{Regulatory Policy}, \text{Control variables}) \quad (1)$$

4. Model specification

Following a previous study by Omet (2019), the study applies the seemingly unrelated regression to deal with possible endogeneity between market power and bank lending. Based on the argument in the literature on competitive and lending behavior of banks, the study investigates a non-linear relationship between market power and bank lending. Thus, the study introduces the quadratic term of market power (proxied by the Lerner index into the model).

Following the baseline equation, the study specifies the model as follows:

$$Bank\ Lending_{jt} = \beta_0 + \beta_1 Market\ Power_{jt} + \beta_2 Market\ Power^2{}_{jt} + \sum_{k=3}^{N} \beta_k C_{jt} + \mu_j + \lambda_t + \varepsilon_{jt} \quad (2)$$

where subscript j denotes the cross-sectional dimension (country specifics), $j = 1, \ldots, M$; t denotes the time-series dimension (time), $t = 1, \ldots, T$.

β_0 is a constant term in the model; $\beta_1$represents the coefficient of market power; $\beta_2$represents the coefficient of the squared term of market power; β_k : k = 3, . . . , N,

represent the regression coefficient parameters for vector C to be estimated. C is a vector of control variables that explain bank lending; $\mu_j$is the country-fixed effect and $\lambda_t$is the time-fixed effect; $\varepsilon_{jt}$is an idiosyncratic error term, which controls for unit-specific residual in the model for the j^{th} *bank* at *period t*.

4.1. Measurements

In this section, we discuss measures of bank lending, market power, and the controls. To estimate equation 2, we build a panel dataset that covers the African banking sectors for the period 2006–2018. We use aggregated data for banks at the country-level.

4.1.1. Dependent variable: bank lending

Following Igan et al. (2021), we use bank-level information in order to construct the bank lending at the country level. Annual bank-level data are obtained from the Bankscope database and in order to construct bank lending at the country-level, we aggregate bank-level data using bank total loans and assets. We construct an aggregate banking-sector lending variable that captures bank loans to total asset ratios of a given country. Most works on bank lending employ aggregate bank-level data (Amidu & Wolfe, 2013; Giovanni et al., 2020). The country-level bank lending is an aggregated weighted average of loan-to-total asset ratio of the banks. To ensure that the aggregated index does not paint a misleading outcome due to changes in the composition of the bank-level dataset and accurately represents a country's banking system as opposed to a very small number of banks, we impose two restrictions: (1) the bank sample used for a country should be balanced; and (2) there should be at least 10 banks in a given country in any given year (Igan et al., 2021). Data on bank lending was obtained from the Bank Scope databases. Higher values of loans-to-total asset ratio reflect more (higher) lending of banks. We complement the information at the bank level with macro-level indicators (market power, regulatory policy variables, and macroeconomic indicators) from the Global Financial Development database.

4.1.2. Market power

Market power is measured using the Lerner index for the banks in a country over a given year. This is formularized by Abba P. Lerner in 1934, and it is expressed as:

Lerner index = $(p - mc)/p$ where p represents price, and mc denotes the marginal cost of the firm.

In our case, the index provides a direct measure of the degree of market power and it represents the mark-up of price over marginal costs. The values range between -4.4 and 9.7 from the sample, with higher values indicating greater market power of banks. Data on the Lerner index were obtained from the Global Financial Development database.

4.1.3. Non-linear relationship

In equation 2, the study expects a negative linear relationship between market power and bank lending. This suggests that market power decreases bank lending. This is true

because in a monopolistic market, banks exhibit greater market power, influence prices by raising interest rates in order to reduce default or limit risky lending behavior, and increase margins. Thus, greater market power leads to lower bank lending. However, the study expects a positive relationship between the square term of market power and bank lending. This implies that an additional increase in the level of market power (the squared term) should give banks the power to increase bank lending (especially when banks operate under optimal scale with identical products, market share, perfect knowledge on prices and technology). In general, the study expects a non-linear U-shaped relationship between market power and bank lending. This is because banks that have the ability to exercise some degree of market power reduce bank lending while at greater degree of market power, banks have the incentive to increase lending.

Further, the study computes the turning (inflexion) point or the level to which a higher degree of market power begins to increase lending.

From equation 2, differentiating from first principle:

$$\frac{\partial\ Bank\ Lending_{ij,t}}{\partial\ Market\ Power_{ij,t}} = \beta_1 + 2\beta_2\ Market\ Power_{jt} = 0 \tag{3}$$

where β_1 is the coefficient of the linear term and β_2 is the coefficient of the squared term.

The threshold level of market power is computed from equation 2 since the outcome variable assumes a value of zero at the inflexion point. Above the inflexion point (0), the study assumes that the levels of market power will induce a positive outcome on lending by estimating the net impact (equation 3). The study uses marginal plots to represent the impacts at different levels of market power.

4.2. Controls

The study controls for bank funding (the ratio of total deposits to total asset ratio); credit risk (the ratio of nonperforming to gross loan); bank concentration (the ratio of asset of the three largest commercial banks to total commercial banking assets in a country); foreign bank entry (measured as dummy, 1 = year of foreign bank entry, 0 otherwise), institution (measured as an aggregate of six indicators (the rule of law, government effectiveness, control of corruption, political stability, regulatory quality, and voice and accountability, which were obtained from the World Governance Indicators); exchange rate (natural logarithm of a country's currency rate to the dollar); and gross domestic product (GDP) per capita). Data on these control variables, bank-specific variables and country-level variables, were obtained from Bank Scope and the World Bank Global Financial Development databases, respectively. Bank specific information from the Bank Scope are aggregated at country level.

In terms of the controls, the study expects either a positive or negative relationship between bank funding and bank lending. A positive impact suggests that banks with greater funding sources are able to advance more credit. A negative relationship suggests that banks that look for other investment channels will reduce lending volumes to the public from their deposit funds. The study expects credit risk and lending to be negatively related. This is because higher credit risk exposure of banks forces banks to lower lending. The study expects a negative relationship between bank concentration and

bank lending, as supported by Shehzad et al. (2009). This is because a concentrated banking system tends to lend less due to possible default. The study expects foreign entry and bank lending to be positively associated. This is because foreign bank entry brings innovation that increases competition and leads to greater lending volumes to potential customers. This offers banks the incentive to lower interest rates and supply more loans in order to maximize profits. The study expects a positive relationship between institution and bank lending, as countries with better institution are able to improve lending. Countries with strong macroeconomic fundamentals (i.e. stable exchange rate, high GDP per capita) are more likely to lend more; hence, the study expects positive effects of exchange rate and GDP per capita on bank lending.

4.3. Non-linear relationship in different regulatory environments

Given the importance of regulatory environments, the study examines the threshold effect of market power on bank lending in different regulatory environments. The study splits the sample into banks that operate in different regulatory policy frameworks (i.e. high and low regulatory policy environments) among African economies. Banks that operate strictly below the industry average are classified as those working in a low (loose or weak) regulatory policy environment, while those that operate around the industry average or above are classified as being in a high (tight or strong) regulatory policy environment. The study computes the turning points or threshold levels of market power for the full sample and the split samples after regressing market power and its square term on bank lending.

Description and definition of regulatory policy variables used in the study are discussed in the next section. The study established that the threshold levels at which market power increases bank lending may vary between countries with different regulatory policy frameworks.

On the one hand, when market power of banks is low, it means that banks have increased competition by reducing their mark-ups or (interest rates) and expanding more loans (lending), leading to a negative market power-lending nexus. This may result into risky lending behavior. On the other hand, banks may reduce competition, increase their degree of market power by increasing interest rates (or mark-ups) while controlling the volume of lending. This behavior induces a positive impact of market power on bank lending. This suggests that additional level of bank's market power induces greater bank lending, leading to greater thresholds in the non-linear relationship.

In this case, regulators set up regulations to control the pricing (quantity) policies of banks. Therefore, the study expects relatively higher threshold levels of market power-lending nexus in countries with high regulatory framework compared to those in low regulatory framework. For instance, the study expects higher threshold levels at which market power increases bank lending in regions with tight monetary policy. This is because a tight monetary policy environment instills discipline in the banking system and may require banks to increase their mark-ups (interest rates) and have greater market power while expanding more loans. The study expects that countries with a high capital requirement should have greater thresholds at which market power increases lending compared to those in a low capital requirement environment. This suggests that countries with stringent capital requirements are able to absorb shocks, fight for higher

margins by increasing prices, and may induce higher thresholds for which market power may increase lending. Similarly, countries with high capital in their buffer are able to reduce lending to a certain threshold, but at higher thresholds or inflexion points of market power, bank lending begins to increase. Again, the study expects that countries operating in high minimum reserve requirements may have a larger threshold point at which market power tends to positively affect bank lending.

The study expects the control variables to have similar results as reported earlier.

4.4. Interaction effect of market power and regulatory policy on bank lending

Following the baseline model, the study hypothesizes that regulation policy plays a role in the relationship between market power and bank lending. In this case, the study does not introduce the squared term of market power; rather, it constructs a model that focusses on the interaction effect of market power and each of the regulatory policy variables on bank lending.

To capture possible unobserved heterogeneity and the impact of market power on bank lending when interacted with each regulatory policy variable, the study extends equation (2) to include the interaction terms as follows:

$$\begin{aligned} Bank\ Lending_{jt} = {} & \alpha_1 Market\ Power_{jt} + \sum_{l=2}^{6} \alpha_l Regulatory\ Policy_{jt} \\ & + \sum_{q=1}^{p} \delta_q (Market\ Power_{jt} * Regulation\ Policy_{jt}) + + \sum_{k=1}^{N} \beta_k C_{jt} \\ & + \gamma_j + \mu_t + \lambda_{jt} \end{aligned} \tag{4}$$

where subscript j denotes the cross-sectional dimension (country specifics), $j = 1, \ldots, M$; t denotes the time-series dimension (time), $t = 1, \ldots, T$.

α_1 represents the coefficient of market power.

$\alpha_l : l = 2, \ldots, 6$,represent the regression coefficients of a vector of five regulatory policy indicators; β_k: $k = 1, \ldots, N$, are regression parameters for vector C (exogenous variables) to be estimated; γ_j is the country-fixed effect; μ_t is the time-fixed effect; t; and λ_{jt} is the idiosyncratic error term, which controls for unit-specific residual in the model for the j^{th} *country* at period t.

δ_q : denote the coefficients of the interaction terms between market power and the regulatory policy variables.

In equation 4, the study decomposes regulatory policy into four indicators: (1) Monetary policy is measured by employing monetary policy rates. Data on monetary policy rates were obtained from IMF (International Financial Statistics). Higher values of monetary policy suggest the tightening of the policy or monetary policy contraction; (2) Capital requirement (also the regulatory capital) is the ratio of bank regulatory capital to risk-weighted assets. Data on capital requirement was obtained from the World Bank Global Financial Development Database; (3) Capital buffer is a mandatory counter cyclical capital that financial institutions are required to hold in addition to other minimum capital requirements, as set forth by the Basel III regulatory reforms. Following Saadaoui (2014), the study measures capital buffer as the difference between total capital ratio (Tier 1 and Tier 2) and the minimum

required ratio. The study constructs capital buffer based on data obtained from the World Bank Global Financial Development Database, with higher values indicating high capital buffers; (4) Reserve requirement is a central bank regulation that sets the minimum amount of reserves that must be held by the commercial banks. It is measured as the specified percentage of the amount of deposits held by banks in each country. Data on reserve requirement was obtained from the World Bank Global Financial Development Database. Higher values indicate high reserve requirements for banks in a particular country.

We explain the expectation of the regulatory variables as follows:

4.4.1. Monetary policy

The study expects a negative relationship between monetary policy rates and bank lending. Contractionary monetary policy by the central bank aims to reduce money supply through higher policy rates. High monetary policy rates of lending rate channels directly constrain the ability of banks to make new or excessive loans, making credit less available to borrowers, as supported by Amidu and Wolfe (2013).

4.4.2. Regulatory quality

The study expects either a positive or a negative relationship between regulatory quality and bank lending. A positive relationship suggests that countries with strong regulatory quality may have the structure to monitor clients and expand more credits at lower rates in order to make profits. A negative impact will mean that countries with a strong quality of regulation may reduce their lending capacity by raising interest rates. This is in line with Klomp and de Haan (2014) who found a negative effect of regulation and the quality of institutions on bank risk-taking behavior associated with lending.

4.4.3. Capital requirement

The study expects either a positive or a negative relationship between capital requirement and bank lending. A positive relationship suggests that a well-capitalized bank may have the confidence to lend more. However, in the long run, lending volumes would be reduced as banks try to lower their credit risk exposures. Thus, higher capital requirements would lead to a cut in (excessive) lending to various sectors of the economy (i.e. a negative impact), as banks attempt to reduce their risk exposures. This is evidenced in the work of Bridges et al. (2014) and Klomp and de Haan (2014). Moreover, well-capitalized banks may opt for other investment channels (for example, money or capital market) and lower their customer lending volumes.

4.4.4. Capital buffer

The study expects either a positive or a negative impact of capital buffer on bank lending, as evidenced in Bridges et al. (2014). A positive impact suggests that banks with higher buffer may be more confident in lending. A negative relationship implies that as banks gradually build up their capital buffer, they may channel their funds into less risky investments to avoid shocks associated with excessive lending, thus reducing lending capacity to customers through lower credit risk exposures.

4.4.5. Reserve requirement

The study expects either a positive or a negative relationship between reserve requirement and bank lending. A positive relationship implies that countries that impose a greater minimum reserve requirement may have the capacity to lend more. However, in the long-run, banks would want to reduce the cost of capital, insolvency problems, and credit risk exposure by further reducing lending volumes. Such a situation indicates a negative relationship between reserve requirement and lending volumes. This supports the argument by Bridges et al. (2014) who show that the reserve requirement ratio exerts a negative impact on bank lending.

Next, in equation 4, the study interacts market power with the regulatory variables and then runs the results. Following Asongu and Nwachukwu (2017), the study interprets the results by computing the net effects of the models. According to Asongu and Odhiambo (2019), net impacts are computed from unconditional and marginal effects. This is computed as:

$$\text{Net Effect} = > \frac{\partial\ Bank\ Lending_{j,t}}{\partial\ Market\ Power_{j,t}} = \alpha_1 + \delta_q(Regulation\ Policy_{jt}) \tag{5}$$

where α_1 *and* δ_q are the respective coefficients of market power, and the interaction terms between market power and the regulatory variables. Equation (5) captures the overall or net effect of market power on bank lending when interacted with regulatory policy variables. The study represents them with marginal plots.

To provide meaningful interpretations for policy implications, the study follows the work by Compton and Giedeman (2011) by considering the signs associated with the coefficients of the constitutive terms (unconditional effect), the interaction terms (conditional or marginal effect), and the marginal plots of market power-bank lending nexus at levels of regulatory policy variables.

For instance, a positive net impact of market power when interacted with a regulatory policy (monetary policy, capital requirement, capital buffer, and require reserve) means that a regulatory policy alters the negative impact of market power on bank lending. However, a negative net effect suggests that a regulatory policy magnifies the negative impact of market power on bank lending.

In equation 4, C is a vector of control variables. The study expects similar results of the relationship between the control variables and bank lending, as reported earlier.

4.5. Estimation technique

Following Omet (2019) the model is estimated using the seemingly unrelated regression (SUR) technique. The SUR estimator recognizes the endogeneity of both market power and bank lending in a simultaneous equations framework and unlike ordinary least squares (OLS), it provides consistent estimates (Zellner, 1962). It provides a methodology to estimate systems of equations with endogenous variables. According to Zellner (1962), the SUR method estimates the parameters of all equations simultaneously, so that the parameters of each single equation also take information provided by the other equations. Two variants of the SUR estimation approached used in the study cater for the OLS inconsistencies and solve endogeneity problems based on the

Conditional Mixed Processes (CMP) developed by Roodman (2011). The system is generated in stata to deal with endogeneity problem. It is also a full-information estimation procedure, used in order to estimate all parameters simultaneously and to deal with the correlation problem between the residuals of the two equations, giving more efficient estimates than those obtained using the OLS. The system or method of SUR is more appropriate, since the error terms are assumed to be correlated across the equations. It is generally efficient because it can be generalized into simultaneous equation models, where the right-hand side regressors are allowed to be the endogenous variables as well. For robustness check, we employ and test our results by providing estimations for the Two-Stage Least Square (2SLS), 2SLS Random Effect, and the dynamic system GMM (see Appendix II). Our results, based on the SUR, are robust and produce "a greater efficiency of the parameter estimates, because additional information is used to describe the system while taking into account correlations among the error terms (see Judge et al., 1988; Yahya et al., 2008)". In spite of these elegant properties, the SUR method has (to our knowledge) not yet been used for estimating our prediction models.

Since the estimation strategy involves interaction models (or multiplicative regressions), it is important to engage some pitfalls associated with these types of regressions documented by Brambor *et al*, (2006). Accordingly, all constitutive variables were entered into the specifications. Again, for the estimations to have economic meaning, corresponding estimated parameters from interactive terms were interpreted as conditional marginal impacts.

The robust standard errors of the SUR were used to correct for heteroskedasticity and autocorrelation. The study controls for unobserved heterogeneity in terms of country-specific effects as well as unobserved time-fixed effects. Cross-country differences are considered in the estimation owing to the panel nature of the dataset. The concern about endogeneity is addressed by estimating two simultaneous equations in the SUR procedure. The time invariant omitted variables are employed to control for the unobserved heterogeneity.

5. Empirical results

In this section, the study presents the results from empirical estimations.

5.1. Descriptive statistics and correlation matrix

A look at our key variables as seen in Table 1 shows that the average annual lending is 49.6% to total asset, ranging from 0.8% to 96%. Given an average loan to total asset of 62.19% and 44.56% over the 2006–2018 period in developed economies and developing economies, respectively (Global Financial Development Database), banks in Africa have relatively a low lending volume compared with developed countries. The average market power of banks in our sample is 0.47, ranging from -4.38 to 9.67. This suggests a relatively high degree of market power in Africa compared with an average of 0.23 and 0.31 from developed and developing countries, respectively, over the period, 2006–2018 (Global Financial Development Database).

Table 1. Summary statistics.

Variables	Mean	Std. Dev.	Min	Max	p1	p99	VIF (mean =1.18)
Bank Lending	0.496	0.145	0.008	0.96	.043	.861	-
Lerner	0.474	1.712	-4.383	9.665	-3.696	8.206	5.75
Monetary Policy Rate	0.0854	0.057	0.0233	0.26	.0233	.25	2.12
Capital Requirement	0.1616	0.064	0.011	0.3986	.0182	.35	1.19
Capital Buffer	0.0784	0.0966	-0.0718	0.3661	-.0020	.2967	1.95
Reserve Requirement	0.086	0.060	0.009	0.2750	.01	.275	1.37
Bank Funding	0.752	0.218	0.001	0.752	.008	.97	1.09
Credit Risk	0.0996	0.0744	0.0008	0.453	.238	.373	1.13
Bank Concentration	0.5532	0.2769	0.0028	1	.0147	.9733	1.39
Foreign Bank Entry	0.593	0.491	0	1	0	1	1.14
Institution	-0.483	0.545	-0.853	1.66	-.823	1.608	1.80
Exchange Rate	4.17	2.42	0.09	10.27	.056	9.18	1.58
lnGDP per capita	2.76	4.042	-17.473	24.215	-7.908	17.69	1.21

Bank Lending is customer loans to total asset ratio; **Market Power** is measured with the Lerner Index; **Monetary Policy Rate** is the central bank policy rate of a country; **Capital Requirement** is the **Countercyclical** Capital Requirement which is the ratio of bank regulation capital to risk weighted assets; **Capital Buffer** is measured as the difference between total capital ratio (Tier 1 and Tier 2) and the minimum-required ratio; **Reserve Requirement** is the specified percentage of the amount of deposits held by banks; **Bank Funding** is the ratio of total deposits to total asset ratio; **Credit Risk** is the ratio of nonperforming to gross loan; **Bank Concentration** is the industry asset concentration of banks, measured as the ratio of asset of the three largest commercial natural logarithm of total bank assets; **Foreign Bank Entry** is a dummy variable (1 = year of foreign Bank entry, 0 otherwise); **Institution** is measured as an aggregate of six indicators (rule of law, government effectiveness, control of corruption, political stability, regulatory quality, and voice and accountability; **Exchange rate** is the natural logarithm of a country's currency rate to the dollar; **lnGDP per capita**, is the natural logarithm of GDP per capita.

Monetary policy rates recorded a mean of 8.54%. This suggests that countries in Africa have relatively high monetary policy rates, compared with an average policy rate of 5.44% in developed countries and an average of 6.21% in developing countries over the 2006–2018 period (Wang et al., 2022). The mean of capital requirement is 16.16%, ranging between 1.1% and 39.86%. This suggests a high capital requirement for banks in Africa compared with the averages of 15.90% in developed countries over the period 2006–2018, but lower than the average of 17.97% in developing countries over the same period). Capital buffer recorded an average of 7.84% of capital holdings required by banks. The average capital buffer in Africa is less than the average of 8.5% in developed countries over the 2006–2018 period, but greater than an average of 7.52% in developing countries over the same period. The average reserve requirement is 8.6%, which is relatively higher than for developed countries (an average of 7.5%) over the 2006–2018 period, but lower than the average of 11.33% in developing countries (Global Financial Development database).

In terms of the controls, bank funding recorded a mean of 75.2%, ranging from 0.1 to 97%. Credit risk recorded a mean of 9.96%, ranging from 0.078% to 45.3%. Bank concentration recorded a mean of 55.32%. Foreign bank entry on average was 59% in Africa over the 2006–2018 period. For the macroeconomic indicators, institutions recorded an average of -0.483. Exchange rates in Africa recorded an average rate of 4.171 to the dollar. The log of GDP per capita recorded a mean of 2.76.

In general, it can be deduced from the correlation matrix (Table 2) that multi-collinearity should not be a problem, as indicated by a coefficient less than 0.7 (see Table 2) and confirmed by a 1.18 VIF that is below the threshold of 10 (see Table 1).

Table 2. Pairwise correlations.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Lerner	1.000												
	(0.000)												
(2) Monetary Policy rate	0.089	1.000											
	(0.000)												
(3) Capital Requirement	-0.037	0.099	1.000										
	(0.038)	(0.000)											
(4) Capital Buffer	0.133	0.339	0.129	1.000									
	(0.000)	(0.000)	(0.000)										
(5) Reserve Requirement	0.044	-0.087	-0.041	-0.159	1.000								
	(0.005)	(0.000)	(0.004)	(0.000)									
(6) Bank Funding	-0.040	0.040	-0.084	0.023	0.095	1.000							
	(0.044)	(0.009)	(0.000)	(0.129)	(0.000)								
(7) Credit Risk	0.215	-0.077	0.010	-0.061	0.084	-0.106	1.000						
	(0.000)	(0.000)	(0.510)	(0.000)	(0.000)	(0.000)							
(8) Bank Concentration	0.096	-0.043	-0.069	-0.220	0.071	-0.037	0.061	1.000					
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.028)	(0.000)						
(9) Foreign Bank Entry	-0.067	0.037	0.017	0.098	-0.037	-0.059	-0.005	-0.025	1.000				
	(0.000)	(0.002)	(0.236)	(0.000)	(0.002)	(0.000)	(0.753)	(0.061)					
(10) Institution	0.073	0.098	0.008	0.147	0.379	-0.050	0.184	0.051	-0.048	1.000			
	(0.000)	(0.000)	(0.582)	(0.000)	(0.000)	(0.002)	(0.000)	(0.030)	(0.000)				
(11) Exchange Rate	-0.057	-0.213	0.006	-0.057	-0.028	0.078	0.139	0.090	-0.113	-0.249	1.000		
	(0.000)	(0.000)	(0.676)	(0.000)	(0.024)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			
(12) GDP per capita	-0.016	0.106	-0.035	0.059	0.094	0.070	0.047	-0.153	0.078	-0.169	0.249	1.000	
	(0.319)	(0.000)	(0.021)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)		
(13) Trend	0.043	-0.002	0.023	-0.054	0.030	0.066	-0.136	-0.034	-0.730	0.061	0.066	-0.045	1.000
	(0.006)	(0.890)	(0.117)	(0.000)	(0.012)	(0.000)	(0.000)	(0.010)	(0.000)	(0.000)	(0.000)	(0.000)	

Bank Lending is customer loans to total asset ratio; **Market Power** is measured with the Lerner Index; **Monetary Policy Rate** is the central bank policy rate of a country; **Capital Requirement** is the **Countercyclical** Capital Requirement which is the ratio of bank regulation capital to risk weighted assets; **Capital Buffer** is measured as the difference between total capital ratio (Tier 1 and Tier 2) and the minimum required ratio; **Reserve Requirement** is the specified percentage of the amount of deposits held by banks; **Bank Funding** is the ratio of total deposits to total asset ratio; **Credit Risk** is the ratio of nonperforming to gross loan; **Bank Concentration** is the industry asset concentration of banks, measured as the ratio of assets of the three largest commercial natural logarithm of total bank assets; **Foreign Bank Entry** is a dummy variable (1 = year of foreign Bank entry, 0 otherwise); **Institution** is measured as an aggregate of six indicators (rule of law, government effectiveness, control of corruption, political stability, regulatory quality, and voice and accountability; **Exchange rate** is the natural logarithm of a country's currency rate to the dollar; **GDP per capita**, is the natural logarithm of GDP per capital. P-value in parenthesis.

***p<0.01, **p<0.05, *p<0.1(level of significance in parenthesis).

5.2. Effect of market power and regulatory policy on bank lending

The study relies on the SUR because it generates consistent, efficient, and robust results after conducting estimations for the 2SLS and the dynamic system GMM (see Appendix II). First, the results from Table 3 show the non-linear effect of market power on bank lending. In model 1, there is a negative and significant relationship between market power and bank lending (consistent across the models). This supports earlier findings of a negative market power-lending nexus through concentration channels (see Färe et al., 2015; Allen & Gale, 2000). They explained that a concentrated banking system offers banks a greater market power to reduce bank

Table 3. Relationship between market power and bank lending in countries with different regulatory policy environment.

PANEL A	Impact of Market Power Full Sample	Tight Monetary Policy Rate	Loose Monetary Policy Rate	High Capital Requirement	Low Capital Requirement
VARIABLES	Model 1	Model 2	Model 3	Model 4	Model 5
Lerner	-1.512***	-1.165**	-7.437***	-2.173***	-.929*
	(.342)	(.484)	(1.006)	(.458)	(.509)
Lerner2	.155***	.143**	3.904***	.224***	.168*
	(.0497)	(.0621)	(1.335)	(.0646)	(.0927)
Bank Funding	-11.42**	.172*	-18.70**	-6.032***	-12.60**
	(4.758)	(.103)	(7.892)	(2.160)	(5.469)
Credit Risk	-.685***	-.0515***	-.102***	-.0520***	-.763***
	(.145)	(.0008)	(.0192)	(.0069)	(.0437)
Bank Concentration	-.0364***	.0864***	-.132***	-.114***	-.252***
	(.0053)	(.0002)	(.0077)	(.0027)	(.0191)
Foreign Bank Entry	28.61***	.673***	-27.74***	-5.907***	-15.28***
	(3.919)	(.0784)	(4.287)	(1.232)	(4.291)
Institution	5.620*	-1.917***	-29.75***	4.382***	-22.93***
	(3.285)	(.544)	(5.973)	(1.008)	(3.877)
Exchange Rate	-.0397***	.0817***	-.0292***	.0019***	-.0314***
	(.0009)	(.0016)	(.0011)	(.0006)	(.0011)
GDP per capita	1.539***	.0327***	4.132***	1.679***	2.218***
	(.432)	(.0096)	(.763)	(.216)	(.487)
Trend (Year dummies)	-1.338**	.431**	.378	.477	.690***
	(.588)	(.189)	(.245)	(.319)	(.244)
GFC2007/2008	-.0095	.0083	.0072	.0072	-.0129
	(.0079)	(.0096)	(.0065)	(.0065)	(.0086)
Constant	64.16***	3.215***	53.46***	12.17***	38.58***
	(7.568)	(.211)	(7.403)	(2.048)	(7.176)
Country Effect	Yes	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes	Yes
Threshold Level $Marketpower = \frac{\beta_1}{2\beta_2}$	4.88	4.07	.95	4.85	2.77
Observations	676	494	189	373	303
R-squared	.657	.998	.635	.873	.818
p-value	.00	.00	.00	.00	.00

This Table shows the non-linear relationship between market power and bank lending (model 1) and also the non-linear relationship across different monetary policy and capital requirement. **Bank Lending** is customer loans to total asset ratio; **Market Power** is measured with the Lerner Index; Bank Funding is the ratio of total deposits to total asset ratio; Credit Risk is the ratio of nonperforming to gross loan; **Bank Concentration** is the industry asset concentration of banks, measured as the ratio of assets of the three largest commercial natural logarithm of total bank assets; **Foreign Bank Entry** is a dummy variable (1 = year of foreign Bank entry, 0 otherwise); **Institution** is measured as an aggregate of six indicators (rule of law, government effectiveness, control of corruption, political stability, regulatory quality, and voice and accountability; **Exchange rate** is the natural logarithm of a country's currency rate to the dollar; **GDP per capita**, is the natural logarithm of GDP per capital.

Standard errors in parentheses, ***p<.01, **p<.05, *p<.1.

lending. The implication is that market power decreases lending in an imperfect competitive banking system. This is because market power offers banks the incentive (monopoly power or monopolistic behavior) to increase mark-ups (profits) and reduce marginal costs (risk of default) through higher lending rates, leading to lower credit supply. Hence, the negative relationship between market power and bank lending. However, the squared term of market power was positively and significantly linked to bank lending in model 1 and consistent across the models (2–9). This suggests that additional increase in market power leads to higher bank lending. This is due to the fact that excess demand in the market forces banks to supply more and charge more in order to maximize profits. Again, in a monopolistic banking environment, banks may determine their price and quantity of their products. Thus, banks with additional level of market power may charge high loan rates and supply more by selecting clients that benefit them the most. Similarly, a monopoly bank may determine the price and quantity and make profit. This explains why greater degree of market power induces higher lending of banks.

In general, the study finds evidence to support a non-linear market power-lending nexus. This non-linear argument supports the concept of a U-shaped relationship (Moen et al., 2019) between market power and bank lending. Thus, a bank with initial level of market power reduces lending but higher levels of market power tend to increase lending behavior of banks in order to create a more stable banking system.

5.2.1. Threshold levels of market power response to bank lending

The study explains that although market power decreases lending, the impact begins to increase bank lending at a certain threshold or inflexion point. From these results, the convex relationship between the degree of market power and bank lending gives the implication that banks must evaluate the appreciable level of market power at which lending capacity can be increased.

The study therefore computes the threshold as follows:

From model 1 (Table 3), the threshold level is 4.88. When values of bank lending (at the inflexion point of zero) are assumed, the study computes the thresholds as follows:

Bank lending = (-1.512) Lerner + (0.155) Lerner^2.
Differentiating at first-order condition becomes:
Bank lending = -1.512 + [(2*0.155)] Lerner = 0

Bank lending, at its threshold (inflexion) point, is zero (0). Thus, when bank lending is 0, Lerner is 4.88, which falls in the range of -4.38 to 9.67 (summary statistics). Therefore, bank lending increases beyond 4.88 degree of market power.

In terms of the controls, the study found similar results as presented in Table I above. We do not report on the results because of space.

5.2.2. Impact of market power at threshold levels in different regulatory environment

Given that the regulator sets policies to control the market structure (competitive pricing (output)) of banks, the study shows different thresholds beyond which the impact of market power on lending changes. The study hypothesized that the

threshold level at which market power increases lending varies across different regulatory environments, as explained earlier. The study splits the data into low regulatory policy environments and high regulatory policy environments, then computes the thresholds of market power at which lending changes in different regulatory environments (see models 2–9).

In order for the established thresholds and net impacts of market power to make economic sense and have policy relevance, they should be within the statistical range (minimum and maximum) of market power as disclosed in the summary statistics. For instance, in Table 3 (model 2), the threshold of market power is 4.07 ([-1.165/(2*0.143)]) in countries with tight monetary policy environments. In the computation, the inflexion point occurs when bank lending takes the value of zero (0). In model 3, the threshold of market power is 0.95 ([-7.44/(2*3.90)]) in countries with loose monetary policy. The estimated thresholds fall between the -4.38 and 9.67 range of market power. Thus, the threshold levels at which market power leads to more lending are higher in countries with tight monetary policy than those with loose monetary policy. This implies that countries with high monetary policy are able to influence more lending rates. It translates into greater market power and provides an incentive for banks to make profits, reduce marginal costs, and thereby make adjustments to their lending capacity. Thus, banks in tight monetary policy environments require greater threshold levels of market power to induce more bank lending. Similarly, in an imperfect competitive environment, banks with greater market power may leverage close lending relationships with their borrowers. Thus, tightening monetary policy suggests that banks require relatively high threshold levels of market power to shift higher loan rates to safe borrowers or clients while maintaining more loan supply compared with loose monetary policy regions.

In Table 3, models 4 and 5, the thresholds of market power show that countries with higher capital requirements have higher threshold levels of market power than those with lower capital requirements. Stringent capital requirements force banks to fund a substantial amount of their investments with equity and retained earnings. This may come with higher costs while creating a buffer against losses. These higher costs are passed through an increased lending rates as the banks shift the burden to their customers. Higher interest rates offer banks greater market power in a tighter capital requirement environment. This accounts for the relatively higher thresholds of market power required to increase lending in countries with high capital requirements.

In the same vein, banks in countries with high required reserve operate in relatively higher thresholds of market power than countries in low required reserve (see Table 4, models 8 and 9). This suggests that countries that enforce higher reserve requirements (of bank deposits) put pressure on banks to raise funds. This translates into increasing their interest charges to gain greater market power and improve their margins. In an imperfect banking market, banks require relatively high threshold of market power to offer lending support to their clients in countries with high required reserve than those with low required reserve.

Figures 1 (1.1, 1.2, 1.3, and 1.4) show the threshold points at which market power begins to increase bank lending. It is apparent that the thresholds of bank market power in countries with high regulatory policies are relatively higher compared with countries in low regulatory policy environments.

Table 4. Relationship between market power and bank lending in countries with different regulatory policy environment.

PANEL B	High Capital Buffer	Low Capital Buffer	High Reserve Requirement	Low Reserve Requirement
VARIABLES	Model 6	Model 7	Model 8	Model 9
Lerner	-1.907***	1.083	**-2.985*** **	**-0.653***
	(.450)	(.721)	**(0.551)**	**(0.375)**
Lerner2	.172***	-1.716**	**0.398** **	**0.0919***
	(.0637)	(.773)	**(0.181)**	**(0.0524)**
Bank Funding	2.049	4.328	-10.25*	0.572
	(4.396)	(3.166)	(5.455)	(0.767)
Credit Risk	-.267***	-.0816***	-0.131***	-0.0426***
	(.0173)	(.0133)	(0.0194)	(0.0032)
Bank Concentration	.0117*	-.105***	-0.0635***	-0.0753***
	(.0067)	(.0043)	(0.0079)	(0.0015)
Foreign Bank Entry	-.597	-2.978	-9.865***	-0.928*
	(2.922)	(2.315)	(3.646)	(0.479)
Institution	-4.599***	-24.61***	-14.48***	-8.881
	(1.044)	(6.508)	(2.635)	(5.344)
Exchange Rate	-.0299***	.0009	-0.0299***	0.003***
	(.0008)	(.001)	(0.0011)	(0.0002)
GDP per capita	1.937***	1.760***	2.426***	0.680***
	(.390)	(.372)	(0.518)	(0.0787)
Trend	.304	.346*	0.582*	0.110
	(.341)	(.185)	(0.317)	(0.206)
GFC2007/2008	.0012	.0025	-0.0042	1.42e-05
	(.0111)	(.0110)	(0.0104)	(0.0111)
Constant	33.53***	-7.905**	42.78***	16.35***
	(4.724)	(3.645)	(6.072)	(0.813)
Country Effect	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes
Threshold Level	5.55	na	**3.75**	**3.55**
$Marketpower = \frac{\beta_1}{2\beta_2}$				
Observations	391	285	381	295
R-squared	.703	.889	0.529	0.995
p-value	.00	.00	0.00	0.00

Table 4 shows the non-linear relationship between market power and bank lending across different capital buffer and required reserve regulatory environments. See Appendix I for description of variables.
Standard errors in parentheses.
***p<0.01, **p<0.05, *p<0.1.

5.3. Interaction effects

The study has shown that market power has a direct negative impact on bank lending without the squared term (see model 12 in Table 5). Prior to analyzing the interaction effects, the study investigates the direct effect of each regulatory policy on bank lending (see model 10).

From Table 5 (model 10), all the regulatory policy indicators are negatively and significantly linked to bank lending. This implies that regulatory policy variables directly affect bank lending. This can be explained that tight monetary policy (Borio & Gambacorta, 2017), stringency of capital requirement (Capgemini Financial Services Analysis, 2014), capital buffer, and required reserve (Capgemini Financial Services Analysis, 2014; Saadaoui, 2014) force banks to find ways to meet higher regulatory policy framework by raising their mark-ups (interest rates), increasing their market power, and simultaneously lowering their lending capacity.

Figure 1.1: Thresholds of Market Power in Loose and Tight Monetary Policy Regions

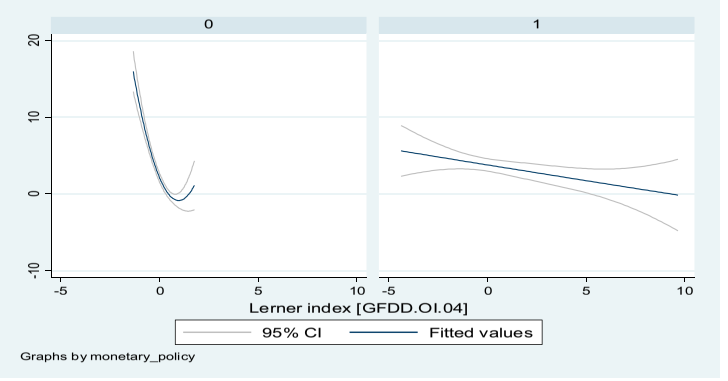

Figure 1.2: Thresholds of Market Power in Countries with Low and High Capital Requirement

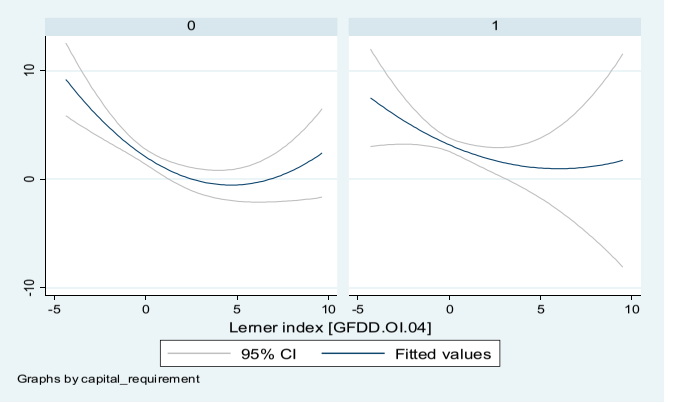

Figure 1.3: Thresholds of Market Power in Countries with Low and High Capital Buffer

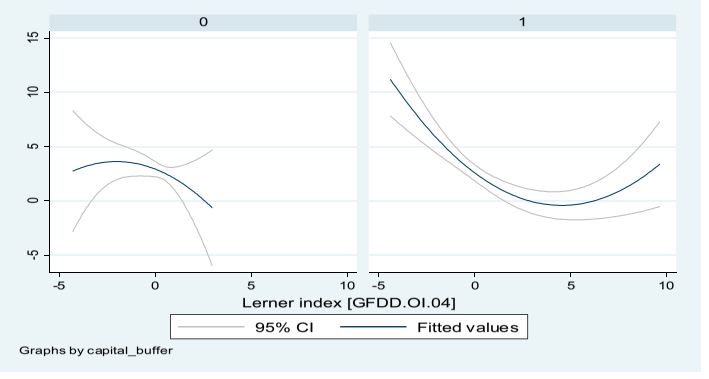

Figure 1.4: Thresholds of Market Power in Countries with Low and High Minimum Reserve Requirement

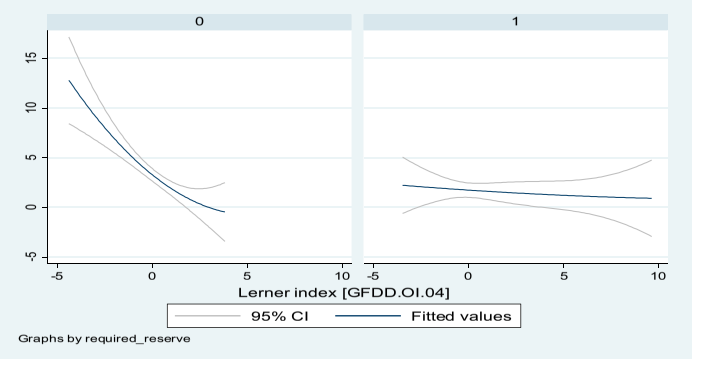

Figure 1. Thresholds of market power at different regulatory policy environment. Lending is on the y-axis; Lerner index is on the x-axis of all the graphs. The graph on the left shows countries in low regulatory policy environments (loose monetary policy, low capital requirement, low capital buffer, and low minimum reserve requirement), which is a dummy equal to 0, when values of policy variables are strictly below the average; and the graph on the right shows countries in strong regulatory policy environments (tight monetary policy, high capital requirement, high capital buffer, and high minimum reserve requirement) minimum reserve requirement, which is a dummy equal to 1, when values of policy variable equal the average or above the average.

Table 5. Effect of market power and regulatory policies on bank lending.

Variables	Model 10	Model 11	Model 12	Model 13	Model 14
Lerner	**-1.918*** (0.425)**	**-5.564*** (0.897)**	**-3.616*** (0.748)**	**-3.511*** (0.499)**	**-3.660*** (0.756)**
Monetary Policy Rate	**-0.0573*** (0.0141)**	**-0.0473*** (0.0104)**			
Regulatory Quality	-2.936** (1.259)				
Capital Requirement	-0.515*** (0.0362)		**-2.662*** (0.346)**		
Capital Buffer	-0.290*** (0.0282)			**-0.496*** (0.0245)**	
Reserve Requirement	**-0.479*** (0.0820)**				**-0.352*** (0.0788)**
Lerner*Monetary Policy Rate		**-0.675*** (0.158)**			
Lerner*Capital Requirement			**-1.910*** (0.428)**		
Lerner*Capital Buffer				**-0.403*** (0.0491)**	
Lerner*Reserve Requirement					**-0.166*** (0.0369)**
Bank Funding	-12.80*** (3.746)	-4.015 (4.611)	-15.16*** (4.155)	-4.619 (3.911)	-8.708* (4.848)
Credit Risk	0.159*** (0.0215)	-0.113*** (0.0149)	-0.368*** (0.0180)	-0.0365** (0.0152)	-0.0555*** (0.0159)
Bank Concentration	-0.116*** (0.0088)	-0.0808*** (0.0062)	-0.179*** (0.0075)	-0.0356*** (0.0057)	-0.0547*** (0.0063)
Foreign Bank Entry	-6.219** (2.427)	-20.07*** (2.896)	-0.210 (2.582)	-4.507* (2.499)	-11.47*** (2.999)
Institution	21.08*** (7.570)	6.386* (3.298)	17.13*** (5.803)	4.950 (3.283)	5.108 (3.333)
Exchange Rate	-0.0179*** (0.0008)	-0.0261*** (0.0009)	-0.0200*** (0.0008)	-0.0248*** (0.0007)	-0.0240*** (0.0009)
GDP per capita	3.115*** (0.355)	2.837*** (0.423)	3.810*** (0.381)	3.349*** (0.365)	2.190*** (0.451)
Trend	52.34*** (4.455)	0.284 (0.191)	0.206 (0.211)	0.330* (0.189)	0.324* (0.189)
GFC2007/2008	0.00571 (0.01)	0.0039 (0.0096)	0.0118 (0.0095)	-0.001 (0.0096)	3.81e-05 (0.0095)
Constant	0.495** (0.232)	39.80*** (4.736)	31.09*** (4.273)	34.58*** (4.151)	17.36*** (5.702)
Country Effect	Yes	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes	Yes
Net Effect					
$\alpha_1 + \delta_q Regulation\ Policy_{jt}$		**-5.62***1**	**-3.92***2**	**-3.54***3**	**-3.67***4**
Observation	676	676	676	676	676
R-squared	0.754	0.596	0.673	0.692	0.539
p-value	0.00	0.00	0.00	0.00	0.00

Table 5 shows the direct impact of market power and regulation on bank lending. It also shows the interaction effect of market power and regulatory policy on bank lending. See Appendix I below for description of variables.
Standard errors in parentheses.
***p<0.01, **p<0.05, *p<0.1.
[1]Net Effect: Monetary Policy = -5.62 [-5.564–0.675(0.0854)]
[2]Net Effect: Capital Requirement = -3.92 [-3.616–1.910(0.1616)]
[3]Net Effect: Capital Buffer = -3.54 [-3.511–0.403(0.0784)]
[4]Net Effect: Reserve Requirement = -3.67 [-3.660–0.166(0.086)]

Next, market power is interacted with each of the regulatory policy variables and the model is rerun. It is clear that market power reduces banks' lending. Given that regulators enact policies to control price (output) policies of banks, the study interacts market power with different regulatory sets to understand their joint effect on bank lending.

Following the contemporary literature on interaction regressions (Brambor, 2006; Compton & Giedeman, 2011, Agoba, Abor, Osei & Sa-Aadu, 2020; Asongu & Odhiambo, 2019c, 2019d), marginal effects are computed. These constitute the conditional effects of market power on bank lending.

As was found in model 10, generally, the coefficient of market power is negative and significant (i.e. the unconditional effect). The study finds a negative coefficient between the interaction of market power and monetary policy (see model 11). Thus, the conditional effect of market power on bank lending is negative and significant when interacted with monetary policy (see the interaction term between Lerner and monetary policy rate). The negative conditional impact is less negative relative to the unconditional impact. This suggests that the negative impact of market power on bank lending is reduced when interacted with monetary policy.

From the marginal plot (Figure 2 (2.1)), market power decreases bank lending, but the impact is reduced at higher levels of monetary policy rates. Tight monetary policy translates into higher lending rates, which offer banks greater market power and, consequently, a greater ability to hedge against loan losses. As a result, they would probably cut down their lending. Therefore, tight monetary policy induces a less negative impact of market power on bank lending.

In model 12, the conditional effect of market power on bank lending is negative and significant when interacted with capital requirement but it is less negative compared to the unconditional impact. This suggests that capital requirement tames the negative impact of market power on bank lending. From Figure 2 (2.2), the negative impact of market power on bank lending is reduced when capital requirement increases. Capital requirement is one of the strongest tools for controlling banks' risky lending behavior and competitive pricing behavior. Banks maintain more capital in a stringent capital requirement, and this gives them the incentive to tame the negative relationship between market power and bank lending. Further, banks conserve more capital in a stringent environment by increasing interest rates and reducing lending volumes in order to yield more mark-ups or profits. This implies that banks with stringent capital requirements are more likely to induce a less negative impact of market power on bank lending compared to those with low capital requirements.

Similarly, the negative conditional effect of market power in model 13 suggests that capital buffer reduces the negative effect of market power on bank lending. Figure 2 (2.3) shows that market power reduces bank lending but the reductive effect is tamed when the capital buffer of banks increases (Figure 2 (2.3)). This implies that banks that have more capital to maintain in their buffer are more likely to induce a less negative impact of market power on bank lending. Thus, the downward marginal slope in Figure 2 (2.3) shows that market power reduces bank lending slowly when capital buffer increases.

Again, market power reduces bank lending but the impact is reduced at higher levels of reserve requirement (Figure 2 (2.4)). The negative conditional impact of market power in model 13 suggests that banks that keep a higher proportion of deposits in their reserves tame the negative relationship between market power and bank lending. This is true because stringent reserve requirement gives banks the power to increase their mark-ups or prices and gradually reduce lending behavior. Hence, the negative impact of market power on bank lending is reduced when reserve requirements increase.

Figure 2.1: Marginal Effect at Levels of Monetary Policy Rates

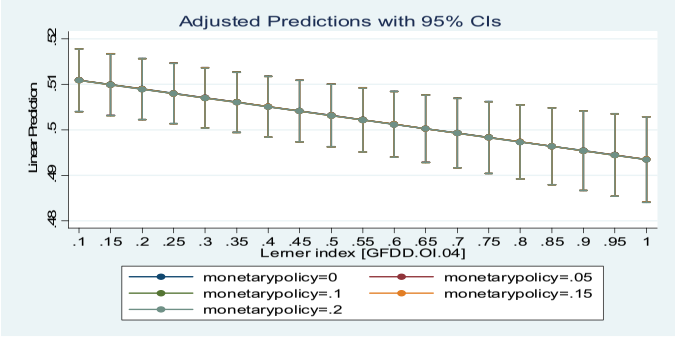

Figure 2.2: Marginal Effect at Levels of Capital Requirement

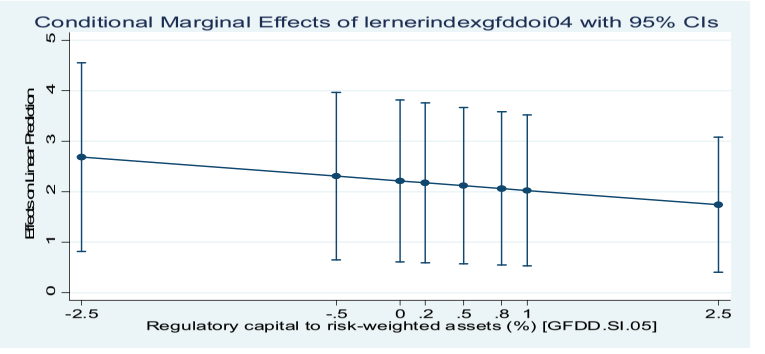

Figure 2.3: Marginal Effect at Levels of Capital Buffer

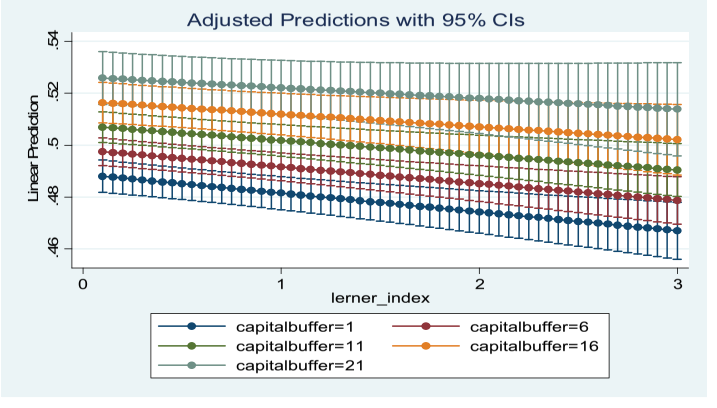

Figure 2.4: Marginal Effect at Levels of Reserve Requirement

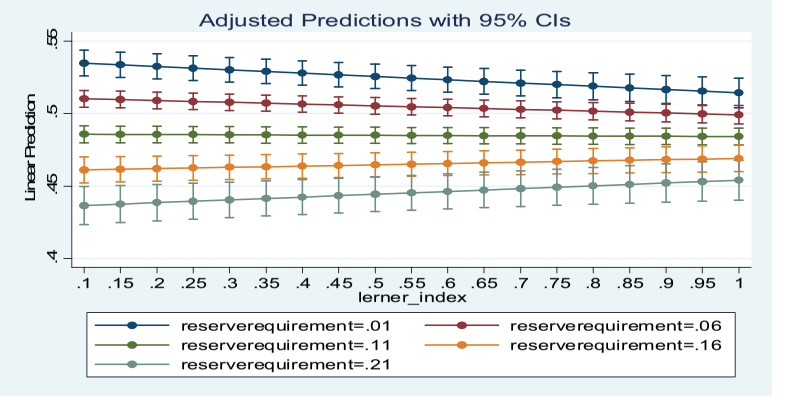

Figure 2. Marginal plots of impact of market power on bank lending at levels of regulatory policy variables. Lending is on the y-axis; Lerner index is on the x-axis of all the graphs, while the slopes show the impact of market power on lending at levels of the different regulatory framework

In general, the implication is that regulatory policies (monetary policy, capital requirement, capital buffer, and reserve requirement) should complement market power or competitive pricing decision in taming the negative effect of market power on bank lending.

6. Conclusion and implication

The study examines how regulatory policy variables modulate the effect of market power on bank lending. First, the study observed a U-shaped relationship between market power and bank lending. Market power was negatively linked to lending, while higher levels of market power positively influence market power. This shows that initial levels of market power reduce bank lending but additional levels of market power induce a positive impact on bank lending. The implication is that banks should be able to provide a competitive pricing policy that helps them to determine the appreciable level of market power that yield an optimal lending behavior. In the light of the non-linear relationship between market power and bank lending, the study estimated the thresholds at which an additional increase in market power would increase the level of bank lending. Accordingly, thresholds are points where the net effects are zero, and from there, further increasing market power endangers the negative effect of market power on bank lending. The study also provided threshold levels of the relationships between market power and lending in different regulatory environments. Higher threshold levels imply that banks with greater market power raise their mark-ups or prices (interest rates), while they simultaneously increase lending to maximize profits.

From the results, 4.88 is the market power threshold, and thresholds between 0.95 and 5.55 of market power are required to start having a positive effect on bank lending across different regulatory environments. Although the computed thresholds fall within the range (-4.38 and 9.67) of market power, we observe that the thresholds of market power at which bank lending increases in countries with high regulatory policy environments are relatively greater than countries operating in low regulatory policy environments. The implication is that banks in countries with low regulatory regimes should strengthen their regulatory policies in order to provide an optimal threshold for the relationship between market power and bank lending.

In light of the above, the study established that regulatory policy has a significant role to play in the relationship between market power and bank lending. The study found that monetary policy, capital requirement, capital buffer, and reserve requirement are key regulatory determinants of bank lending. The study interacted market power with each of the regulatory policies and showed how they jointly impact bank lending. The study provided evidence that the negative impact of market power on bank lending is reduced when interacted with monetary policy rates, capital requirement, capital buffer, and reserve requirement.

The policy implication is that regulatory policy framework (monetary policy rates, capital requirement, capital buffer, and reserve requirement) should complement market power in yielding an optimal relationship between market power and bank lending.

The regulator and the managers of banks should implement reforms that foster optimal lending behavior through the right mix of coordinated pricing and regulatory

policy framework. Moreover, countries in low regulatory policy regimes (particularly countries operating in loose monetary policy, capital requirement, capital buffer, and reserve requirement) should strengthen these regulatory policies in order to offer prudent competitive pricing of their market structure and optimal lending volumes that would improve the banking system.

6.1. Limitation and future recommendation

Acquiring data from 2018 to 2022 was very difficult because it was not available publicly as a secondary source at the time of the research. Though, bank-level data could provide a robust estimation, acquiring bank-level information were difficult for a study in this nature. Hence, future studies should consider alternative estimation techniques and explore bank-level data and models that make room for large sample observations in this nature. The study could not report results that isolated years before and after the global financial crisis due to space. In addition, the study is limited to Africa due to the availability of data. Therefore, future studies should extend the data to include different regions in developing and developed context and observe the non-linear interrelationship between market power, regulation, and bank lending.

Further, the empirical framework presented in the study does not allow to interpret the estimates as causal effects. Future studies should employ models that can allow the estimates to be interpreted as causal effects. Future research is required to explore this study to other regions in the world to reveal how applicable this model fits the other part of the world. Some other moderators of policy variables should also be tested in this context to ensure their role in the market power-lending nexus.

Disclosure statement

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Data availability statement

The data that supports the findings of these studies are available from the corresponding author upon request. The data is publicly available, and the arrangement of the datasets used and/or analysed during the current study is also available from the corresponding author upon request.

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Country Name	Bank lending	gdppcg	exrate ($)	Regulatory Quality: Estimate [RQ.EST]	Monetary Policy-Related Interest rate	Credit risk	Regulatory capital to risk-weighted assets (%) [GFDD.SI.05]	Required Reserve	capbuffer	Lerner index [GFDD.OI.04]	Foreign Entry	5-bank asset concentration [GFDD.OI.06]	Bank funding	Institutions
ALGERIA	0.572	1.075	76.294	-6.291	2.981	7.942	22.184	0.080	7.562	-0.374	0.615	-10.663	0.655	-0.843
Angola	0.495	2.943	1544.998	-3.662	8.080	10.178	15.480	0.089	7.044	0.336	0.574	-8.534	0.799	-0.477
BENIN	0.572	1.673	489.020	-0.917	2.906	3.102		0.150	-.150	0.416	0.615	92.854	0.870	-0.273
BOTSWANA	0.557	3.151	488.209	-0.983	2.906	5.627	8.382	0.050	1.562	0.481	0.615	104.025	0.885	0.675
BURKINA FASO	0.553	1.966	488.209	-1.227	2.981	2.077	8.382	0.080	1.149	-0.911	0.615	101.696	0.861	-0.368
Burundi	0.492	3.010	1597.452	-3.568	8.262	10.261	15.200	0.089	7.025	0.363	0.572	-8.458	0.804	-0.463
Cabo Verde	0.490	3.058	1637.039	-3.662	8.453	10.526	15.200	0.087	7.282	0.361	0.571	-12.076	0.802	-0.470
CAMEROON	0.447	3.066	488.209	-1.731	2.835	0.456	8.333	0.118	13.336	-2.536	0.615	122.652	0.841	-0.931
Central African Republic	0.487	3.055	1678.068	-3.758	8.651	10.707	15.473	0.088	7.486	0.356	0.569	-16.223	0.799	-0.512
Chad	0.485	3.093	1720.563	-3.848	8.854	11.027	15.757	0.089	7.391	0.403	0.567	-20.434	0.796	-0.518
Comoros	0.486	3.094	1764.576	-3.924	9.069	11.418	16.054	0.088	7.178	0.512	0.566	-25.545	0.795	-0.502
Congo, Dem. Rep.	0.483	3.152	1821.939	-3.908	9.289	11.743	16.114	0.089	6.893	0.533	0.564	-30.117	0.792	-0.485
Congo, Rep.	0.486	3.143	1886.644	-3.614	9.066	11.744	16.170	0.088	6.828	0.403	0.562	-34.321	0.792	-0.476
COTE D'IVOIRE	0.576	1.487	158.413	-4.361	2.910	2.641	14.548	0.048	15.171	-0.061	0.615	102.471	0.867	-0.964
Djibouti	0.490	2.989	1953.423	-3.598	9.286	11.716	16.170	0.086	7.077	0.472	0.560	-31.765	0.793	-0.459
Egypt	0.390	3.394	10.189	-12.162	15.519	11.735	14.720	0.106	8.720	4.052	0.615	87.617	0.809	-0.740
Equatorial Guinea	0.489	2.846	2023.124	-3.677	8.994	11.682	16.170	0.086	6.868	0.427	0.558	-20.010	0.793	-0.478
Eritrea	0.489	2.881	2089.395	-3.714	8.973	11.862	16.041	0.087	6.802	0.450	0.556	-13.604	0.792	-0.471
Eswatini	0.489	2.904	2160.385	-3.809	8.591	12.034	16.093	0.089	6.772	0.458	0.554	-16.353	0.793	-0.475
ETHIOPIA	0.371	7.447	16.838	-4.058	2.910	12.500		0.150	-.150	-1.461	0.615	-105.911	0.754	-0.942
Ethiopia	0.489	2.925	2237.220	-3.920	8.786	12.169	16.147	0.089	6.494	0.472	0.552	-20.943	0.791	-0.471
Gabon	0.490	2.945	2311.728	-4.022	8.871	12.072	16.019	0.089	6.680	0.488	0.550	-7.773	0.788	-0.500
Gambia	0.485	3.071	2392.522	-4.069	9.084	12.282	16.163	0.091	6.918	0.512	0.548	5.224	0.794	-0.507

(*Continued*)

(Continued).

Country Name	Bank lending	gdppcg	exrate ($)	Regulatory Quality: Estimate [RQ.EST]	Monetary Policy-Related Interest rate	Credit risk	Regulatory capital to risk-weighted assets (%) [GFDD.SI.05]	Required Reserve	capbuffer	Lerner index [GFDD.OI.04]	Foreign Entry	5-bank asset concentration [GFDD.OI.06]	Bank funding	Institutions
Ghana	0.514	6.992	1.809	-1.375	17.451	12.623		0.095	12.928	1.671	0.615	-360.891	0.802	0.060
Guinea Bissau	0.483	3.206	2566.352	-3.891	8.958	11.906	16.219	0.088	7.396	0.506	0.543	4.952	0.793	-0.529
KENYA	0.507	1.886	167.540	-2.655	9.596	6.836	19.632	0.051	8.720	-0.196	0.615	-199.367	0.827	-0.653
Lesotho	0.482	3.202	2605.116	-3.171	8.887	11.976	16.248	0.082	7.642	0.500	0.540	4.957	0.790	-0.508
Liberia	0.482	3.094	2478.643	-2.634	8.954	12.106	16.039	0.083	7.904	0.492	0.537	3.881	0.792	-0.517
Libya	0.482	2.923	2051.170	-2.833	9.169	11.869	16.055	0.084	8.188	0.492	0.543	2.711	0.792	-0.528
Madagascar	0.481	2.827	1867.588	-3.027	8.899	11.682	15.440	0.086	8.260	0.499	0.544	2.137	0.790	-0.521
MALAWI	0.483	2.243	101.655	-1.039	19.654	7.193	14.639	0.049	7.635	0.258	0.615	63.350	0.745	-0.365
MALI	0.483	2.290	9.024	-0.698	3.147	8.403	14.639	0.075	14.561	0.058	0.611	112.167	0.866	-0.580
Mauritania	0.479	2.798	1751.493	-3.142	8.964	11.846	15.479	0.088	8.260	0.504	0.542	4.265	0.791	-0.550
MAURITIUS	0.478	2.374	150.973	-1.069	6.394	14.772	19.599	0.092	1.295	0.040	0.615	-389.695	0.861	0.303
MOROCCO	0.617	-.566	49.494	-2.712	2.906	6.411	12.133	0.034	.014	-0.149	0.615	-371.682	0.614	-0.315
MOZAMBIQUE	0.521	1.096	1.680	-4.053	12.385	23.438	15.743	0.148	.623	0.461	0.615	30.664	0.798	-0.450
NAMIBIA	0.507	1.318	1.526	-9.058	9.194	10.876	15.107	0.122	.038	0.739	0.613	-13.521	0.828	0.033
Niger	0.484	2.855	1676.407	-3.377	8.941	11.539	15.876	0.085	8.669	0.475	0.564	-1.370	0.791	-0.512
NIGERIA	0.512	3.322	1480.964	-24.062	1.962	9.997	15.416	0.244	.514	0.657	0.615	4.806	0.867	-1.108
RWANDA	0.486	6.214	6146.351	-18.203	7.019	8.478	21.901	0.050	.314	0.713	0.615	35.103	0.759	-0.256
Sao Tome and Principe	0.484	2.882	1719.786	-3.567	9.094	11.506	16.055	0.088	8.485	0.496	0.563	-0.646	0.790	-0.523
SENEGAL	0.486	7.902	14447.884	2.946	2.923	18.503	15.603	0.050	-.050		0.375	36.630	0.768	-0.223
Seychelles	0.486	2.853	1780.364	-3.646	8.822	11.639	15.878	0.084	7.954	0.514	0.561	-2.997	0.793	-0.521
SIERRA LEONE	0.488	5.605	7191.486	2.583	16.724	16.912	32.651	0.050	6.173	0.297	0.511	18.784	0.846	-0.707
SOUTH AFRICA	0.541	3.636	5118.230	0.194	7.078	7.258	14.407	0.025	8.258	0.359	0.615	-57.453	0.767	0.259
SUDAN	0.376	1.797	2566.458	-0.472	11.751	20.131	5.025	0.180	2.114	0.765	0.287	45.064	0.748	-1.582
SWAZILAND	0.461	2.251	3009.847	0.668	6.731		15.603	0.060	3.151	1.061	0.179	119.781	0.834	
Togo	0.485	2.828	1840.424	-3.646	8.948	11.782	16.183	0.085	7.819	0.538	0.560	-2.613	0.791	-0.525

(*Continued*)

(Continued).

Country Name	Bank lending	gdppcg	exrate ($)	Regulatory Quality: Estimate [RQ.EST]	Monetary Policy-Related Interest rate	Credit risk	Regulatory capital to risk-weighted assets (%) [GFDD.SI.05]	Required Reserve	capbuffer	Lerner index [GFDD.OI.04]	Foreign Entry	5-bank asset concentration [GFDD.OI.06]	Bank funding	Institutions
TUNISIA	0.484	2.095	461.794	1.947	4.654	12.476	11.029	0.010	13.841	-0.136	0.601	-21.635	0.831	-0.203
UGANDA	0.412	3.687	23.588	-1.357	16.714	7.792	2.842	0.200	23.355	0.010	0.606	65.202	0.716	-0.581
UNITED REPUBLIC OF TANZANIA	0.528	3.549	98.678	-3.649	5.276	7.632	7.632	0.070	11.730	-0.155	0.597	-13.771	0.835	-0.403
ZAMBIA	0.405	1.323	7.626	-0.387	16.000	9.003	23.361	0.056	7.598	0.533	0.609	62.939	0.736	-0.295
ZIMBABWE	0.535	.142	7.960	-8.342	3.727	19.984		0.047	18.215	2.487	0.614	99.825	0.781	-1.415

Zellner, A. (1962). An efficient method of estimating seemingly unrelated regression equations and test for aggregation bias. *Journal of American Statistical Association*, *57*(298), 348–368. https://doi.org/10.1080/01621459.1962.10480664

VARIABLES	2SLS model 15	2SLS model 16	2SLS Random Effect model 17	2SLS Random Effect model 18
Lerner	-322.5*	-236.3***	-767.1	-456.4***
	(165.6)	(30.85)	(658.5)	(95.32)
Lerner^2		27.04***		54.05***
		(3.498)		(11.22)
Bank Funding	361.5*	-50.31**	-1.545	5.381
	(210.8)	(23.23)	(6.085)	(30.26)
Credit Risk	4.855	1.311**	-0.147	0.350
	(3.223)	(0.617)	(0.208)	(0.869)
Bank Concentration	1.449*	-0.438***	7.769	-0.763***
	(0.756)	(0.0604)	(6.709)	(0.161)
Foreign Bank Entry	-48.11	-17.61	-7.162	-16.51
	(72.86)	(17.76)	(6.470)	(14.03)
Institution	13.09*	-7.046***	-2.518	-6.302***
	(7.289)	(0.869)	(2.130)	(1.276)
Exchange Rate	-0.0421**	-0.0538***	-0.00712	-0.0417***
	(0.0165)	(0.00494)	(0.00473)	(0.00756)
GDP per capita	2.351	5.548***	-1.294	8.743***
	(8.095)	(2.093)	(1.118)	(2.283)
Trend (Year dummies)	28.07	-4.075	11.78	-1.743
	(18.65)	(2.941)	(10.33)	(2.307)
Constant	-231.8	111.6***	1,366	-33.49
	(196.7)	(36.55)	(1,198)	(37.89)
Country Effect	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes
Observations	573	573	573	573

Standard errors in parentheses.
***p<0.01, **p<0.05, *p<0.1.

Appendices

	Coef.
Chi-square test value	.414
P-value	0.9

Appendix I

Appendix II Robustness Results

Diagnostics: Hausman (1978) specification test

```
scalars:
        e(kappa) = 1
         e(rss) = 20349804.41210667
           e(N) = 702
        e(df_m) = 10
        e(rmse) = 141.4554365275936
         e(mss) = -17852356.5032428
          e(r2) =.
          e(chi2) = 124.806943418822
        e(iterations) = 0
          e(rank) = 11
    macros:
              e(exogr) : "sqlerner depositta nplnonperformingloanstogrossloan concentrationbankconcentrationgf
    foreignentry institutions exrate gdppcg trend"
              e(insts) : "sqlerner depositta nplnonperformingloanstogrossloan concentrationbankconcentrationgf
    foreignentry institutions exrate gdppcg trend L.exlendnew"
              e(instd) : "lernerindexgfddoi04"
              e(title) : "Instrumental variables (2SLS) regression"
            e(properties) : "b V"
    matrices:
                e(b) : 1 x 11
                e(V) : 11 x 11
    functions:
              e(sample)
```

VARIABLES	Two stage Dynamic System GMM model 19	Two stage Dynamic System GMM model 20
L.exlendnew	1.006***	1.008***
	(0.000774)	(0.000809)
Lerner	0.0182***	0.0220
	(0.00374)	(0.0460)
$Lerner^2$		0.000899
		(0.00599)
Credit Risk	0.000954	-0.000696
	(0.00180)	(0.00140)
Bank Concentration	-8.18e-05	-0.000126
	(5.26e-05)	(8.37e-05)
Institution	-0.000589	0.000675
	(0.000756)	(0.000511)
Exchange Rate	-3.66e-05	1.26e-05
	(2.99e-05)	(1.21e-05)
GDP per capita	0.00508**	0.00409
	(0.00226)	(0.00259)
Constant	-0.0831***	-0.145***
	(0.0250)	(0.0249)
Observations	476	477
Number of countryid	51	52
No. of instruments.	19	19
AR1	-2.13	-2.13
P-value	0.033	0.034
AR2	-0.70	-0.71
P-value	0.482	0.481
Sargan's Test	2.35	0.19
P-value	0.885	0.995
Hansen's Test	18.56	18.56
P-value	0.005	0.005
Wald chi2	1.37e+7	1.37e+7
P-value	0.000	0.000
Number of bankcode	316	317

Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.