Original Article

Central Bank Policies and Market Power Over the Business Cycle in Africa

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Abstract

This article empirically examines the impact of the business cycle on the relationship between individual central bank policies and market power. We present a representative sample of 52 African economies over the period 2006–2018. We find that monetary, macro-prudential and central bank independence policies increase market power. The study found that, in the long run, market power reacts positively to changes or adjustments made to a central bank policy framework. We show that the individual central bank's policy framework increase market power, when interacted with business cycle.

Keywords

Central bank policies, business cycle, market power

JEL Codes: E3, E5, E61, G21, L10, L51, M21

1. Introduction

In most economies, institutions (government and central bank) establish joint regulatory policies to maintain price stability through the financial

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system of the economy (Lubis et al., 2019). The market power of banks is one of the most important channels through which price stability goals can be achieved in the economy. However, in an effort to ensure the stability of the banking system, one of the key issues for policymakers is how to shape the market power of banks through both central bank policies and business cycles. Therefore, policymakers need to understand the combined effect of different central bank policy measures and business cycles on banks' market power. Despite considerable efforts in recent years to assess the extent of the impact of various central bank policies on the competitive banking system (Agoraki et al., 2011; Akinci et al., 2018; Bagliano et al., 2000; Bolt & Tieman, 2004), the literature has not been very successful on empirically examining the influence of the business cycle in explaining the relationship between different central bank policy measures and the market power of banks. This is partly due to the different nature of central bank policies in different economies and also the differences in the business conditions across different contexts. In view of that, our study aims to investigate the extent to which different measures of policies of the central bank affect market power of banks when interacted with business cycle.

Our article is a part of an extended literature drawing from market power (i.e., percentage mark-up that is charged over marginal costs) response to changes in central bank policies. According to Gruss and Sgherri (2009), there is a trade-off between prices (interest rate) and output (credit), so the goal of the central bank is to keep prices as stable as possible through regulatory policy framework. For instance, a monetary policy decision that tightens interest rates leads to an increase in the costs of borrowing. This offers few larger banks an incentive to exercise greater market power in the industry by shifting available credit to best borrowers at the high rate of interest that gives banks good returns (Corbae & D'Erasmo, 2021). Similarly, the tightening of macro-prudential policies by the central bank implies that banks raise their capital reserves and buffers in order to reduce bank competition and provide them the incentive to exercise greater market power (Scalco et al., 2019). This implies that banks with more market power are less vulnerable to changes in monetary and macro-prudential policies of the central bank.

Apart from market power response to regulatory policies (i.e., monetary and macro-prudential policies) enacted by the central banks, the business environment plays a significant role in banks' exercise of market power. Business environment refers to those aspects of the economy, which influence its operations and growth (Saadaoui, 2014). For instance, when

the economy is weak and many businesses are not thriving, banks often lower their prices on loans (Barczyk, 2018; Saadaoui, 2014), and thus, affect the ability of banks to exercise market power.

Our article is one of the first to study the effect of different policy framework of the central bank (i.e., monetary, macro-prudential and central bank independence (CBI) policies) on market power over the business cycle in Africa. To the best of our knowledge, we note that most of the research have been devoted to analyzing the individual impact of policies (monetary and macro-prudential) on bank loans (Auer & Ongena, 2019; Camors et al., 2014; Cubillas & Suarez, 2018), risk-taking behavior of banks (Bruno & Shin, 2012; Tabak & Gomes, 2015), the transmission of monetary and macro-prudential policies (Duval et al., 2021; Tressel & Zhang, 2016), and their effects on financial stability (Lubis et al., 2019), however, not directly on banks' market power. Besides that, it appears the impact of individual policies of central banks on market power conditioned on business cycle, has been ignored by these studies. Additionally, past empirical studies have mainly employed a single central bank policy measure in their analysis (Cubillas & Suarez, 2018; Delis, 2012; Scalco et al, 2020; Toolsema-Veldman, 2003; Wang et al, 2019) but did not allow for the interaction effect of central bank policy and business cycle on market power. This requires an empirical study to understand how individual central bank policies affect market power when conditioned on the business cycle, which the current study seeks to fill and contribute to the literature.

This article is motivated by the fact that, with the exception of some few studies, much of the research is mainly based in developed and emerging economies without considering Africa. In the case of Africa, the shocks that affect the financial system can disrupt the link between central bank policy and market power. In this perspective, the business environment (Angelini et al., 2014), which may have some degree of impact on the central bank policies–market power nexus, needs to be taken into account. Hence, the study examines the impact of central bank policies on banks' market power when interacted with the business cycle. More so, Africa provides an interesting case study for this empirical experiment because scholars and policymakers on the continent are now viewing policy framework of central banks, as an important tool for stabilizing the banking system through market power of banks. Finally, Africa has experienced several adjustments in regulatory reforms, changing phases of business cycles, as well as dynamics of institutional activities by both the central bank and the banking sector. Based on this, the study is the first to examine the relationship between central bank policies and market power conditioned on business cycle in Africa. .

The rest of the section is organized into four sections. Literature review of related studies is contained in Section 2, and Section 3 discusses the data and methodology. The empirical results are contained in Section 4 and Section 5 concludes the study.

2. Literature Review

The study builds on the literature on the effects of the business cycle on the central bank policy– market power nexus. While there is no evidence of how the business cycle interacts with central bank policy frameworks to enhance the exercise of market power by banks, some theoretical approaches make interesting arguments about how market power is likely to increase the countercyclical behavior of a macro-prudential policy framework, such as capital buffer (Saadaoui, 2014). Torres-García et al. (2020) examined the pro-cyclical movements of macro-prudential policies and the impact of capital requirements on the business cycle and financial stability. They find that capital requirements act as an important financial accelerator during productivity and monetary shocks. They added that bank capital requirements help real and financial sectors of the economy perform better.

2.1 Central Bank Policy and Market Power

Recent literature presents the importance of understanding market power and assess the policy transmission efficiency through the deposit channel of market power (Drechsler et al., 2017) and the lending channel of market power (Wang et al., 2019). Due to the nature of these channels, bank market power may change in response to changes in central bank policy. In line with the impact of policies on banks' market power, monetary policy affects the competitive behavior of banks through interest rates (Brissimis et al., 2014; Saadaoui, 2014). Chu and Zhang (2021) assert that high policy rates adversely affect banks with less market power, causing smaller number of large banks to be dominated in the banking market over time. Liu et al. (2014) explore that leaders in the industry have an incentive to gain a strategic advantage over their followers when the markup is low, leading to a rise in banks' market power. Scalco et al. (2019) indicated that macro-prudential policies to which the financial institutions are subject may affect banks

market power, thus, they found that macro-prudential measures reduce bank competition by increasing the market power of banks. Dadzie and Ferrari (2019) showed that increasing macro-prudential policies through the stringent initial capital requirements of central banks impose barriers to the entry of foreign banks (Dadzie & Ferrari, 2019). This can restrict competition and allow existing banks to build power, leading to more prudent and less risky behavior (Saadaoui, 2014). Furthermore, stronger macro-prudential policies are associated with greater market power for banks (Bolt & Tieman, 2004). The present study complements the literature by examining the individual effects of central bank policy (such as monetary, macro-prudential and CBI policies) on the market power of banks.

2.2 Impact of Business Cycle on Market Power

Banks' behavior in response to central bank policies varies across phases of business cycle. For instance, in higher levels (i.e., upturn phase) of the business cycle, there is a high rate of growth (i.e., high use of production inputs, an increase in consumer goods and market demand for investment) which may lead to an increase in the money supply of the central bank and thus, increase the creditworthiness of banks (Barczyk, 2018). In this way, central banks can regulate the value, supply and cost of money in the economy with the aim of maintaining price stability. Research suggests that banks tend to expand their loan portfolios during the expansionary phase of the business cycle. However, in order to respond appropriately to the related credit risk and improve profits, banks tend to increase their capital reserves (Ayuso et al., 2004). This forces banks to increase their interest rates (interest rates) in order to have a higher rate of return, thus helping to increase their market power. On the other hand, when the economy is in recession, the money supply market tends to increase, interest rates (prices) may fall and lending activities for investment and consumption may increase. This limits the banks' market power. In addition, in the event of a recession, the capital buffers of banks with more market power may absorb the credit risk associated with it. Ayuso et al. (2004) suggest that banks with greater market power operate at higher levels of capital during the expansion phase in developed markets. However, banks that reduce their capital and risk adjustment costs tend to cause counter-cyclical behaviors in the banking system and eventually lower their market power.

2.3 Empirical Review

In the empirical literature, Wang et al. (2019) estimated a dynamic banking model in which monetary policy does not influence the refinancing costs of perfectly competitive banks. They show that banks optimize the transfer of their costs to borrowers and depositors, while facing the regulation of capital and reserves. They show that the bank's market power explains much of the transmission of monetary policy to borrowers, with an effect comparable to that of the bank's capital ratio. In addition, Wang et al. (2019) show that market power interacts with capital regulation when the federal funds rate falls below 0.9% to reverse the effect of monetary policy. Duval et al. (2021) used enterprise-level data for the US and a large multi-country enterprise-level dataset for 14 advanced economies to examine the monetary transmission of market power. They argued that the impact of a company's mark-up on its response to a monetary shock is large enough to affect monetary policy transmission. They show that firms' market power dampens their output reaction to monetary policy shocks. Scalco et al. (2020) examined the effect of macro-prudential measures on market power. They show that a more competitive banking system depends on macro-prudential policies. They found that macro-prudential policies reduce banking competition by increasing banks' market power. Agoba et al. (2020) employed a panel dataset from 1970–2012 of African countries to examine CBI as a mechanism for achieving lower inflation and effective for enhancing financial sector development. Oduor et al. (2017) examined capital needs, banking competition and stability in Africa using data from 167 banks in African countries. They found that increasing regulatory capital improves competitive prices for foreign-owned banks in Africa. Agoraki et al. (2011) examined whether regulations have an independent effect on banks' risk taking or whether their effect is passed on through banks' market power. They used data from the banking sector in some European countries from 1998 to 2005. They found empirically that banks with market power tend to reduce credit risk.

Furthermore, the empirical literature presents models in which monetary policy influences the behavior of the banking sector in good and bad states (Bagliano et al., 2000; Toolsema-Veldman, 2003). Bagliano et al. (2000) and Toolsema-Veldman (2003) find that pro-cyclical monetary policy in good countries affects only lending rates and degree of market power over the business cycle. This indicates that increased pro-cyclicality leads to weaker competition between banks in good countries (Bagliano et al., 2000). Toolsema-Veldman (2003) finds that the effect on market power is negative for good states. However, in bad states (i.e., during a recession), there is always a clear complicity, regardless of the monetary

policy rule of the central bank (Bagliano et al., 2000). Thus, with the pro-cyclical policy rule, the competitiveness of the banking sector fluctuates more sharply during the business cycle. This review demonstrates that research into the use of central bank policy and business cycle interactions to explain the market power of banks is still developing. This serves as a motivation for examining the empirical relationship between central bank policy, business cycle and market power in Africa.

The following hypotheses were formulated:

H_1: Individual central bank polices are important determinants of banks' market power.

H_2: Business cycle impacts the relationship between the individual central bank policies and banks' market power.

3. Methodology and Data

We employ a panel dataset for 52 African economies. The sample covers 13 years from 2006 to 2018, a period covering different economic conditions and regulatory framework across the sample. Following Amidu and Wolfe (2013), we utilize the three-stage least square (3SLS) model. This is a type of instrumental variable technique that solves endogeneity issues associated with the variables that explain the outcome variable (Zellner & Theil, 1962). We maintain that there are more efficiency gains as more equations are identified in the 3SLS model. Belsley (1988) argues that whereas the 2SLS is cheaper to compute, it is less efficient when compared to the 3SLS estimations. Moreover, one choose the 3SLS framework when considering efficiency over computational cost and when the efficiency gains are sufficiently higher (Zellner & Theil, 1962).

3.1 Model Specification

To examine the individual impact of individual policies of the central bank on market power, and the impact of business cycle on this relationship, we specify our models as follows:

$$\begin{aligned} Market\ power_{jt} &= \sum_{l=1}^{3} a_l Central\ Bank\ Policies_{jt} + \\ a_4\ Business\ Cycle_{jt} &+ \sum_{K=1}^{N} \beta_k X_{jt} + \gamma_j + \mu_t + \varepsilon_{jt} \end{aligned} \tag{1}$$

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

a_l: : l = 1, ... , 3 represent the regression coefficients of three central bank policy variables; a_4 represents the coefficient of business cycle.

β_k: K = 1, ... N are regression parameters for vector X (control variables) to be estimated; γ_{jt} is the country-fixed effect; and μ_t is the time-fixed effect; and ε_{jt} is an idiosyncratic error term, which controls for unit-specific residual in the model for the banks in the j^{th} country at period t.

To capture possible unobserved heterogeneity and the impact of the individual policies on market power conditioned on business cycle, the study includes the interaction terms.

Specification of the model is done by expanding equation 1 in this form:

$$\begin{aligned} &Market\ power_{jt} = \sum_{l=1}^{3} a_l Central\ Bank\ Policies_{jt} \\ &+ a_4\ Business\ Cycle_{jt} + \sum_{p=1}^{3} \Omega_p \\ &+ \left(Central\ Bank\ Policies_{jt} \times Business\ Cycle_{jt}\right) \\ &\sum_{k=1}^{N} \beta_k X_{jt} + \gamma_j + \mu_t + \varepsilon_{jt} \end{aligned} \tag{2}$$

where, a_4 represents the regression coefficient of the business cycle and Ω_p: p = 1,…,3 represent the coefficients of the interaction terms.

$$\begin{aligned} \text{Marginal Effect} &= \frac{\partial\ Market\ Power_{j,t}}{\partial \sum_{l=1}^{3} Central\ Bank\ Policies_{jt}} \\ &= a_l + \Omega_p Business\ cycle_{jt} = 0 \end{aligned} \tag{3}$$

From the above models, the dependent variable is market power, which is measured by the Lerner Index. Oredegbe (2021) used the inverse of the Lerner index to measure competition. In this study, we apply the economic procedure of Delis (2012) and Brissimis and Delis (2014), we do not include here all the technical details for the estimation process, but we provide a brief definition of the Lerner Index. Lerner's index represents the markup of price (interest rate) in relation to the marginal cost that a bank may charge its customers (Elzinga & Mills, 2011). Estimates of the Lerner Index are at the country-level and the data was obtained from the Global Financial Development Database, where higher values indicate that banks have greater market power. In equation 1, we examine the effect of individual central bank policies on market power. The study decomposes the central bank policy variables into three: (a) monetary policy; (b) macro-prudential policy; and (c) central bank independence policy.

Monetary policy is measured as monetary policy rates of the central banks in Africa and data was obtained from the International Financial Statistics of the International Monetary Fund (IMF). Following Delis

et al. (2011), we utilize the central bank policy rates of African countries as a measure of monetary policy. Monetary policy rates range between 0 and 1 (i.e., 0 and 100%), with higher values indicating tightening of the policy rates. The study expects a positive monetary policy–market power nexus, which indicates that tightening monetary policy leads to greater market power of banks. This agrees with Freixas and Rochet (2008) who indicated that an Increase in monetary policy rates, which reflects an increase in the interbank rates, leads to an increase in the optimal interest rates on loans and deposits, causing banks to reduce risk-taking by selecting best clients, which in turn leads to a rising market power (Chu & Zhang, 2021). Therefore, an increase in monetary policy rates may increase market power of industry leaders while the rivals (or others) in the industry responds accordingly.

Macro-prudential policy is an aggregated index of 17 indicators of macro-prudential action. Data were obtained from the iMaPP database compiled by Alam et al. (2019), incorporating information from existing large databases (i.e., Global Macro-prudential policy instruments, IMF annual macro-prudential policy survey and national sources from Lim et al. (2011) and Alam et al. (2019). The importance of macro-prudential policy instruments is that it can overlap with other policies. The integrated macro-prudential policy database provides dummy-type indices of country-level averages for 17 macro-prudential policy instruments and their subcategories[1]. The indicator records tightening actions (+1), loosening actions (–1), and no change (0). The index varies between –1 and 1, with positive values (values >0) indicating tightening or stringent policy action and negative values indicating loosening of the policy action (Alam et al., 2019).

The study expects macro-prudential policy to positively affect banks' market power. This shows that an increase in macro-prudential policy leads to an increase in market power. The central bank set macro-prudential policies to tame the risky behavior of banks. The expected positive relationship means that tightening macro-prudential actions of central banks offer banks the opportunity to reduce risk, make greater profits, and in turn increase market power. Again, raising macro-prudential policy allows banks to raise more capital in their buffers and reserves by shifting investments to best clients at higher rates that yield more profits. This increases the markups and hence offers banks the incentive to exercise greater market power. This reveals the importance of macro-prudential policy in strengthening the banks' market power (Silalahi, 2013).

Central bank independence is an index that measures the ability of the central bank to formulate independent policies, as employed in the work of Agoba et al. (2020). In general, a policy that controls monetary policy tools and limits the government's influence on the management of

monetary policy by the central bank. It is a *de jure* measure of CBI based on a weighted aggregation of 16 legal indicators using the criteria and weights of the Cukierman, Webb and Neyapti indexes (CWN) (Garriga, 2018). The index varies between 0 and 1 (i.e., 0 and 100%), with higher values indicating a greater degree of CBI or a more stringent independent central bank. The study expects that CBI should have a positive effect on the market power of banks. The independent role of central banks enables them to monitor the opportunistic behavior of managers, control excessive risk-taking and achieve optimal returns. This requires banks to reduce output (i.e., loans or lending) while raising prices (interest rates) to yield more returns, thus pushing banks to exercise greater market power. Therefore, the positive effect shows that the countries that allow the strict independent function of the central bank tend to increase the market power of banks.

3.1.1 Robustness Check

African countries have made many changes in their reforms or policies over the years (World Bank, 2019), which can have a significant impact on the structure of the banking market. In this light, we introduce into equation 1, the changes in the individual central bank policies as well as the lag effect of changes in the individual central bank policies over the sample. This is done to observe whether market power responds to the impact of immediate or past changes/adjustment of each policy variable. For instance, we expect a negative relationship between the current changes on monetary policy and market power. This is because it takes some time for banks' market power to respond to changes in monetary policy. However, we expect a positive relationship between changes in the lag of monetary policy and market power. This means that changes in the previous year's monetary policy leads to an increase the market power of banks. Thus, an increase in monetary policy changes, induces a positive impact on market power in the long term. Similar results are expected for the effect of initial and past changes in macro-prudential and CBI policies on market power.

In equation 2, it is argued that the effect of central bank policies on market power is conditioned on business cycle. Business cycle is a cycle of fluctuations in the Gross Domestic Product (GDP) around its long-term natural growth rate. It explains the expansion and contraction in economic activity that an economy experiences over time. Following the recent work by Moudud-Ul-Huq (2019), real growth of GDP is one of the important indicators for the economy that is often used as a proxy for business cycle. In this study, the business cycle is measured as the real rate of GDP growth. The data on the real GDP growth rate was obtained from the Global Financial Development Database.

Designing competitive pricing policies requires how each of the policies of the central bank should be changed to generate a desirable outcome when interacted with business cycle. In equation 3, the interest was to estimate the marginal impact of individual central bank policy conditioned on the business cycle (see equation 2).

In equation 1, the unconditional effect of individual central bank actions (i.e., monetary policy, macroeconomic policies, CBI) on market power is said to be positive. When calculating the average marginal impact, a positive marginal effect means that the business cycle magnifies the positive impact of individual central bank policies on market power. The negative marginal effect shows that the business cycle reduces the positive effects of individual central bank policies on market power.

In equations 1 and 2, we control for a vector of bank-specific and macroeconomics variables. On the relationship between the control variables and banks' market power, we expect interesting results, but we do not report here because of space.

3.2 Estimation Technique

The country level data on African countries over the period 2006–2018 is ideal because it captured the 2007/08 global financial crisis that affected many countries, including Africa. The panel data entails banking industry data on each of the countries used in the study over the study period. By employing the panel data, the study accounted for the possible influence of omitted variables on the dependent variables. The robust standard errors of the 3SLS 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. Following Greene (2003) and Iyoha (2004), the study formed four structural equations outside market power, with three endogenous variables and eight exogenous variables (controls). The system generated its instrumental variables from the endogenous equations but not reported because of space). The equations were identified based on the order conditions and rank conditions in order to determine whether the parameters can be estimated from their reduced form. Further, the parameters of the model were estimated by a 3SLS to handle possible endogeneity.

4. Empirical Results

In this section, we present and discuss the results on summary statistics correlation matrix and the regression results. In Table 1, the average

Table 1. Descriptive Statistics.

Variables	Obs.	Mean	Std. Dev.	Min	Max
Market power	681	0.474	1.712	–4.383	9.665
Monetary policy	664	8.535	5.683	2.331	26
Macro-prudential policy	600	6.218	2.9307	0.47797	13.627
Central bank independence policy	681	1.86	4.145	0	27.227
Business cycle	630	7.381	0.866	5.53	9.23
Deposit funds	651	75.2	21.8	0.1	97
Credit Risk	690	0.99	0.74	0.08	45.3
Concentration	681	55.32	27.69	0.28	100
Foreign bank entry	686	0.593	0.491	0	1
Money supply	682	43.3	38.79	26.1	113
Inflation	609	7.74	6.259	–2.409	44.357
Institutions	630	–0.483	0.545	–1.66	0.853

Source: The authors (based on data from the World Bank, IMF, Alam et al., [2019], and Garriga [2018] databases).

Note: Market power = measured with the Lerner Index; Monetary policy rate = the central bank policy rate of a country; Macro-prudential policy action policy action = the sum of dummies for all 17 categories—countercyclical capital buffer, requirements for banks to maintain a capital conservation buffer, capital requirements, limit on leverage of banks, loan loss provision requirements, limits on foreign currency, limits to the loan-to-value ratios, debt service-to-income ratio, minimum requirements for liquidity coverage ratios, limits to the loan-deposit ratio, limits to net or gross open foreign exchange positions, reserve requirements, loan restrictions, risk measures, taxes and levies applied to specified transactions; Central bank independence = the weighted average of components of central bank independence (Central Bank's ability to control monetary instruments, usually a set of restrictions on the government's influence on the management of monetary policy by the central bank); Business cycle = measured as real GDP growth rate; Deposit funds = ratio of total deposit to total asset; Credit risk = ratio of nonperforming to gross loan; Bank concentration = 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 = a dummy variable (1 = year of foreign Bank entry, 0 otherwise); Money supply = broad money (M2+) to GDP ratio; Inflation = consumer price index; Institutions = measured as an aggregate of six indicators (rule of law, government effectiveness, control of corruption, political stability, regulatory quality and voice and accountability) from the world governance indicators.

market power of the banks in our sample is 0.47 and ranges from –4.383% to 9.665%. The key monetary policy rate averaged 8.54%, ranging between 0 and 1. Macro-prudential policy action index recorded an average of 0.012, which is neutral since it is not far from zero (0) (no change in macro-prudential policy across the sample), and ranging from –1 to 1.[2] On the average, business cycle accounted for 7.38% of real GDP. The study does not report on the descriptive statistics because of space.

From the Pearson Correlation Coefficient matrix, there is no evidence of multicollinearity as confirmed by the VIF below the threshold of 10 (see Table 2).

Table 2. Correlation Matrix.

Variables	Mean VIF = 3.11	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Macro-prudential policy	–3.37	1.000										
(2) Monetary policy	3.91	0.541	1.000									
(3) Central bank independence policy	3.35	–0.180	0.112	1.000								
(4) Business cycle	4.34	–0.425	–0.551	0.108	1.000							
(5) Credit–deposit funds	5.65	0.612	0.320	–0.653	–0.377	1.000						
(6) Credit risk	1.65	0.127	0.201	–0.268	–0.297	0.371	1.000					
(7) Concentration	3.14	–0.313	–0.225	–0.543	–0.006	0.172	0.208	1.000				
(8) Foreign bank entry	1.09	0.113	0.131	0.077	–0.108	0.043	–0.017	–0.139	1.000			
(9) Money supply	2.98	0.297	–0.204	–0.281	–0.248	0.403	–0.037	–0.250	0.067	1.000		
(10) Inflation	1.50	0.066	0.190	–0.141	–0.259	0.155	0.400	–0.036	–0.048	0.012	1.000	
(11) Institutions	3.21	0.063	0.001	0.317	0.539	–0.354	–0.197	–0.378	0.136	–0.178	–0.309	1.000

Source: The authors (based on data from the World Bank, IMF, Alam et al., [2019], and Garriga [2018] databases).

Note: Market Power = measured with the Lerner Index; Monetary Policy Rate = the central bank policy rate of a country; Macro-prudential Policy Action Policy action = the sum of dummies for all 17 categories: countercyclical capital buffer, requirements for banks to maintain a capital conservation buffer, capital requirements, limit on leverage of banks, loan loss provision requirements, limits on foreign currency, limits to the loan-to-value ratios, debt service-to-income ratio, minimum requirements for liquidity coverage ratios, limits to the loan-deposit ratio, limits to net or gross open foreign exchange positions, reserve requirements, loan restrictions, risk measures, taxes and levies applied to specified transactions, and other; Central Bank Independence = the weighted average of components of central bank independence (Central Bank's ability to control monetary instruments, usually a set of restrictions on the government's influence on the management of monetary policy by the central bank); Business cycle = measured as real GDP growth rate; Deposit funds = ratio of total deposit to total asset; Credit Risk = the ratio of nonperforming to gross loan; Bank Concentration = 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 = a dummy variable (1 = year of foreign Bank entry, 0 otherwise); Money supply = broad money (M2+) to GDP ratio; Inflation = consumer price index; Institutions = measured as an aggregate of six indicators (rule of law, government effectiveness, control of corruption, political stability, regulatory quality and voice and accountability) from the world governance indicators.

4.1 Regression Results

This section shows the regression results of the study. First, the study examines the effects of the individual central bank policies on market power.

4.1.1 Individual Central Bank Policies and Market Power

In Table 3, the individual central bank policies was positively linked to market power (see Models 1–3). For instance, in model 1, monetary policy is positively associated with market power. This indicates that contractionary monetary policy encourages banks to raise interest rates, reduce the possibility of default and increase markups. This in turn gives banks greater market power. Thus, an increase in the monetary policy rate, which reflects an increases in price of a product makes it more expensive in relation to other products. This makes banks shift to best clients, reduce excessive risk, make greater markups and thus, exercise greater degree of market power. For this reason, a tightening of monetary policy (i.e., an increase in policy rates) leads to greater market power. This agrees with the work by Dalla (2017) who found that monetary policy increases banks' interbank rates, increases the optimal level of interest rates on loans and deposits, leading to an increase in banks' market power. It also agrees with the conclusions of Chu and Zhang (2021) that the effect of a rise in the policy rates among banks with less market power leads to bank failure and therefore seeking consolidation can be a natural resolution to increase concentration and gain market power.

In Model 2, macro-prudential policy has a direct and significant positive effect on market power. This is possible because the central bank sets macro-prudential policy to reduce the risk-taking activities of banks. By so doing, the tightening of the policy action gives banks the power to raise capital by simultaneously reducing outputs while increasing their prices (interest rates) in order to yield more returns/markups. This leads to greater market power. This implies that countries that increase their macro-prudential policy may induce greater market power. The study agrees with the research of Cozzi et al. (2020) and Budnik and Kleibl (2018), that macro-prudential policy aims at achieving price stability and eliminates the need for extremely low interest rates. Thus, countries that increase the level of macro-prudential policies are able to enforce price (interest rate) stability in the banking system, which leads to a greater market power.

In Model 3, CBI policy has a positive and significant effect on market power. This indicates that banks' market power responds positively to a stringent CBI policy. This implies that countries that allow the central

Table 3. Impact of Central Bank Policies on Market Power.

Variables	Model 1	Model 2	Model 3	Model 4
Monetary policy	0.0230***			0.00264**
	(0.00368)			(0.00124)
Δ Monetary policy	–0.0376***			–0.00548***
	(0.00340)			(0.00131)
Δ Monetary policy$_{t-1}$	0.00153***			0.000168
	(0.000122)			(0.000116)
Macro-prudential policy		0.0317***		0.0116
		(0.00783)		(0.00748)
Δ Macro-prudential policy		–0.0189*		–0.0452***
		(0.0113)		(0.0128)
Δ Macro-prudential policy$_{t-1}$		0.000837**		0.000447
		(0.000357)		(0.000550)
Central bank independence policy			0.397***	0.366***
			(0.0135)	(0.00548)
Δ Central bank independence policy			–0.0231***	0.0460***
			(0.00258)	(0.00404)
Δ Central bank independence policy$_{t-1}$			0.000369**	0.000245
			(0.000187)	(0.000218)
Deposit funds	–0.00141***	–0.00147***	0.00421***	0.00379***
	(0.000186)	(0.000109)	(0.000424)	(0.000169)
Credit risk	–0.0158**	–0.00237	–0.00888***	–0.00307
	(0.00650)	(0.00849)	(0.00261)	(0.00448)

(Table 3 continued)

(Table 3 continued)

Variables	Model 1	Model 2	Model 3	Model 4
Concentration	0.00626***	–0.000966	0.00209	–0.00253***
	(0.00102)	(0.00151)	(0.00152)	(0.000690)
Foreign bank entry	0.0260	–0.149*	–0.193**	–0.122
	(0.0536)	(0.0804)	(0.0807)	(0.0860)
Money supply	–0.00686***	–0.0114***	0.000432	–0.00565***
	(0.000629)	(0.000828)	(0.000553)	(0.000334)
Inflation rate	–0.00383	–0.0275***	–0.000650	0.0154**
	(0.00574)	(0.0106)	(0.00556)	(0.00763)
Institutions	–0.731***	–0.980***	–0.110***	–0.353***
	(0.0454)	(0.0443)	(0.0379)	(0.0333)
Trend	0.0373***	0.0136	–0.0244***	–0.00533
	(0.00567)	(0.0113)	(0.00824)	(0.00761)
Constant	0.420***	1.049***	–0.229	–0.280**
	(0.129)	(0.260)	(0.154)	(0.130)
Time effect	Yes	Yes	Yes	Yes
Country effect	Yes	Yes	Yes	Yes
Observations	681	458	534	395
R-squared	0.7411	0.5848	0.8092	0.9107
Wald Chi^2	761.09***	514.56***	7186.34***	627.96***

Source: The authors (based on data from the World Bank, IMF, Alam et al., [2019], and Garriga [2018] databases).
Note: Description of variables are found below Table 1 & 2, they are not reported here because of space; Robust standard errors in parentheses;
*** p< .01; ** p< .05; * p< .1

bank to set independent policy instruments allows them to monitor the opportunistic behavior of managers in the money market, generate optimal returns that gives them greater market power. Although, we do not find strong support for the claim by Agoba et al. (2020) that CBI promotes financial development by reducing inflation (price stability), our study agrees with the hypothesis developed by Baumann et al. (2021) and Neiss (2001) that having an independent central bank for a long period of time do not necessarily lower inflation, but leads to achieving greater price stability (inflation), a rise in lending rates, an increase in the mark-ups of banks (market power). Thus, stringent CBI policy increases market power of banks.

4.1.2 Business Cycle and Market Power

In Table 3, we observed a positive relationship between business cycle and market power across the models (model 1–3). This shows that an increase in the average levels of business cycle increases market power of banks, implying that banks have a greater incentive to exercise market power in a growing business environment. This happens both in the short term and around the turning points (or close to the peaks) of the business cycle. During the average business cycle, economic agents can, on the one hand, make more resources available to the financial sector and charge higher interest rates. It forces the banks to identify investment and credit opportunities that may give them greater returns and markups, resulting in greater market power. On the other hand, economic agents may demand less credit and reduce competition in the market. Banks may find alternative ways of raising funds by selecting best clients that offer them higher returns, leading to greater market power of banks. This outcome agrees with the deductions of Saadaoui (2014), who showed that business cycle provides a mechanism for banks to maintain stability, and hence higher competitive pricing policy and market power.

4.1.3 Robustness Results

In model 1, market power responds negatively to initial changes in monetary policy. This implies that central banks that make initial changes to their monetary policy instrument induces a negative impact on market power. However, changes made to the monetary policy instrument in the past had a positive effect on market power, hence, a positive relationship between changes in 1st lag of monetary policy and market power. Similarly, market power responds negatively to initial changes in macro-prudential policy (see model 2). This implies that an initial change in macro-prudential policy instrument by the central bank induces a

negtive impact on market power. However, adjustments made to macro-prudential policy in previous years lead to greater market power. Again, market power responds negatively to initial changes in CBI policy in the short run but changes in past CBI induces a positive impact on market power (see model 3)

It can be deduced that when a central bank attempts to increase a policy framework, the impact of the increase in the policy induces a reductive effect on market power in the short term. However, market power responds positively to the rate of increase in the individual policies of the central bank (i.e., monetary, macro-prudential and CBI policy) in the long term. Our findings support the argument by Cuciniello and Signoretti (2015) that the central bank—which sets the policy rate and macro-prudential requirements—influence banks' loan margins. In this setup, banks' market power, which reflects the mark-up prices, responds to changes in central bank's policies, and therefore, an increase in the policy instrument will lead to an increase in bank's market power in the long run.

In terms of the controls, we do not report on the controls due to space.

4.2 Interaction Effect

Given that the economic or business environment affect the way bank's market power responds to central bank policies, the study interacts the individual central bank policies with business cycle and observe their impacts. For instance, the study interacts monetary policy with business cycle and estimates its impact on market power. This is done by computing and interpreting the marginal effects of monetary policy on market power conditioned on business cycle (see Table 4). In model 5, monetary policy has a marginal effect of 0.1393[3] (see Model 5). This indicates that the positive monetary policy–market power nexus is enhanced when interacted with business cycle (see Figure 1). This is in line with Moudud-Ul-Huq (2019) and Saadaoui (2014) who explained that central banks maintain price stability by inducing a positive relationship between monetary policy and banks' market power. According to Saadaoui (2014), there is high productivity and growth during the higher phases of business cycle, which allows the central bank to raise the policy rate in order to attract the supply of funds from the surplus unit, which in turn causes leaders of the banking industry to respond to the increase in the policy rates by taking prudent intermediation activities that gives them higher markups. Thus, an increase in monetary policy rates increases market power when interacted with business cycle.

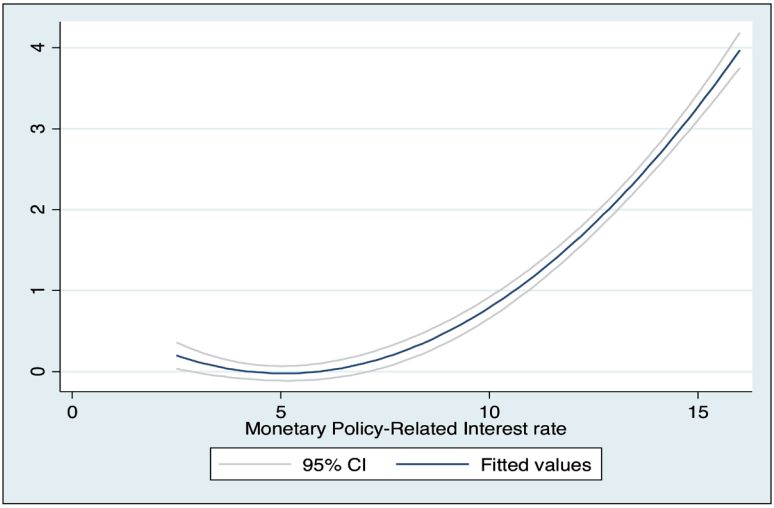
The study introduces the interaction term between macro-prudential policy and business cycle into the model to estimate the marginal impact

Table 4. The Interaction Effect of Individual Central Bank Policies and Business Cycle on Market Power.

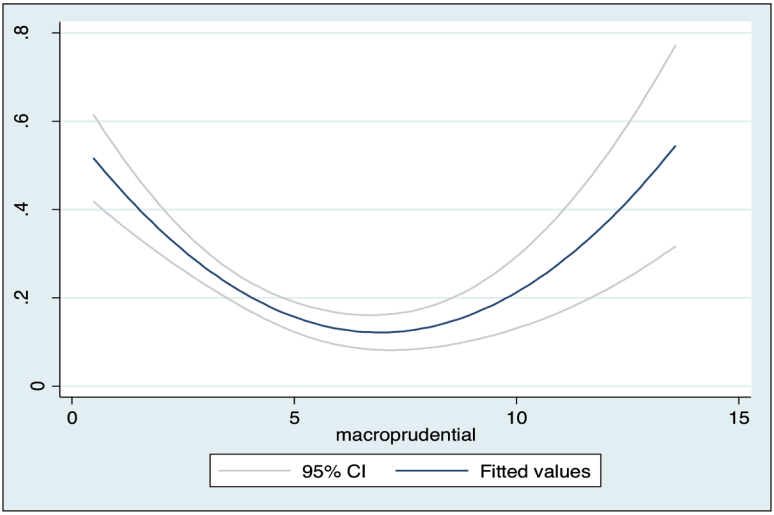
	Model 5	Model 6	Model 7
Monetary policy	0.129***		
	(0.0439)		
Macro-prudential policy		0.872***	
		(0.0738)	
Central bank independence policy			0.1823***
			(0.0329)
Business cycle	0.357***	1.248***	0.414***
	(0.0563)	(0.0833)	(0.0261)
Monetary policy × business cycle	0.140***		
	(0.0058)		
Macro-prudential policy × business cycle		0.0109***	
		(0.0028)	
Central bank independence policy × business cycle			0.0035***
			(0.00126)
Deposit funds	0.0014***	0.0012***	0.00485***
	(0.0002)	(0.0001)	(0.000481)
Credit risk	–0.0187***	–0.00032	–0.00820*
	(0.0064)	(0.0059)	(0.00437)
Concentration	0.0073***	0.0039**	0.000355
	(0.0016)	(0.0016)	(0.000654)
Foreign bank entry	0.0084	–0.120***	–0.0809*
	(0.0417)	(0.0372)	(0.0421)
Money supply	–0.0068***	–0.0128***	–3.11e-05
	(0.0008)	(0.0006)	(0.00119)
Inflation rate	0.0005	–0.0104	–0.00470
	(0.0061)	(0.0067)	(0.00897)
Institutions	–0.837***	–1.589***	–0.142***
	(0.0302)	(0.0567)	(0.0524)
Trend	0.0307***	0.0231***	0.0283***
	(0.006)	(0.0068)	(0.00726)
Constant	–0.624**	–9.414***	–2.338***
	(0.275)	(0.795)	(0.204)
Time effect	Yes	Yes	Yes
Country effect	Yes	Yes	Yes
Observations	676	676	700
R-squared	0.8517	0.8463	0.9147
Wald Chi^2	2612.64	2504.77	4880.82
Marginal effects	0.1393***	0.8928***	0.2081***

Source: The authors (based on data from the World Bank, IMF, Alam et al., [2019], and Garriga [2018] databases).

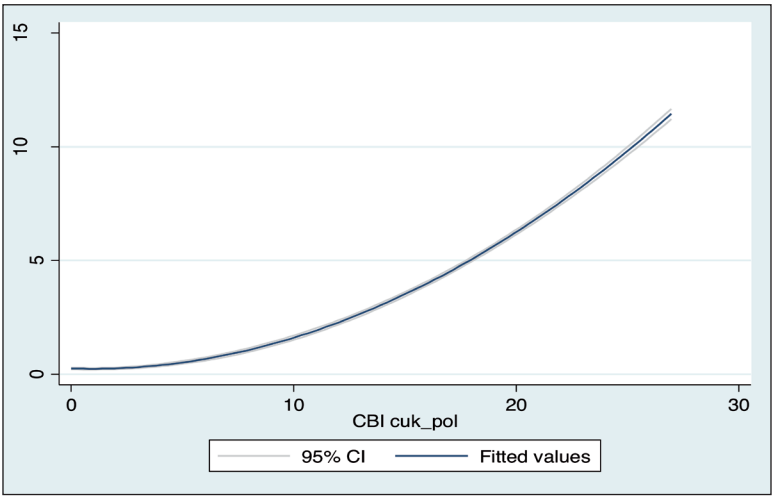
Note: Description of variables are found below Table 1 & 2, they are not reported here because of space; Robust standard errors in parentheses; *** p< .01; ** p< .05; * p< .1.



(a) Market power (Lerner index) on the y-axis or vertical axis and monetary policy, on the x-axis or horizontal axis respectively.



(b) Market power (Lerner index) on the y-axis or vertical axis while macro-prudential policy is on the x-axis or horizontal axis respectively.



(c) Market power (Lerner index) on the y-axis or vertical axis while central bank independence (CBI) policies are on the x-axis or horizontal axis respectively.

Figure 1. Marginal Plots: Impact of Central Bank Policies on Market Power Conditioned on Business Cycle.

Source: The authors (based on data from the World Bank, IMF, Alam et al., [2019], and Garriga [2018] databases).

of macro-prudential policy on market power. In Model 6, the average marginal effect of a macro-prudential policy on market power when interacted with the business cycle is more positive than the unconditional effect of the macro-prudential policy. Figure 1 shows that the positive effect of macro-prudential policy on market power are magnified when it is interacted with the business cycle. Therefore, during the upturn phase of business cycle, banks are able to build up their capital buffers by taking less risky activities, allowing best clients to borrow at higher prices (interest rates) while central banks maintain financial stability through macro-prudential policy. These transmission channels increase banks market power. The study agrees with IMF (2013) report that designing macro-prudential policies requires determining how large a buffer should be built up during boom periods and how much it can be released safely during periods of burst periods. Therefore, an increase in macro-prudential policy may lead to an increase in market power of banks in the upturn phases of business cycle.

Similarly, the positive average marginal impact of CBI policy on market power is greater when interacted with the business cycle compared to the unconditional effect of CBI policy. In Figure 1, the positive CBI policy–market power nexus is enhanced when interacted with business cycle. Policy independence reflects the central bank's power to formulate and execute monetary policy and to restrict government's influence on central bank bank's management of monetary instruments. This includes the central bank's ability to set the goals and or choose the instruments of monetary and prudential instruments. During the upturn phase of business cycle, banks are able to build up their capital buffers, leading to greater market power. Thus, market power of banks responds stringent CBI policy at increasing business cycle. The study agrees with IMF (2013) report that designing independent central bank policy allows central bank to provide optimal pricing policies for banks to maintain banking stability during different phases of business cycle. Therefore, the positive CBI policy–market power nexus increases when conditioned on business cycle.

In terms of controls, we found results interesting results similar to our basic model. However, we do not report on the results because of space.

5. Conclusion and Policy Implications

Given the importance of central bank policies in stabilizing the competitive pricing strategies of the banking system conditioned on the changing phases of the business environment, the study examines the effects of central bank policies on banks' market power when conditioned on business cycle. The study concluded that the individual policies of the central bank (monetary, macro-prudential and CBI) and the business cycle had a positive and significant impact on market power. The study found that market power responds positively to the changes or adjustments made to previous year's central bank policy frameworks. The study provides evidence to support that the positive impact of monetary, macro-prudential and CBI policies on market power is magnified when interacted with business cycle.

This result is generally in agreement with the findings of Chu and Zhang (2021), Budnik and Kleibl (2018), Baumann et al. (2021), and the theoretical review of Vollmer (2021). Chu and Zhang (2021) found that when monetary policy tightens, banks with low market power are less likely to pass on the rate hikes to the asset side of their balance sheets and are forced to pass on the rate hikes to the liability side. Therefore,

banks with greater market power respond strongly to increases in the monetary policy rates. Budnik and Kleibl (2018) employed various macro-prudential instruments to observe their impact on the entire banking system, and found that tightening macro-prudential actions helps banks to preserve more capital in their buffer and gain greater market power. Based on the work of Baumann et al. (2021), our study provides a strong support that independent central bank is a tool for achieving higher equilibrium rates of inflation (price stability) in the banking sector, leading to an increase in the mark-up price and a gain in the market power of banks. In addition, Vollmer (2021) was with the view that during good times in the business cycle, banks accumulate capital from the credit and deposit markets, as well as from retained earnings—and are subject to changes in central bank policy. In this case, during the higher phases of the business cycle, banks are able to fully pass on stringent policy action to the demand side of the credit market, which in turn helps them to gain more market power.

The results of this article have important policy implications for African countries. First, policymakers and monetary authorities must take the business environment into account when structuring or formulating regulatory frameworks in order to shape the market power of banks. Second, countries should set prudent policies that aim at providing a better regulatory–market power nexus for banks during fluctuations of business cycle. The limitation of the study is that the market power response to the coordinated impact of various central bank policies in different business environment, was not considered. Therefore, future studies could investigate this relationship since, such a step will enable a central bank to better strategize through a coordination process in order to target optimal market power of banks.

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Notes

1. See Alam et al. (2019) for more details of 16 indicators.
2. iMaPP ranges from –1 (loosening policy action), 0 (no change in policy action) and 1 (tightening policy action)
3. [0.129 + (0.140 × business cycle)], when the business cycle takes an average of 7.381%

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