Regulation and agriculture financing in Kenya

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Abstract

Purpose – The agricultural sector remains the backbone of several emerging economies, including Kenya, where it contributes 34% to its gross domestic product (GDP). However, access to financing for agricultural activities appears to be very low compared to developed economies. Following this, governments in a number of countries have sought to introduce banking sector regulations to facilitate increased funding to the agricultural sector. Taking motivation of the interest rate capping regulations by the Central Bank of Kenya (CBK) in 2016, this paper examined the effect of these interest rate ceiling regulations on agri-lending in Kenya.

Design/methodology/approach – The paper employs random effects technique to estimate a panel data of 26 commercial banks in Kenya from 2014 to 2018 using the ratio of loans to agricultural sector to gross loans and the natural logarithm of loans to agricultural sector as proxies for agri-lending. Bank size, equity, asset quality, liquidity, revenue concentration and bank concentration are employed as control variables.

Findings – The results of the panel regression estimations show that the introduction of the interest cap resulted in increases in the proportion and growth in agri-lending compared with the pre-interest cap period. In addition, large banks and highly capitalised banks were found to be associated with lower agri-lending, with differences in the effects across pre-cap and post-cap periods.

Practical implications – From a policy perspective, the findings highlight the effectiveness of interest rate capping in meeting this objective and supports the calls for strengthening cooperation between the government and key stakeholders in the financial sector. This will allow for the effective enforcement of policies by the regulatory powers in a manner that guarantees sound and dynamic financial systems, particularly within the agricultural sector.

Originality/value – As far as the authors are aware, this the first paper to examine the effect of the interest rate cap regulation on agri-lending in Kenya.

Keywords Interest rate caps, Regulation, Agricultural finance, Kenya

Paper type Research paper

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1. Background of the study

Kenya's agricultural sector contributes up to 34% of the gross domestic product (GDP) and is responsible for about 10% of formal jobs in the economy (Kenya National Bureau of Statistics KNBS, 2019). However, the government's investment in the sector has been lagging at 3.2% of government expenditure (Parliamentary Budget Office, 2019). This is much lower than the 10% envisioned in the Malabo Declaration (African Union Commission, 2014), whose goal was to accelerate agricultural development, towards the achievement of the Sustainable Development Goals (Goals 1, 2, 3, 10 and 12). The underinvestment in agriculture has resulted in the sector growing at a slower rate than the population growth. This underinvestment has had an impact on the health of the population, as can be seen in Kenya's nutritional indicators. According to The Integrated Food Security Phase Classification (IPC), about 7 million people in Kenya faced an acute food crisis in 2021 (IPC, 2022), and the UNICEF reports that more 30% of children under the age of five suffered from acute malnutrition (Kamer, 2021).

In a more developed economy with higher productivity levels, the gap in public financing for agriculture would be adequately bridged by private financing. This has, however, not been the case in Kenya. In 2018, agriculture made up of only 3.6% of commercial banks' commercial lending portfolio (Kenya National Bureau of Statistics, 2019). According to the Central Bank of Kenya (CBK), of the KES [1] 2.48 trillion private sector loans availed by banks in 2018, only KES 95.78 billion went into agriculture (CBK, 2019). Individuals received the most loans (26%), followed by trade (19.14%) and real estate (15.15%). Taking into consideration agriculture's contribution to the economy as enumerated above, there exists a significant mismatch in the quantum of commercial funding available to agricultural business in Kenya. In a bid to stimulate lending to agriculture, the government and development finance institutions have supported the banks by providing guarantees and low-cost financing. However, this approach has not resulted in a significant increase in the share of commercial funding available to the agriculture sector. In August 2016, Kenya's parliament enacted the Banking (Amendment) Act 2015. This law set the maximum interest rate chargeable for a credit facility at "*no more than four percent, the base rate set and published by the CBK*" (CBK, 2016). This law was in response to the indications that the interest rates that were then being charged by the banks were punitive and were a key factor in the slowing down of Kenya's economic growth. The legislators responded to public opinion that the banks were making unreasonably high returns by employing interest rate spreads of up to 10% (KNBS, 2019). The introduction of the regulation was meant to increase access to financing, especially for low-margin business sectors such as agriculture and manufacturing.

Kenya has a history of a mix of regulated and liberal interest rate policies. In the 1960s and 1970s, the post–independence government administered a fixed interest rate regime, where it mandated minimum lending rates for commercial banks, non-banking financial institutions and building societies. This policy was aimed at encouraging investment. However, from the 1980s onwards, financial reforms undertaken at the advice of multilateral institutions, such as the World Bank and the IMF, saw the government undertake a gradual interest rate liberalisation strategy. This was educated by the view that interest rate ceilings and other government interventions limited the economic growth of the country. By 1991, the country had fully liberalised its interest rates (Odhiambo, 2009). The liberalisation of interest rates saw a significant increase in the cost of lending and banks were perceived by the public to be engaging in predatory lending. Between 2001 and 2015, interest rate spreads by commercial banks averaged 10.5% (Safavian and Zia, 2018). In 2012, the Committee on the Cost of Private Sector Credit and Mortgage Finance constituted by the National Treasury made key recommendations towards reforms within the financial sector. These included strengthening the system for movable collateral, increasing the scope of credit reporting and promoting consumer protection measures (Safavian and Zia, 2018). This was an attempt at self-regulation and market-based solutions to the high cost of credit. The CBK also embarked on

initiatives to increase the degree of transparency on lending information and development in credit information sharing through the licensing of credit reference bureaus (Safavian and Zia, 2018).

In post–independence Kenya, the government was the main source of agriculture finance through the Agricultural Finance Corporation (AFC). The AFC was established in 1963 and its chief function was to assist in the development of the agriculture sector (Amimo, 2004). With time however, the AFC's prominence as a source of agricultural financing declined due to reduced repayment rates and low levels of funding by the government. With its recession and the subsequent growth of commercial banks, the agriculture lending landscape has been taken over by commercial banks, whose agriculture portfolio remains small in comparison to the sector's overall contribution to GDP. In 2015 and 2016, lending to the agriculture sector grew by 15 and 5% respectively, but in 2017 and 2018, lending contracted by 6 and 2% respectively (KNBS, 2019). As of 2018, only about 4.24% of the overall commercial bank loan portfolio to private enterprises was dedicated to agriculture.

Though unpopular, interest rate ceilings are still a widely used tool to control the price of funds in markets. According to a 2010 Consultative Group to Assist the Poor (CGAP) survey, 17 countries in Sub-Saharan Africa had introduced or were using some sort of rate capping mechanism. Since then, additional countries have followed suit. In 2013, Zambia introduced ceilings on annual effective rates charged by non-banking institutions. In the same year, the West Africa Economic and Monetary Union, which includes eight Francophone African countries, lowered the interest rate ceiling - initially established in 1997 – by three percent. A 2014 study by the World Bank showed that at least 76 countries around the world had some form of interest rate caps in place (Maimbo and Gallegos, 2014). Despite this, there are major arguments against interest rate ceilings, given their distortive effect on the market, thereby locking out poor and vulnerable customers who are perceived to be high-risk to formal lenders. These actions make them vulnerable to predatory lending which pushes them further into poverty (Finch and Kocieniewski, 2021). This resultant effect runs counter to the financial outreach agenda behind these ceilings (Villegas, 1982; DeYoung and Phillips, 2009).

In a perfectly competitive market, the price of credit (interest rate) should be set by the forces of supply and demand (Rothbard, 1988), where an increase in the demand for credit should see a corresponding increase in the interest rate and vice versa. However, due to market imperfections, interest rates are determined by a multitude of factors. Governments may choose to tamper with interest rates by instituting ceilings for three reasons. The first is to rein in banks in instances, where the central bank feels that banks may be colluding to distort the market and make super profits. The second and the third reasons are a monetary policy tool through which government achieves its monetary policy goals (Cottarelli *et al.*, 1986) and protection of non-bank borrowers, who are vulnerable to high interest rates (Alshebami and Khandare, 2015). In the Kenyan case, the reason cited for interest rate controls was to rein in banks, where the central bank felt that banks may be colluding to distort the market to make super profits and to protect a vulnerable group of borrowers. Banks were said to be charging usurious rates that were not reflective of the risk levels in the economy and that these high rates were locking out a significant portion of borrowers from accessing credit. The argument made by the legislators was that the interest rate ceiling would provide a margin that allowed for risk-based pricing by banks. It was also argued that by controlling the pricing of loans, more credit would be available for underfunded economic sectors, such as agriculture and manufacturing. However, evidence suggests that these objectives were not achieved. For instance, Alper *et al.* (2020) found that the introduction of the interest rate control has resulted in the reduction in lending to micro, small and medium-sized enterprises (MSMEs) and the credit portfolio of small banks.

Although the literature abounds on both bank level (Betubiza and Leatham, 1995; Maloba and Alhassan, 2019; Brester and Watts, 2019; Kim and Katchova, 2020) and the macroeconomic determinants of agricultural lending (Ayaya, 1997; Salami and Arawomo, 2013), little evidence exists on the effect of interest rate capping on lending to agriculture. In Kenya, the studies on interest rate caps have focused on its effect on aggregate lending (Meja, 2017; Safavian and Zia, 2018; Ochenge and Tiriongo, 2018; Alper *et al.*, 2020) and bank profitability (Mbua, 2017; Ng'ang'a, 2017). Due to the critical role of the agricultural sector to the country's development, it is imperative to evaluate the role of major policy changes such as introducing interest rate caps on the credit available to agricultural enterprises, especially considering that there is lack of conclusive evidence on the effect of regulation on bank lending (Thamae and Odhiambo, 2021). As far as the authors are concerned, the evidence of the effect of the introduction of the policy on lending to the agriculture sector in Kenya appears non-existent. Against this background, this paper therefore examines the effect of interest rate caps in stimulating lending to the agricultural sector using a panel data of 26 commercial banks between 2014 and 2018 in Kenya. From the panel regression analysis, the paper finds that the imposition of interest rate ceilings has a positively significant impact on credit supply to the Kenyan agricultural sector after controlling for bank-specific characteristics such as firm size, equity, asset quality, liquidity and revenue concentration. This suggests that interest ceilings may be effective in boosting lending to the sector.

The rest of the paper is organised as follows: Section 2 reviews the theoretical and empirical literature related to the paper, and section 3 discusses the empirical strategy employed in the paper. Section 4 presents the results, while section 5 concludes the paper with policy recommendations.

2. Literature review

2.1 Theoretical framework: interest rate cap and lending

Similar to other forms of government activities in free markets, the economic theory underlying the government's role in placing a cap on interest rates on bank loans is driven by the need to efficiently allocate resources at rates affordable for market participants. Theoretically, interest rate caps are meant to protect vulnerable consumers from excessive interest rates and enhance access to financial services by removing the barriers to credit (Ferrari *et al.*, 2018; Caballero-Montes *et al.*, 2021). Their effectiveness is however debatable. Advocates of interest rate caps believe that they are an effective tool for improving the competitiveness of the banking sectors (Capera *et al.* 2011), in countries where the market is not well developed. They also are said to limit access to high-interest loans and protect vulnerable consumers from usury (Glaeser and Scheinkman, 1998). In markets where the poor are exposed to disproportionately high interest rates, interest rate caps may improve financial inclusion to the poor by reducing their cost of borrowing and to limit competition to prevent over-indebtedness (Zetzsche and Dewi, 2018), especially in the micro finance sector (Caballero-Montes *et al.*, 2021). By limiting the profits of the lending sector, interest rate caps may cool down overheating debt markets by adding a barrier to entry for new players (Acclassato, 2008).

Notwithstanding the potential positives, interest rate caps have been shown to have significant undesirable effects as an alternative view suggests that interest rate caps have an adverse effect on bank lending because of credit rationing (Caballero-Montes *et al.*, 2021). For instance, the caps which serve as price ceilings distorts the market mechanism by under-pricing credit, which disincentivizes lenders and reduces the supply of credit (Madeira, 2019; Stiglitz and Weiss, 1981), especially where the rate caps are significantly lower than the market rates (Sloman *et al.*, 2012). This reduction of credit supply is particularly disadvantageous "among high-risk and low-income borrowers which may become

unprofitable due to the inability of charging them a higher interest rate" (Madeira, 2019; Zinman, 2010; Rigbi, 2013). Among the borrowers that are perceived to be riskier include micro-enterprises, rural borrowers and women (Campion *et al.*, 2010), and this may lead to poverty concentration and exclusion of vulnerable groups from financial markets. Other than credit rationing, other negative outcomes caused by interest rate ceilings may lead consumers to adopt less regulated forms of credit outside of the formal banking system (Roa, *et al.*, 2022) and potentially lead to mission drift whereby banks stray from a critical element of their core business (Cozarenco and Szafarz, 2020).

According to Ferrari *et al.* (2018) state that some countries a blanket approach or a single interest rate cap for all transactions. This may be problematic as it can result in a "dislocation of credit away from small or high-risk loan products". Moreso, an interest rate ceiling can either be set at a level that is suitable for large and secured loans or it can be too low for riskier borrowers (Bezemer *et al.*, 2023; Al-Azzam and Parmeter, 2021). This problem can be mitigated by applying multiple caps for various types of credit. By implementing interest rate ceilings, banks compensate for the loss of earnings from interest by charging additional fees and commissions. In Kenya, Ferrari *et al.* (2018) reported that 10 banks listed on the Nairobi Stock Exchange (NSE) between June 2016 to June 2017 experienced a drop in net interest income of 8.6% but income from fees and commissions increased by 6.2%. Furthermore, 54% of commercial banks in Kenya reported a that interest rate cap negatively affected lending to MSMEs (Alper *et al.*, 2020; Ferrari *et al.*, 2018). Additionally, they reduce the transparency of financial markets and sometimes lead to increased overall cost of transacting as banks seek to recoup their losses through hidden fees and charges (Sinha, 2016).

Caballero-Montes *et al.* (2021) argue that regulatory intervention is justified in the absence of a competitive market, such as a monopoly or oligopoly that causes asymmetric market power and high market prices. As such, regulators should consider measures that strengthen competition through a combination of inventions such as enhancing transparency and promoting financial literacy among clients (Caballero-Montes *et al.*, 2021; Acclassato, 2008). Alternatively, the interest rate ceiling could be initially set at a reasonable level and then incrementally reduced over time, which would give financial institutions the opportunity to adapt and not resort to charging additional fees (Caballero-Montes *et al.*, 2021).

2.2 Empirical literature

Several empirical studies have demonstrated the importance of commercial credit supply towards growing agricultural productivity, food security and the economy. The studies on the supply of credit to agricultural sector, which is closely related to this paper can be categorised into macroeconomic and bank level factors. From the bank level factors, Betubiza and Leatham (1995) examined the determining factors of commercial lending to agriculture in Texas covering 1053 banks in the United States of America (USA). The paper was motivated by the observed fluctuating commitment of commercial banks to lending to agriculture. In particular, the study observed that in the wake of the 1980 bank deregulation, the resultant increased access to loanable funds to banks had not resulted in increased lending to agriculture. Among the factors analysed were the banks' deposit structures, competition, profitability, the value of land in each county, the ratio of farm income to total income in each county, the population, oil production and the risk levels of each county, among others. The results showed that as commercial bank deposits become more sensitive to market rates, less funding was availed to agriculture. Following the introduction of the interest rate cap in Kenya in 2016, Safavian and Zia (2018) examined the effect on lending in the financial sector and reported reductions in general lending by banks [2]. To date, only two studies have examined the effect of (the Basel) regulations on lending to the agricultural sector in the USA. First, Brester and Watts (2019) documented evidence that an increase in agri-lending leads

to reduction in capital reserve requirements in the USA, while Kim and Katchova (2020) also found evidence to support reduction in agricultural lending following the implementation of Basel III regulations between 2008 and 2017.

From a macroeconomic perspective, Ayaya (1997) examined the effect of macroeconomic indicators on lending to agricultural sector in Kenya and found evidence to support the positive effect of inflation, interest rate and budget deficit between 1973 and 1992. Salami and Arawomo (2013) extended the study of Ayaya (1997) to cover ten African countries [3] from 1990 to 2011 to examine the effect of institutional factors on agricultural credit. The authors found land availability and savings rate improve agri-lending while deterioration in governance mechanisms and interest rates have the opposite effect on agri-lending.

In summary, the evidence on the impact of regulation on lending to the agricultural sector is limited mostly to the USA (Brester and Watts, 2019; Kim and Katchova, 2020), with no empirical assessments on financial systems in emerging economies which frequently implement the banking sector's regulatory reforms. This paper therefore seeks understand the role of regulations in stimulating the supply of credit finance to the agricultural sector in an emerging economy.

3. Methodology

3.1 Sample, data period and source

This paper targeted all 42 licensed commercial banks in Kenya as of 31st December 2019 (CBK, 2019) of which three were under statutory management and, therefore, were excluded from this paper. This paper covered the 4-year period between 2014 and 2018, which consisted of two years of a liberalised interest rate regime (i.e., 2014 and 2015), and two years under interest rate ceilings (2017 and 2018). The data from 2014 to 2018 was collected for purposes of analysis but only data for periods 2014/2015 and 2017/2018 was analysed. Data from 2016 was excluded as it covered a period which was not under interest rate ceilings (January to August) and a period that was under interest rate ceilings (September to December). Only the banks with continuous annual data over the periods 2014–2015 and 2017–2018 were included in this paper. After all such exclusions, the final vetted balanced panel data set comprised of 26 commercial banks.

3.2 Empirical model specification

This paper models the effect of interest rate caps on agri-lending on studies by Maloba and Alhassan (2019) and Kim and Katchova (2020) as defined in equations (1) and (2):

$$AGRILR_{it} = \beta_0 + \beta_1 IRCD_t + \beta_2 BSIZE_{it} + \beta_3 EQR_{it} + \beta_4 LIQ_{it} + \beta_5 ASQ_{it} + \beta_6 REV\_CON_{it} + \beta_7 BCR_t + \mu_{it} + \varepsilon_{it} \ldots\ldots\ldots\ldots \quad (1)$$

$$LAGRIL_{it} = \alpha_0 + \alpha_1 IRCD_t + \alpha_2 BSIZE_{it} + \alpha_3 EQR_{it} + \alpha_4 LIQ_{it} + \alpha_5 ASQ_{it} + \alpha_6 REV\_CON_{it} + \alpha_7 BCR_t + \epsilon_{it} + \theta_{it} \ldots\ldots\ldots\ldots \quad (2)$$

where i and t denote the bank and year respectively. *AGRILR* denotes agri-lending ratio defined as the percentage proportion of loans advanced to the agricultural sector to total industry loans and advances; *LAGRIL* denotes the natural logarithm of gross agricultural sector loans; *IRCD* is a dummy variable taking 0 to represent the pre-capping period (2014–2015) and 1 representing the post-capping period (2017–2018); *BSIZE* denotes the bank size;

EQR represents the equity ratio; *LIQ* is the liquidity ratio while *ASQ*, *REV_CON* and *BCR* represent asset quality, revenue concentration and 5-bank concentration ratio year *t* respectively. Finally, μ_{it} and ε_{it} denote the error term, which includes other unobserved bank-specific effects and idiosyncratic errors.

3.3 Measurement of variables

Agri-lending (AGRIL): It was measured by the agricultural-gross loans ratio computed as the percentage of total annual loans advanced to the agricultural sector in the total annual loan portfolio of a bank (AGRILR). In addition, we also included the second proxy, the natural logarithm of total annual loans advanced to the agricultural sector to capture the sensitivity of agri-lending to the interest rate capping regulation. It was hypothesised that interest rate capping would have a significant effect on the volume of loans to the agricultural sector. Studies by Maloba and Alhassan (2019) and Kim and Katchova (2020) have used similar metrics to evaluate agri-lending.

Interest rate capping (IRCD): This was taken as a dummy variable with 0 representing the pre-interest rate capping period (2014–2015) and 1 denoting the post-interest rate capping period (2017–2018). It was hypothesised that interest rate capping would have a significant effect on the amount of loans advanced to the agricultural sector (Madeira, 2019).

3.4 Measurement of control variables

Bank size (BSIZE): This was measured by the natural logarithm of a bank's total assets in a given year (Yasmin and Rashid, 2018). A study by Ellinger *et al.* (2007) established a positive relationship between the size of a financial institution and lending to agriculture by commercial banks. Therefore, it was anticipated that interest rate capping would have a significant effect on the volume of loans to the agricultural sector after controlling for the effects of the bank size.

Equity (EQR): This was measured by the banks' equity-asset ratio. This was computed as the percentage of total annual equity to the total assets of a bank (Prabowo *et al.*, 2019). There is no consensus regarding the true nature of the relationship between equity and lending to the agricultural sector in the extant literature. For instance, Koch (1988) observed that banks with a large equity base are more willing to engage in more risks by investing more in loans. In contrast, Betubiza and Leatham (1995) posited that financial institutions with a smaller equity base are more willing to invest in riskier assets, such as loans, in a bid to boost expected returns. However, based on the trade-off theory advanced by Berger (1995), a positive relationship exists between equity and the amount of credit supplied by a financial institution. Therefore, it is expected that interest rate capping would have a significant effect on the volume of loans to the agricultural sector after controlling for the effects of the equity of the banks.

Liquidity (LIQ): This was measured as the ratio of a bank's cash balances to total deposits expressed as percentage. Previous studies by Olumuyiwa (2012) and Timsina and Pradhan (2017) established that a bank's liquidity level has a significant effect on its lending behaviour. To determine the relationship between interest rate capping and the volume of loans advanced to the agricultural sector, it was important to control for the effect of the banks' liquidity. It is expected that interest rate capping would have a significant effect on the volume of loans to the agricultural sector after controlling for the effects of the banks' liquidity levels.

Asset quality (ASQ): This was measured by the ratio of non-performing loans to the annual total loan portfolio of a bank. Shirzadi (2015) established a negative relationship between asset quality and credit advanced to the agricultural sector. Therefore, in order to

determine the relationship between interest rate capping and the volume of loans advanced to the agricultural sector, it was important to control for the effect on the banks' liquidity. It was expected that interest rate capping would have a significant effect on the volume of loans to the agricultural sector after controlling for the effects of asset quality.

Revenue Concentration (REV_CON): In line with arguments of Abedifar *et al.* (2018), this paper argues for a positive effect of revenue diversification on bank lending performance through two main channels. First, the expansion into non-interest and fee generating activities enable banks to access to information on potential clients and their credit worthiness, hence increasing lending. The second channel is through the lower interest margins facilitated by information access from non-interest income activities which increases lending, ceteris paribus. In line with Alhassan (2015), this variable was measured using the Herfindahl-Hirschman Index (HHI) of interest and non-interest income.

Bank Concentration (BCR): Market concentration has been shown to affect lending in two contrasting mechanisms: the first, which is associated to the *market power hypothesis* (Klein, 1971), shows that high bank concentration reduces access to bank loans as there is reduced loan supply and higher lending rates. In contrast, the *information hypothesis* (Petersen and Rajan, 1995) argues that where there's high bank concentration, banks invest more in building client relationships, reducing information asymmetries and agency costs thereby increasing access to finance. The structure-conduct-performance paradigm attempts to find resolution to these two contrasting theories and finds that increased concentration is associated to greater access to finance both in Germany (Fischer, 2000) and the US (Petersen and Rajan, 1995), but the opposite in countries where the banking systems are not sophisticated (Chong *et al.*, 2013) or the country's level of economic development is low (Beck *et al.*, 2004).

Table 1 shows a summary of how variables were measured, along with the corresponding literature sources.

	Measurement	Literature sources
Dependent Variable		
Agri-lending	Ratio of a bank's loans to the agricultural business segment to total loans advanced (AGRILR) The natural logarithm of loans to the agricultural business segment (LAGRIL)	Maloba and Alhassan (2019), Kim and Katchova (2020)
Independent Variable		
Interest rate capping	Dummy variable taking 0 to represent the pre-capping period (2014–2015) and 1 for the post-capping period (2017–2018)	Madeira (2019)
Control Variables		
Bank size	Natural logarithm of a bank's total assets	Yasmin and Rashid (2018)
Equity	Ratio of equity to total assets	Prabowo *et al.* (2019)
Liquidity	The ratio of cash balances to total deposits	Timsina and Pradhan (2017), Olumuyiwa (2012)
Asset quality	The ratio of non-performing loans to gross loans	Shirzadi (2015)
Revenue Concentration	HHI index of interest and non-interest income	Alhassan (2015)
Bank Concentration	5 bank asset concentration ratio	Corvoisier and Gropp (2002)

Source(s): Authors' construction

Table 1.
Variable description

4. Results

4.1 Summary statistics

The summary statistics of the regression variables are presented in Table 2. The average volume of loans advanced to the agricultural sector during the entire study period was 7.50% of total industry loans (*SD* = 0.120), a substantial increase compared to the estimates report by Maloba and Alhassan (2019) for Kenya between 2011 and 2017, albeit for a smaller sample of financial institutions. Similarly, the growth in loans and advances to the agricultural sector averaged 7.287% over the study period. Compared to the estimates of 16.9% by Kim and Katchova (2020) between 2008 and 2016, agri-lending is much higher among banks in the USA. On average, the size and equity of the banks through 2014 to 2018 stood at 10.68% (SD = 1.362) and 23.4% (SD = 0.213) respectively with average asset quality ratio (ASQ) of 21.8% (*SD* = 0.264). The average liquidity ratio 31.0% (*SD* = 1.353) indicates that Kenyan banks hold approximately 30% of customer deposits in cash to meet on-demand customer withdrawals. Finally, the revenue concentration indicator suggests heavy reliance on interest generating activities as the main source of revenue while approximately 52% of total industry assets are held by the top 5 banks which indicates a high level of bank concentration. The winsorized values presented in Table 2 are for illustrative purposes but employed in the regression estimations to account for the effect of outliers.

4.2 Regression results [4]

The results of the fixed effects (FEM) regression estimation to examine the effect of the interest rate capping on agricultural lending in Kenya are presented in Table 3 (Column A). The results, based on the Random effects (REM) estimation technique are presented for the period where the cap was not in place (pre-cap) in Column B and the post-cap period in Column C. The regression models were estimated to control for the presence of heteroskedasticity based on the Breusch-Pagan/Cook-Weisberg Heteroskedasticity test results. The results indicate that approximately 37% (Equation 1, A) and 36% (Equation 2, A) variation in the proportion of loans to the agricultural sector and growth in agriculture sector lending respectively when accounting for interest rate capping is explained by the models. The explanatory power ranged between approximately 16 and 47% for the pre-cap and post-cap estimations.

From Table 3, the proportion of agricultural loans during the post-interest cap period was 0.020 times higher compared with the pre-cap period. Similarly, a growth of 0.302% in

Stats	Mean	SD	Median	Min	Max
WAGRILR	0.068	0.094	0.038	0.005	0.403
LAGRIL	7.287	1.719	7.629	0.461	9.752
IRCD	0.500	0.502	0.500	0.000	1.000
BSIZE	10.680	1.362	10.540	7.870	13.450
WEQR	0.229	0.190	0.170	0.098	0.827
WLIQ	0.146	0.165	0.094	0.042	0.762
WASQ	0.207	0.227	0.108	0.020	0.820
REV_CON	0.712	0.134	0.698	0.501	1.067
BCR	52.870	2.132	53.748	48.654	54.260

Note(s): AGRILR=Agricultural lending ratio; LAGRIL = Natural logarithm of agricultural loans; IRCD=Interest rate capping; BSIZE=Bank Size; EQR = Equity ratio; LIQ = Liquidity ratio; ASQ = Asset quality; REV_CON=Revenue concentration index; BCR = 5-Bank concentration ratio. W denotes winsorized values of the variables to account for outliers

Source(s): Authors' estimates from research data

Table 2.
Descriptive statistics

Dependent variable	Equation (1) Agricultural sector loans/Gross loans			Equation (2) Ln (loans to the agricultural sector)		
Models	Full sample A FEM	Pre-interest rate cap B REM	Post-interest rate cap C REM	Full sample A FEM	Pre-interest rate cap B REM	Post-interest rate cap C REM
Constant	1.090***	0.975	0.472**	26.411***	81.648	−1.766
	(0.277)	(0.913)	(0.192)	(8.701)	(55.272)	(3.337)
Interest rate cap	0.020**			0.302**		
	(0.008)			(0.146)		
Bank size	−0.083***	−0.039***	−0.037***	−1.499**	0.832***	0.584***
	(0.023)	(0.014)	(0.012)	(0.611)	(0.215)	(0.182)
Equity ratio	−0.145***	−0.375*	−0.073	−2.130	−5.180	−0.372
	(0.036)	(0.212)	(0.079)	(1.673)	(6.141)	(1.199)
Liquidity	0.026	0.042	0.236**	−0.001	1.097	3.539
	(0.028)	(0.026)	(0.104)	(0.577)	(1.178)	(2.281)
Asset quality	−0.020	−0.002	0.021	−0.913	−0.031	1.001
	(0.024)	(0.022)	(0.069)	(0.538)	(0.899)	(1.095)
Revenue	0.012	−0.031	0.035	0.491	−0.331	2.973*
Concentration	(0.037)	(0.051)	(0.101)	(0.696)	(1.723)	(1.794)
Bank	−0.002	−0.007	−0.001	−0.041	−1.542	−0.004
Concentration	(0.001)	(0.018)	(0.001)	(0.038)	(1.040)	(0.033)
F/Wald χ^2	5.11	14.26	14.91	2.69	23.7	16.53
Prob > F/Wald χ^2	0.0001	0.0269	0.0209	0.0319	0.0006	0.0112
R-squared	0.3736	0.1557	0.3074	0.3613	0.4672	0.4891
Hausman χ^2 (Prob > χ^2)	−14.73 (0.000)	3.36 (0.7624)	4.01 (0.6752)	15.463 (0.032)	1.81 (0.936)	1.16 (0.8848)
BP/CW Hettest χ^2 (Prob > χ^2)	66.66 (0.000)	32.65 (0.000)	36.79 (0.000)	6.34 (0.012)	7.18 (0.007)	3.82 (0.051)
Banks	26	23	25	26	23	25
Observations	93	44	49	93	44	49

Note(s): Model A denotes the sample period estimate (2014–2018); Model B denotes pre-interest rate cap estimates (2014–2015); Model C denotes post-interest rate cap estimates (2017–2018); BP/CW Hettest = Breusch-Pagan/Cook-Weisberg Heteroskedasticity Test; Hausman χ^2 = Hausman specification test; Heteroskedastic and autocorrelation consistent (HAC) standard errors in parentheses. ***, ** and * denotes significance at 1%; 5 and 10% respectively

Source(s): Authors' estimates from research data

Table 3.
Random effects regression results

agriculture sector lending was observed for the post-interest rate cap at a 5% significance level. This indicates that lending to the agricultural sector increased post-interest capping. A possible explanation of this phenomenon, as suggested by Ochenge and Tiriongo (2018), is that the banks lent more to clients with collateral or better risk profiles, a criterion which a lot of the agricultural practitioners met. The finding contradicts the non-price rationing theory and arguments of Stiglitz and Weiss (1981), Madeira (2019) and Caballero-Montes *et al.* (2021) that establishing interest rate ceilings leads to a reduction in the total loan portfolio.

The results also showed that of the five control variables, bank size, equity ratio and liquidity have a significant effect on agri-lending. Specifically, the coefficient of bank size was observed to be negative and significant at 1% across all the three models in Equation (1), which indicated that the larger a financial institution was, the lower their level of lending to the agricultural sector. This suggests that firm size plays an important role in agri-lending by Kenyan banks, supporting the finding by Ellinger *et al.* (2007). However, the estimated effect

of bank size on the agri-lending was lower during the post-capping period (−0.037) than during the pre-capping period (−0.039). This finding is consistent with the observations of Alper *et al.* (2020) who reported a reduction in lending by smaller banks after the introduction of the interest rate ceilings. On the contrary, a positive effect of banks size is observed on the growth in agri-lending across both periods, with the pre-cap period associated with a higher effect compared to post-cap period.

Similarly, the effect of equity is observed to be negative across all models but only significant in Equation (1) (Models A and B) at 5% which suggests that decreases in the bank's equity ratio leads to an increase in the volume it lends out to the agricultural sector. This finding can be attributed to the argument of Betubiza and Leatham (1995) as cited in Maloba and Alhassan (2019) that less capitalised banks undertake riskier lending with the expectation of a higher return. In addition, a higher coefficient of the equity ratio is observed for the pre-cap period compared with post-cap to suggest that introduction of the interest rate cap curtailed the risky lending behaviour of banks. Similar to the arguments by Cosimano and Hakura (2011) on capital requirement regulations, the introduction of the interest rate cap which places a maximum limit rate on loans reduces banks marginal revenue from intermediation and incentive to lend.

The positive effect of liquidity proportion agri-lending is only significant in the post-cap at 5% (Equation 1, C), which indicated that increases in bank liquidity resulted in an increase in bank agri-lending. This could be attributed to the fact that high liquidity ratios point to better protection from shocks due to their deposit size and ability to expand lending. This outcome is consistent with Olumuyiwa (2012) and Timsina and Pradhan (2017), who established that a bank's liquidity level has a significant effect on its lending behaviour. Unlike bank size, the effect of liquidity on agri-lending was observed to be greater during the post-capping period than the pre-capping period. The negative effects of asset quality and bank concentration were found to have no significant effect on agri-lending during the entire study period. This finding contradicts Shirzadi (2015) who found a negative link between asset quality and volume of loans advanced to the agricultural sector. Lastly, the positive effects of revenue concentration on the proportion of agri-lending and growth of agri-lending are observed to be insignificant in the full sample estimations. However, the pre-cap period was associated with negative effect of revenue concentration while post-cap period was found to be associated with a significant (10%) positive effect of revenue concentration on growth in agri-lending. This observation is consistent with arguments of Abedifar *et al.* (2018).

5. Conclusions and recommendations

The goal of this inquiry was to examine the influence of interest rate capping on the loans issued to the agricultural sector by commercial banks in Kenya. The results revealed that the amount of credit supplied to the agricultural sector increased following the imposition of interest rate ceilings. The findings from the panel regression analysis confirmed that the variations in the amount of loans to the agricultural sector are affected by the imposition of interest rate ceilings. The key finding in this paper is that the imposition of interest rate ceilings has a significant impact on credit supply to the Kenyan agricultural sector. The finding holds true after controlling for bank-specific characteristics such as bank size, equity, asset quality, liquidity, revenue concentration and bank market concentration. This suggests that interest ceilings may be effective in boosting lending to the sector.

The government has the critical role of ensuring a stable policy environment that enhances the growth of the financial sector, which by extension, facilitates the growth of other key sectors through the provision of funding. With this in mind, incentivising and disincentivising policies or regulations must be long term and stable in order to ensure

investment certainty, which in turn, motivates private funding and business activity in the financial sector. Interest rate ceilings are commonly said to be necessary to ensure access to "fair" interest rates. The assumption underlying this view is that the demand for loans would be higher if the interest rates charged by banks are lower, and there would be no dampening of the supply of credit to the private sector as a result of the ceilings. The imposition of an interest rate ceiling on lending rates and a floor on deposit rates was anticipated to attract a greater flow of savings into the Kenyan commercial banking system to facilitate a more efficient allocation of funds for longer-term credit arrangements resulting in better intermediation. With a greater bulk of total bank deposits, it was expected that the outcome would fundamentally lead to more positive returns for the banks in terms of profitability and dividend payouts to the shareholders. The analysis in this paper attests to the success of ceilings in attracting borrowers.

The results of this paper point to the effectiveness of interest rate capping in meeting its objectives. This calls for the strengthening of cooperation between the government and key stakeholders in the financial sector. This will allow for the effective enforcement of policies by the regulatory powers in a manner that guarantees sound and dynamic financial systems. In this regard, there is a need for continuous engagement between the banking sector, the non-financial sector and the CBK. This is necessary to explore additional measures and strategies that can support the banking sector, protect consumers from exploitation and protect borrowers from excessive interest rates. The Kenyan government should strive to provide an enabling environment set up to elevate the competitiveness of the banking sector, which could potentially lower the cost of credit access by many citizens. A number of steps can be undertaken to facilitate this, such as stabilising macroeconomic factors, charting sound legal regulations, launching widespread financial education initiatives and diversifying the financial ecosystem through efforts, such as setting up credit agencies or expanding the role of existing credit bureaus to enhance the sharing of credit profile information across banks. When used, interest rate capping legislation should be selective to target sectors, as opposed to being sector wide, to prevent disincetivisation of investment in the country. Direct agriculture-sector incentives such as rebates and guarantees are policy alternatives to consider.

The present study primarily relied on secondary data and was limited to commercial banks in Kenya. As such, it is suggested that future researchers consider carrying out more robust studies utilising mixed methodology designs in uncovering the effects of interest rate capping with a wider coverage of different types of financial institutions and of different countries. Finally, a study of the sector after the lifting of the interest rate caps would increase the availability of evidence-based research on the effect of interest rate ceilings on lending to the agricultural sector.

Notes

1. The average exchange rate in 2023: 1 USD = 131.9257 KES.
2. A related study by Maloba and Alhassan (2019) investigated the determinants of agri-lending among financial institutions in Kenya over the period 2011 to 2016 and found a negative effect of equity and credit risk on the proportion of gross loans advanced to the agricultural sector. The lending rate and firm size were observed to have a positive and significant effect on agricultural lending.
3. Burundi, Chad, Egypt, Kenya, Lesotho, Mali, Nigeria, Rwanda, South Africa and Sudan.
4. Before undertaking the regression estimations, the correlation among the independent variables were first examined to avoid the potential of multicollinearity which produces biased and inconsistent estimates of the model parameters. Based on the correlation matrix (Appendix), lower correlations (i.e. correlation coefficients less than 0.5) are observed among the variables which implies that multicollinearity is not present in the model.

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Appendix

Table A1. Correlation results

	AGRILR	LARGRIL	IRCD	BSIZE	WEQR	WLIQ	WASQ	REV_CON	BCR5
AGRILR	1.000								
LARGRIL	0.258***	1.000							
IRCD	−0.066	−0.040	1.000						
BSIZE	−0.428***	0.586***	0.023	1.000					
EQR	−0.060	0.045	0.126	−0.050	1.000				
LIQ	−0.025	0.287***	0.016	0.171**	0.164**	1.000			
ASQ	−0.015	0.123	0.161*	0.042	−0.108	−0.044	1.000		
REV_CON	0.192**	−0.022	−0.012	−0.144*	0.078	−0.121	−0.161**	1.000	
BCR5	0.008	−0.015	−0.490***	−0.032	0.024	−0.034	−0.098	0.052	1.000

Note(s): AGRILR=Agricultural lending ratio; LAGRIL = Natural logarithm of agricultural loans; IRCD=Interest rate capping; BSIZE=Bank Size; EQR = Equity ratio; LIQ = Liquidity ratio; ASQ = Asset quality; REV_CON=Revenue concentration index; BCR5 = 5-Bank concentration ratio. W denotes winsorized values of the variables to account for outliers. ***, ** and * denote significance at 1%, 5 and 10% respectively
Source(s): Authors' estimates from research data