

**Research Article****PRUDENTIAL MEASURES AND MONETARY POLICY ON MORTGAGE LOANS IN THE ECONOMIC COMMUNITY AFRICA****¹François-Romain BAHATI SEBASORE, ²Clément BULA BASUAYI, ³Isaie KADHAFI and ^{4,*}Ildephonse SINDAYIGAYA**^{1,2}The Faculty of Economics, Business, and Management, University of Rwanda University, Kigali, Rwanda³Monash University, Department of Management, McMahons Road, Frankston 3199, Austria⁴Ecole doctorale de l'Université du Burundi, Bujumbura, Burundi**Received** 10th September 2024; **Accepted** 12th October 2024; **Published online** 29th November 2024

Abstract

This paper aims to investigate and analyze the role that play monetary policies and prudential measures on mortgage portfolio. It also compares the level of applicability of monetary policies and prudential measures on mortgage portfolio in the low incomes countries of the Economic Community of the Great Lakes Region of Africa (Tanzania, Uganda and Kenya). Panel data analysis was applied to samples from a period of 1990 to 2020 to perform various statistical analyzes and test hypotheses. In spite of that the study investigated the role of prudential measure and monetary policy on loan mortgage in the low income countries rather than high incomes countries as usually, the study added to the existing models new variables such political instability, financial inclusion, lack of insurance credits, institutional quality and business environment.

Keywords: Mortgage, Monetary policy, Prudential measures, Financial inclusion, Political stability, Quality of institution.

INTRODUCTION

Clausen & Dib (2018) suggests that the reaction of real estate markets to changes in monetary policy depends on the economic and financial conditions specific to each country. Developed economies tend to exhibit stronger and more direct transmission mechanisms, while emerging markets may exhibit a more moderate or delayed response. This highlights the importance of examining country-specific factors when assessing the potential impact of monetary policy on real estate markets. On their side, Romagnoli & Duca(2019) indicate that the effect of monetary policy adjustments on mortgage interest rates is not perfect and is conditioned by various factors. Similarly, Hofmann & Clausen (2015) highlight that unconventional monetary policy measures can influence mortgage lending beyond traditional changes in interest rates. Quantitative easing programs can boost mortgage lending by reducing borrowing costs and increasing market liquidity, while forward guidance can shape expectations and build confidence in the real estate sector. However, their effectiveness and the associated transmission mechanisms vary depending on the specific political configuration of each country, its economic situation and the structure of its financial system. In opaque environments with less institutional oversight, borrowers faced higher interest rates and unfair lending terms than in transparent environments with strong regulatory frameworks (Sindayigaya, 2024, 2023a, 2023b, 2022). This suggests that corruption and poor institutional governance can lead to predatory lending practices in the mortgage market (Abhijit Banerjee & Esther Duflo, 2005). Variables such as mortgages, bank balance sheet characteristics, and channel variables were also used (Everett *et al.*, 2021).

So far, the studies mentioned above have been conducted in high-income countries, different from low-income countries. It is therefore necessary to investigate this study in low-income countries such as the Great Lakes region of Africa (Economic Community of the Great Lakes Countries, CEPGL). The CEPGL includes the following states: Burundi, Democratic Republic of Congo (DRC) and Rwanda. These are low-income countries and are exposed to ongoing political instability/insecurity caused by civil wars which can positively or negatively affect the mortgage loan. Furthermore, the above studies did not include their model of variables such as political instability, financial inclusion, lack of credit insurance, institutional quality and business environment (Jonja *et al.*, 2024, 2023). The aim of the present study was to fill gaps in the literature review by updating and supplementing the study by Everett *et al.* (2021) by adding variables such as political instability, financial inclusion, lack of credit insurance and institutional quality. Therefore, although several studies have been conducted on surveillance measures and monetary policy in high-income countries, no consensus has yet been found on the types of intermediate/control variables that can be used in the models. Some studies have focused on variables such as macro prudential policy, excess household credit growth, bank size and liquidity, credit growth, bank risk and non-performing loan ratios (Cantú, Gambacorta & Shim, 2018). The Central Bank of Ireland has capitalized on macro prudential mortgage policy, financial stability, borrower and lender resilience, house prices and credit (Central Bank of Ireland, 2022). Borio, Drehmann & Tsatsa (2017) focused on macro prudential policy, mortgage costs, high-risk borrowers, aggregate credit supply, macro prudential policy, finance, etc. I was using variables. Stability and access to credit. Variables such as macro prudential and monetary policy, housing market cycles, systemic risk, macro prudential policy(David *et al.*, 2023; Ndayisenga and Sindayigaya, 2024a, 2024b; Nduwimana and

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Sindayigaya, 2023a, 2023b), procyclical effects of monetary policy and housing credit are highlighted (Cecchetti, & Mohanty, 2018). Cheng & Scatigna (2017) focused on macro-prudential and micro-prudential policy variables, mortgage market management, excessive credit growth, and systemic risk. Mortgage market stress, propagation of monetary policy shocks, mortgage financing, information asymmetry, transaction costs, interest rates, increased borrowing, policy effectiveness monetary policy, the real estate market, the effectiveness of monetary policy, etc. variable (Duca & Polidoro, 2015). The variable changes in monetary policy, MBS issuance, interest rate decline, high risk MBS issuance, low risk MBS issuance, monetary policy, risk behavior and mortgage market were modeled (Duca & Jin, 2016). Beck, Demirgüç-Kunt & Maksimovic (2018) explain changes in monetary policy, housing affordability, monetary policy, house prices, income growth, and decline in affordability, housing markets, potential conflicts, and support for economic growth. We used basic variables such as interest rates and affordable housing prices. Housing and low-income households (Beckles, Hanousek and esaran, 2023). Inflation, house prices, house price increases, unexpected inflation, uncertainty, rising borrowing costs, inflation volatility, financial systems, real income We used variables such as growth, interest rates, and exchange rates prices for modeling their research.

Rochowicz and Shi (2018) used inflation, housing affordability, emerging markets, house prices, income growth, low-income households, public credit, housing costs, economic growth, income inequality, government policies, etc. as variables. The scope of application of regulatory and monetary policy rules is very broad. Several studies have highlighted the relationship between mortgage credit and other control variables. Supervisory measures could effectively curb the mortgage boom and reduce systemic risks in the financial system (Beck, Demirgüç-Kunt & Maksimovic, 2019). However, Adjali, Degryse & Mizen (2012) shows that regulatory policies, especially the tightening of his LTV ratio, lead to a decline in both mortgage lending and house prices. Regions with LTI restrictions experienced significantly lower mortgage growth and less pronounced home price increases compared to regions without policies (Iacovella & Pozo, 2013). Chetty, Friedman, & Rothstein (2014) demonstrated the positive effects of fair housing laws in improving access to mortgage loans for minority borrowers in some areas, although in equalities still exist and emphasizes the continued need for strong fair lending regulation and institutional enforcement. In this sense, Mitchell, McGuire & Timothy (2014) guaranteed property rights evidenced by clear title documents and effective dispute resolution mechanisms can lead to expanded access to mortgage financing and are associated with higher homeownership rates. However, stricter regulation ends to constrain the introduction and distribution of new mortgage products, and concerns about the potential trade-off between regulatory stability and the availability of diverse financing options for borrowers (Robert, Lucas Jr., Driscoll & Moscoso, 2012). (Cerutti, Clausen & Zaman (2017) showed that different macro prudential policies have different impacts on housing prices and credit. It is often difficult to separate regulatory measures from monetary policy. As shown by Clausen & Bouwman (2015), monetary policy easing tends to be associated with rising house prices, particularly in the top quartile of the distribution. For their part, (Duca & Polidoro (2013) show the dynamic interrelation between monetary policy and the demand for mortgage loans. Changes in interest

rates directly affect mortgage borrowing, but expectations of future monetary and fiscal policy stress may also play a role in shaping the response. As already mentioned by Gagnon & Leduc (2012), lower interest rates can stimulate demand for housing and lead to increased investment in construction. They added that QE (quantitative easing) had a significant downward effect on mortgage rates, particularly at the height of the financial crisis. Rising mortgage rates can make housing more affordable, even if house prices fall, due to the cumulative effect of increased interest payments on mortgage borrowers (Mayer and Rossi, 2006).

There is strong evidence of a negative relationship between interest rates and property investment, meaning that higher interest rates discourage borrowing to buy or build a home (Mayer, 2011). However, this effect lessened over time as market conditions stabilized. Monetary policy changes have asymmetric effects on MBS issuance. As noted, falling interest rates tend to stimulate the issuance of high-risk MBS more than that of low-risk MBS (Iacovella & Ahearne, 2007). Changes in monetary policy have a significant impact on both mortgage growth and house prices. Lower interest rates tend to increase mortgage borrowing and drive up housing prices, but higher interest rates have the opposite effect (Buhendwa *et al.*, 2023; Nyabenda and Sindayigaya, 2024, 2023; Sabiraguha *et al.*, 2023; Sindayigaya and Nyabenda, 2022). The extent of the impact varies from country to country and depends on several factors, including the level of development of financial markets and the presence or absence of tensions in the mortgage market.

However, Iacovella & Pozo (2012) emphasize that monetary policy shocks affect the real estate market mainly on the demand side by affecting mortgage loans and real estate prices. They added that lower interest rates could boost demand, spur credit growth and potentially increase house prices. However, supply-side effects also play a role, as changes in construction activity respond with a lag to changes in monetary policy. Along the same lines, Everett, Farrelly & Fitzgibbon (2021), a restrictive monetary policy shock in the Eurozone reduces mortgage growth in Ireland and the Netherlands. However, we also find that while stronger domestic prudential regulation mitigates the impact of monetary policy shocks in Ireland, this is not the case in the Netherlands. However, Ahearne, Bouwman & Gobbi (2011) shows the complexity of the relationship between monetary policy and real estate investment, where demand and supply factors play a role. This complexity between monetary policy and mortgages highlights the relationship between mortgages and inflation. There is a significant negative relationship between inflation and the demand for mortgages. As noted previously, higher inflation rates are associated with lower growth in mortgage debt (Funder and Jensen, 2009). Ling, Mayer & Sinai (2010) argue that rising inflation can negatively impact housing affordability for potential buyers because the nominal price of a home increases more quickly as income. This could lead to less demand for housing and lower homeownership rates. There is, however, a positive long-term relationship between inflation and house prices around the world. On average, higher inflation leads to higher house prices in the long term. In the short term, unexpected inflation could negatively impact house prices due to uncertainty and rising borrowing costs. This study also highlights significant heterogeneity in relations between countries. The impact of inflation on property prices is stronger in countries characterized by high inflation

volatility and weak financial systems (Beckles, Hanousek, Pesaran, 2023). Michal and Shi (2018) found that inflation has a negative impact on housing affordability in emerging markets. Rising inflation causes house prices to rise faster than income growth, reducing housing affordability for households. However, the impact of inflation varies by country and household type. Low-income households and those with limited access to public financing are disproportionately affected by rising housing costs due to inflation. Besides the link between mortgages and inflation, there are also studies that prove a link between mortgages and gross domestic product (GDP). Therefore, a 10% increase in mortgage financing was associated with a 0.6% increase in GDP growth rate, and a positive and significant causal relationship between mortgage financing and economic growth was observed PIB (He, Qian, and Zhai, 2013). They also found that while increased mortgage lending led to higher GDP growth in the short term, it was also associated with higher house prices and increased vulnerability to financial shocks. The ensuing housing crisis had a significant negative impact on GDP growth and employment (Mayer and Rossi, 2012). Like that, Mayer and Perli (2018) found strong evidence of a positive relationship between real estate financing and economic growth in developed and developing countries.

They also highlighted the importance of considering potential risks and vulnerabilities associated with the rapid growth of the mortgage market. However, Caballé, Lafarga, and López-Salido (2010) believe that the strength of the relationship varies depending on the level of financial development and the quality of institutions. Regarding the relationship between housing loans and total bank assets, we found that an increase in bank capital is associated with a decrease in housing loans during an economic downturn, but is associated with an increase in housing loans during economic recovery. This suggests that there is a complex relationship between bank capital and mortgage lending activity depending on economic conditions (Ahearne & Bouraoui, 2010). Large banks in emerging markets tend to have a higher proportion of mortgage lending as a percentage of their total assets, but surprisingly they do not necessarily have riskier lending activities than smaller banks (Demirgüç-Kunt, Laeven and Levine, 2008). However, smaller banks tend to have a higher proportion of mortgages in their loan portfolio than larger banks. This suggests that there may be a relationship between bank size and concentration on certain lending segments, as has been highlighted in the case of mortgages (Berger & Udell, 2004). On the other hand (Sufi, 2011), it was found that banks with a higher ratio of mortgage loans to total assets resorted to riskier lending practices and suffered higher losses during the crisis, and that banks with a higher proportion of mortgage loans than banks total assets were found to have resorted to riskier lending practices and suffered higher losses during the crisis, which highlights the potential vulnerability associated with reliance on loans. The higher the proportion of mortgage assets in a bank's portfolio, the more likely it is to use wholesale financing through securitization. This highlights potential financial vulnerabilities associated with banks' financing structures that rely heavily on mortgage-backed securities (Pagano and Zurlini, 2010). Some authors also found that digital channels increased the number of mortgage applications overall, although there were differences based on borrower demographics and creditworthiness. Access to technology and convenience influence borrowers' participation in online mortgage applications (Agarwal, Chomsisengphet

and Feng, 2019). Areas with large mortgage markets tend to have higher ATM densities and broader financial inclusion (Demirgüç-Kunt and Klapper, 2010). Rural areas generally have lower ATM densities than urban areas and faced difficulty accessing mortgage financing (Boulianne and Patten, 2014). However, growing uncertainty around house prices has led to a decline in personal consumption, including fewer ATM withdrawals. Mortgage affordability indirectly influences ATM usage through its impact on overall financial confidence and spending habits (Boulianne and Patten, 2014). For example, the World Bank suggests that implementing digital platforms and technology solutions in bank branches can improve efficiency, transparency and access to mortgage services, particularly for underserved populations (World Bank, 2017).

For branch banks, agency banking results in lower transaction costs for mortgage products compared to traditional branch services, potentially making mortgages more affordable for some borrowers (Mwai, 2013). Agency banking has increased access to mortgage products, especially in rural areas where the presence of branches was limited (Barasa & Mwirigi, 2013). Berger & Udell (2004) also found that banks with more diverse branch networks, especially in urban and rural areas, have higher loan transaction volume. Bank closures in some markets have led to a decline in mortgage lending (Hirtle, 2007). Avery & Shin (2010) found that branch closures disproportionately impact low-income and minority communities, leading to a decline in mortgage and real estate lending. He adds that access to services is limited. Additionally, bank mergers in some markets have led to reduced mortgage competition, particularly in rural areas. This highlighted the negative relationship between bank consolidation and access to mortgages in some communities (Berger & Udell, 2004). Khan also pointed out that certain types of bank mergers, coupled with a lax regulatory environment, result in less competition and limited access to affordable mortgages in local markets. He also emphasized the importance of a strong regulatory framework to support the market (Kahn, 2009). Countries with high levels of general trust have high levels of financial inclusion and good access to credit, including mortgage products, highlighting the potential role of social capital in promoting healthy mortgage markets (Fisman & La Porta, 2004). Countries with stronger legal systems had lower foreclosure costs and fewer mortgage defaults. This highlights the positive relationship between institutional quality and a more efficient and stable mortgage market (La Porta, Lopez-de-Silanes, Shleifer, 2008). Countries with high institutional quality, measured by factors such as rule of law, protection of property rights, and control of corruption, have lower mortgage default rates and better mortgage management credit. Risk efficiency in the mortgage market (Abhijit Banerjee, Roland Benabou, & Dilip Mookherjee, 2002) There is therefore also a negative correlation between historical periods of political repression and current homeownership rates. Political instability has persistent negative effects on mortgage market development and household wealth accumulation (Edwards & Olivero, 2012). Countries experiencing long periods of political instability tend to experience slower mortgage market development and economic growth over time (Fecht & Isern, 2017). Periods of increased political instability, coupled with lower mortgage loan applications and lower real estate transaction volumes, lead to lower consumer confidence in the housing market and provide an indirect means for political

uncertainty to arise (Fecht & Klose, 2023). Political violence, including guerrilla attacks and kidnappings, has reduced mortgage lending and restricted access to financing in affected regions, highlighting the negative impact of instability on real estate markets in conflict zones (Castro & Diaz-Bonilla, 2015). Increasing levels of corruption have been associated with rising land prices and construction costs, leading to limited access to mortgages and restricted access to mortgage loans, particularly for low-income households (Banerjee, Benabou, & Mookherjee, 2002). Periods of increased political instability are associated with increased mortgage defaults, suggesting a negative relationship between political uncertainty and financial behavior in the mortgage market (Fecht & Isern, 2010).

Furthermore, increased political risk leads to higher mortgage rates, suggesting that political uncertainty increases borrowing costs and limits homeowners' access to financing (Demirguc-Kunt & Claessens, 2003). Mortgage defaults were particularly common in regions with the greatest local political uncertainty (Faricy & Grodsky, 2016). However, negative and alarming media coverage of political events also increases perceptions of economic risk and uncertainty, leading to lower homebuyer confidence and fewer mortgage applications. It highlights the potential influence of media coverage on mortgage market behavior (Erickson & Inchausti, 2018). Therefore, international aid programs focused on strengthening institutions, the rule of law and combating corruption can foster the development of stable and fair mortgage markets in post-conflict situations, thereby promoting lasting peace and an economic recovery (Knudsen & Brooks, 2019). And the first transition to democracy led to some setbacks in the development of the mortgage market. Finally, countries with stronger democratic institutions have experienced faster growth and expansion of their long-term mortgage markets (Demirguc-Kunt & Claessens, 2004).

MODEL

The purpose of this study is to investigate the effectiveness of monetary policy and regulatory measures on changes in mortgage portfolios in non-CEPGEL countries of the East African Community. To achieve this objective, a quantitative and econometric design was used and panel data were used. This method has been used in previous studies, particularly in Ireland and the Netherlands (Everett et al. 2021). This study used secondary source data from the World Bank, BT, CBK, BU dataforhis1990tohis2020period. Nevertheless, it is important to note that the last three sources of funding are the national monetary authorities examined in the business community of the Great Lakes countries. Please note that data has been converted to United States Dollars (USD) to provide consistent monetary units. This dataset was used to measure the key independent and dependent variables used in this task. The developed model takes into account each country's monetary policy and country-specific factors such as financial inclusion, institutional quality, and political stability that are expected to influence monetary policy. Therefore, the econometric model measures the impact of monetary and prudential policies on housing loans and agricultural credit. Panel data modeling was applied to the sample to perform various statistical analyzes and test the main research hypotheses. Various statistical analyzes were performed using EVIEWS10, including descriptive statistics, correlation analysis, and regression models. These variables are: Abank's

mortgage portfolio (Ymbt) as a dependent variable and monetary policy (MPt) as an independent variable are captured by a bank's various aggregates, indicators, and/or internal supervisory policies before the monetary policy shock, and are measured by loans. Will be done. Non-financial legal entities (PRUt), real total bank assets (TRABt), domestic and global factors (NGFt). Inflation (It), (BFEbt) = bank fixed effects, interest rate (IRbt) and other demands on the economy (OCEbt) attimet. Financial inclusion is measured by commercial bank branches per 100,000 adults (CBBt) and ATMs per 100,000 adults.

Model Specification

The basic specific model is that of Everett *et al.* (2020), presented as follows:

$$Y_{bt} = \alpha_0 + \alpha_1 Pru_{t-4}^{home} + \sum_{ctry} \alpha_2 MP_{t-3}^{ctry} + \sum_{ctry} \alpha_3 MP_{t-3}^{ctry} \cdot Pru_{t-4}^{home} + \alpha_4 Pru_{b,t-4}^{home} \cdot Channel_{b,t-4} + \sum_{ctry} \alpha_5 MP_{t-K}^{ctry} \cdot Channel_{b,t-4} + \sum_{ctry} \alpha_6 MP_{t-3}^{ctry} \cdot Pru_{b,t-4}^{home} \cdot Channel_{b,t-4} + \alpha_7 X_{b,t-1} + \alpha_8 Z_{t-1} + f_b + \varepsilon_{bt} \quad (1)$$

Where:

- y_{bt} : new mortgages per quarter t through Irish/Dutch bank b , MP^L : are EA monetary policy shocks,
- Pru : determine the national (IE or NL) prudential guideline stance prior to the monetary guideline shock.,
- X_h : Is a vector of time-various bank-degree manipulate variables,
- Z_{ht} : determines the national and global factors, which involve a proxy for domestic economic action (real GDP growth for the Netherlands and modified domestic demand for Ireland), global risk, and domestic credit demand.
- f_b : are unobserved, time-invariant banking fixed effects,

Model Specification

At this stage, the following model was update Tanzania, Kenya and Uganda economies,

$$Y_{mbt} = \alpha_0 + \alpha_1 MP_t + \alpha_2 PRU_t + \alpha_3 TRAB_{bt} + \alpha_4 I_t + \alpha_5 BFE_{bt} + \alpha_6 NGF_t + \alpha_7 OCE_{ht} + \alpha_8 IR_{bt} + \alpha_9 ATM_{ht} + \alpha_{10} CBB_{bt} + \alpha_{11} QI_t + \alpha_{12} PS_t + U_t \quad (2)$$

Where:

- Y_m = Bank Mortgage Portfolio, MP = Monetary Policy, PRU = Prudential policies, TRAB = Total real assets of banks, NGF= National and global Factors, BFE = Bank Fixed effects, OCE = Other claims on the economy, IR = Interest rate, ATM = ATMs of Banks for 100.000 adults, CBB = Commercial bank agencies (branches) per 100.000 adults, QI: Quality of institutions, PS: Political stability. U = Error term

RESULTS

The results in this table (1) show that the mean and deviation of the monitoring measures are ($\bar{x} = 21.25$, $SD = 1.29$). It is followed by monetary policy with mean and standard deviation ($\bar{x} = 20.39$, $SD = 2.68$). The mean and standard deviation of total bank assets ($\bar{x} = 19.97$, $SD = 4.33$), mortgage credit score ($\bar{x} = 17.50$, $SD = 3.21$), and GDP ($\bar{x} = 17.36$, $SD = 1.79$) are the highest of each. case. Bank fixed effects have the lowest mean and standard deviation ($\bar{x} = -1.86$, $SD = 5.77$), followed by political stability ($\bar{x} = -0.08$, $SD = 2.23$).

Table 1. Descriptive statistics of panel data from Tanzanian, Kenyan and Ugandan

	YBT	MP	PRU	XBT	PIB	FB	OCE	IR	GAB	SUCBA	QI	PS
Mean	17.50	20.39	21.85	19.97	17.36	-1.98	9.63	2.12	0.75	0.62	1.08	-0.08
Median	18.49	21.28	21.98	20.89	16.73	1.65	9.43	2.28	0.97	0.88	1.10	-0.01
Max	21.53	24.45	24.56	27.67	20.71	3.83	21.04	3.55	2.27	1.75	1.53	18.73
Min	2.79	15.95	19.31	14.31	14.74	-13.22	-4.82	-2.38	-1.78	-3.58	0.00	-4.24
Std. Dev	3.21	2.68	1.29	4.33	1.79	5.77	2.62	0.87	1.05	0.88	0.27	2.23
J-B	311.64	8.93	2.56	8.86	9.22	14.70	783.19	256.97	5.88	130.19	214.52	11464.49
Prob	0.00	0.01	0.28	0.01	0.01	0.00	0.00	0.00	0.05	0.00	0.00	0.00
Obs	93	93	93	93	93	93	93	93	93	93	93	93

Except for surveillance measures and ATMs, most Halke-Vera values are above 5.99 and these values are low. This means that the residuals obey the law of approximate normality of residuals.

In Table 2, the following regression equation for each country can be expressed as follows:

Table 2. Estimative results

	Tanzania	Kenya	Uganda
Variable	Coefficient	Coefficient	Coefficient
C	-25.653	26.40	-36.09
Monetary Policy (MP)	2.895	-0.39	3.27**
Prudential policies measures (PRU)	0.883	-1.24	-0.42
Total real assets of banks (TRAB)	-0.371	-0.02	0.23
National and global Factors (NGF)	-2.041	1.63**	-1.37
Bank fixed effects (BFE)	-1.111	0.00	-0.08
Othe cleans of economics	-0.549	-0.03	-0.11
Interest rate (IR)	-1.398	-0.17	0.58
ATMs of Banks for 100.000 adults (ATM)	0.529	-0.06	1.05*
Commercial bank agencies per 100.000 adults (CBB)	-1.617	-0.17	-0.61
Quality of institutions (QI)	9.251	-0.13	6.15**
Political stability (PS)	-0.729	0.01	-0.55
R-squared	0.61	0.83	0.88
Adjusted R-squared	0.38	0.73	0.81
S.E. of regression	3.17	0.44	1.24
F-statistic	2.66**	8.48***	12.70*
Mean dependent var	16.85	19.53	16.13
S.D. dependent var	4.02	0.86	2.86
Sum squared resid	190.76	3.76	-43.13
Durbin-Watson stat	3.02	1.80	1.62

Kenya: $Y_{mta} = 26.40 + 1,63NGF$ (1). According to (1), all else being equal, a one-unit increase in domestic and global factors (NGF) increases mortgage lending by 1.63.

Uganda: $Y_{mtb} = -36,09 + 3,27 MP + 1,05 ATM + 6,15 QI$ (2). According to (2), all other things being equal, the following variables are respectively monetary policy (MP), the number of automated teller machines per 100,000 adults (ATM) and the quality of institutions (QI). Increased by 3.27 respectively. 1:05 a.m. and 6:15 a.m.

In the Tanzanian model, no variable was significant at the 1% level. 5%, not even the 10% threshold.

Panel of Tanzania, Kenya and Ouganda

Variables	Pooled least squares	Fixed effects	Random effects
C	4.51	36.81	31.03
Monetary Policy (MP)	0.24	0.76*	0.67
Prudential policies (PRU)	-0.84	-0.68	-0.71
Total real assets of banks (TRAB)	0.31**	0.33**	0.34**
National and global Factors (NGF)	1.30***	-1.43*	-0.95
Bank fixed effects	-0.40**	-0.64**	-0.59
Other claims on the economy (OCE)	-0.05	-0.05	-0.05
Interest rate (IR)	0.19	-0.09	-0.047
ATMs of Banks for 100.000 adults (ATM)	1.26***	1.80***	1.71***
Commercial bank agencies per 100.000 adults (CBB)	-1.49***	-1.40***	-1.42***
Quality of institutions (QI)	-3.06***	-2.69**	-2.76**
Political stability (PS)	-0.22**	-0.19*	-0.20*
R-squared	0.57	0.62	0.50
Adjusted R-squared	0.51	0.55	0.44
S.E. of regression	2.24	2.14	2.14
Sum squared resid	408.47	360.94	369.47
Log likelihood	-200.77	-195.02	
F-statistic	9.78***	9.93***	7.64***
Mean dependent var	17.50	17.50	1.40
S.D. dependent var	3.21	3.21	2.86
Akaike info criterion	4.58	4.49	
Schwarz criterion	4.90	4.87	
Hannan-Quinn criter.	4.71	4.64	
Durbin-Watson stat	2.11	2.31	0.57
Hausman-test	0.99		

DISCUSSION

The results in Table 3 are presented using three approaches or methods such as square pooling, fixed effects and randomness. The results of the pooling method show that the variables of total bank assets per 100,000 adults, GDP and ATMs have a positive impact on mortgage solvency, while the following variables are bank fixed effects: ($b = -0.40$, $p < 10\%$). The results of the fixed effects method revealed that the following variables: monetary policy ($b = 0.76$, $p < 10\%$), total real assets of banks ($b = 0.33$, $p < 5\%$) and bank ATMs per 100,000 adults ($b = 1.80$, $p < 1\%$) positively affect mortgage credit while the next variables are GDP ($b = -1.43$, $p < 10\%$), the effects banks ($b = -0.64$, $p < 5\%$), commercial bank branches per 100,000 adults ($b = -1.40$, $p < 1\%$), the quality of institutions ($b = -2.69$, $p < 5\%$) and political stability ($b = -0.19$, $p < 10\%$) negatively affect mortgage credit.

The results of the random effects method revealed that the following variables: total real assets of banks ($b = 0.34$, $p < 5\%$) and ATMs of banks per 100,000 adults ($b = 1.71$, $p < 1\%$) positively affect mortgage credit, while the following variables: commercial bank branches per 100,000 adults ($b = -1.42$, $p < 1\%$), the quality of institutions ($b = -2.76$, $p < 5\%$) and political stability ($b = -0.20$, $p < 10\%$), negatively affect mortgage credit. To decide, in panel data analysis, between random effects and fixed effects, the Hausman test was used to examine whether the null hypothesis is that the preferred model is that of random effects (RE), which indicates higher efficiency compared to the alternative, fixed effects (FE) which are less consistent. However, if the p-value is small (less than 0.05), reject the null hypothesis, in this case $p\text{-value} = 1 > 0.05$, we failed to reject the null hypothesis, then the choice focused on random effects (RE) which indicated greater efficiency. Random effects mean that each level of effect can be considered as a relationship for random variables. In other words, a level or group of random effects can be conceptualized as a sample of levels from a larger population, some of which may not be represented in the model.

Comparative statistics

The results of this research provide a comparison of how mortgage loan management is affected in non-CEPGL East African countries such as Tanzania, Kenya and Uganda by the predictors such as monetary policy, prudential policy, total bank assets, bank fixed effects, other claims on the economy, domestic and global factors, interest rates, ATMs, commercial bank branches, quality of institutions and stability policy. The country results showed that in Kenya, everything remains constant, everywhere the following variables each taken by the National and Global Factors (NGF), increased per unit, then mortgage loans increased by 1.63. Furthermore, for the case of Uganda, if everything remains constant, everywhere the following variables taken each in turn, monetary policies (MP); automated teller machine (ATM) and institutional quality (IQ) increased per unit, then mortgage loans increased to 3.27 respectively; 1.05 and 6.15. Furthermore, for Tanzania, if everything remains constant, by all the following variables each taken by monetary policy, prudential policy, total bank assets, bank fixed effects, other claims on the economy, national factors and world, interest rates, ATMs, commercial bank branches, quality of institutions and stability policy, no effect is observed on mortgage loans.

Conclusion

The objectives of this article were to study and analyze the role that prudential measures and monetary policy play on mortgage lending in low-income countries such as non-CEPGL East African countries. (Economic community of the Great Lakes region of Africa). This article used data from the World Bank and national banks from each country studied. In order to make panel data analysis useful, the Hausman test was used to examine whether the null hypothesis is that the preferred model is the random effects (RE) model which indicates higher effectiveness, the alternative, fixed effects (FE) which is the least consistent. After the analysis of the Hausman test, the random effects model was found to be appropriate. The results revealed that monetary policy, prudential measures, bank fixed effects, domestic and global factors, other claims on the economy, interest rates were not statistically significant on mortgage loans, while The independent variables such as total real assets, bank ATMs, commercial bank branches, institutional quality and stability were found to be statistically significant on mortgage loans. However, the results on monetary policy contradict those of (Duca & Polidoro, 2013), which revealed a dynamic two-way relationship between monetary policy and the demand for mortgage loans. (Duca & Polidoro, 2015), also found that changes in monetary policy have a significant impact on both mortgage credit growth and real estate prices. The results showed a positive and significant effect between banks' total real assets and mortgage loans. This result is similar to that of (Ahearne, & Bouraoui, 2010), who revealed that higher levels of bank capital were associated with a reduction in mortgage lending during an economic downturn, but with an increase in mortgage lending during economic recovery. This suggests a complex relationship between bank capital and mortgage activity, depending on the economic context. The results indicated that ATM and mortgage credit are positively correlated. These results bear similarities to that of (Agarwal *et al.*, 2019), who revealed that digital channels increased the overall volume of mortgage loan applications even though disparities existed. Based on borrower demographics and creditworthiness. Access and convenience to technology has influenced borrowers' participation in online mortgage applications. This could be because the majority of banks use technology and IT. The results revealed a positive and significant effect of commercial bank branches on mortgage lending. These results corroborate with those of (Barasa, & Mwirigi, 2013), which attest that agency banking services increased access to mortgage products, particularly in rural areas where the presence of branches was limited. (Berger *et al.*, 2004), for their part, also assert that banks with more diversified branch networks, particularly present in urban and rural areas, have posted loan volumes mortgages than banks with only urban or rural branches. The results also indicate that institutional quality positively affects mortgage lending. This result catches up with those of (Raymond Fisman & Rafael La Porta, 2004), who noted that countries where levels of generalized trust are higher display greater financial inclusion and wider access to credit, including mortgage products. , highlighting the potential role of social capital in facilitating a healthy mortgage market. For their part, (Abhijit Banerjee *et al.*, 2002), found that countries with superior institutional quality, measured by factors such as the rule of law, protection of property rights and control of corruption, have experienced lower mortgage default rates and more effective risk management within their mortgage markets. With regard to the

CEPGL's prudential policy, there is no statistically significant impact on mortgage credit. These results contradict what had been found (Beck, 2019), the study had revealed that prudential measures can effectively curb mortgage booms and potentially mitigate systemic risks in the financial system. Overall, these results, this study suggests that Tanzania, Kenya and Uganda review their interest rates by providing subsidies to compensate the mortgage portfolio and reduce taxes on the importation of construction materials to increase the mortgage portfolio. For the DRC, this study suggests that stakeholders initiate a real policy that gives citizens the opportunity to save and build their property opportunities. To promote the CEPGL mortgage portfolio, the following mechanisms should be put in place: (1) avoid an inflationary situation that results in a high long-term interest rate that discourages both the lender and the borrower, (2) reduce or even eliminate import taxes on construction materials, (3) subsidize real estate loans to significantly reduce the interest rate and encourage real estate loans by creating a real estate loan bank and (4) encourage and promote housing for a specialization of real estate credit well adapted to the realities of each country and each decentralized area.

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