Bank-level analysis of the determinants of lending rate stickiness in Uganda

Dorothy Nampewo

Research Paper 440

AFRICAN ECONOMIC RESEARCH CONSORTIUM
CONSORTIUM POUR LA RECHERCHE ÉCONOMIQUE EN AFRIQUE

Bringing Rigour and Evidence to Economic Policy Making in Africa

Bank-level analysis of the determinants of lending rate stickiness in Uganda

By

Dorothy Nampewo

Bank of Uganda,
Kampala

AERC Research Paper 440
African Economic Research Consortium, Nairobi
July 2021

THIS RESEARCH STUDY was supported by a grant from the African Economic Research Consortium. The findings, opinions and recommendations are those of the author, however, and do not necessarily reflect the views of the Consortium, its individual members or the AERC Secretariat.

Published by: The African Economic Research Consortium
P.O. Box 62882 - City Square
Nairobi 00200, Kenya

ISBN 978-9966-61-138-3

Contents

List of tables

List of figures

Abstract

This study determines the existence and drivers of the asymmetrical response of lending rates to policy rate changes in Uganda's banking sector. Uganda's banking system seems to be faced with sticky adjustments of lending rates following changes in policy rates. Whereas interbank money-market rates have tended to track the evolution of the policy rate, bank lending rates have been stickier, only responding partially to changes in the policy rate, with lags. These lag periods appear to be longer when the policy rate is reduced than when it is raised, which has created challenges for monetary policy implementation. The analysis is based on bank-level data covering 17 commercial banks for the period 2009–2017. The econometric approach is based on panel error-correction methods. Results show that downward stickiness exists in bank-level lending rates. The factors identified as causing the asymmetrical response of interest rates to policy rates include: risk, cost, bank capability, banking sector concentration and government borrowing. These results provide new insights necessary for the design of appropriate policy measures to reduce high and sticky lending rates in order to, among other things, reduce the cost of finance and ensure effective implementation of monetary policy. In particular, the study recommends policies that improve cost efficiency, reduce government borrowing and support mostly small and indigenous banks to compete and penetrate the market, as well as measures towards minimizing credit risks that could help to achieve symmetric adjustment.

JEL classification numbers: E4, E43, E430

Key words: Lending rate stickiness, monetary policy transmission mechanism, banking sector, Uganda

Acknowledgements

I thank Machiko Nissanke, Victor Murinde, Laurence Harris, the resource persons and all AERC Group C participants at the biannual workshops held in Dakar, December 2016, Johannesburg, June 2017 and Port-Louis, June 2018 for insightful comments. I also thank colleagues in the Economic Research Department at the Bank of Uganda for the support. Finally, I am very grateful to the African Economic Research Consortium for financial support. All errors and omissions are mine.

1. Introduction

The size and speed of bank lending rate adjustment to changes in policy rates has attracted much debate and has been an important subject for the evaluation of monetary policy transmission mechanisms (Borio and Fritz, 1995). This is because monetary policy effectiveness relies on a well-functioning transmission mechanism where changes in monetary policy rates are fully transmitted to interest rates throughout financial markets (Mishkin, 1996; Grigoli and Mota, 2017). Bank lending rates are an important component of the marginal cost of financing and thus affect incentives for consumer and investment spending. As such, interest rates are a potentially important channel of monetary policy transmission (Lowe and Rohling, 1992; Borio and Fritz, 1995).

The theory of monetary policy transmission mechanism stipulates that changes to the policy rate are expected to influence the domestic market interest rates and later the real economy through their effects on the flow of credit and on incentives for the optimal intertemporal allocation of expenditure (Mishkin, 1996). However, this transmission mechanism requires an effective price adjustment mechanism where the reaction of market interest rates is symmetrical to changes in policy rates. Otherwise, asymmetrical price adjustments may cause an incomplete pass-through of monetary policy.

As in many countries, Uganda's banking system is characterized by an asymmetrical response of lending rates to changes in policy rates. Since the onset of the inflation targeting framework in 2011, the interbank money-market rates have tended to track the evolution of the policy rate. However, recent trends suggest that the response of bank lending rates to changes in the policy rate is asymmetrical, with interest rates reacting faster when policy rates are rising, and slower when they are falling (Bank of Uganda, 2014).

The factors responsible for the sticky behaviour of interest rates have not been determined conclusively. The available literature has mainly focused on the drivers of lending rate spreads without necessarily focusing on investigating the drivers of asymmetrical responses of lending rates to policy rates (Nampewo, 2012; Beck and Hesse, 2006). This paper attempts to fill this gap in the literature. First, the paper investigates the existence of downward stickiness in lending rates in Uganda's banking sector. Second, the study investigates the drivers of the asymmetrical adjustment of lending rates to changes in policy rates.

The results support the existence of downward stickiness in bank-level lending rates. Moreover, the asymmetrical response of lending rates to policy rates is associated with risk, cost, bank capability, concentration, and government borrowing as the major causes of sticky lending rates. The rest of the paper is organized as follows: Section 2 surveys the extant literature and Section 3 introduces the methods and data. The results are presented and discussed in Section 4, and Section 5 concludes with a summary of the findings and policy options.

1.1 Status of Uganda's Banking Sector

Uganda's banking institutions are classified into four tiers. Tier 1 includes commercial banks that are authorized to hold chequing, savings and time-deposit accounts for individuals and institutions in local as well as international currencies. Commercial banks are also authorized to buy and sell foreign exchange, issue letters of credit and extend loans to depositors and non-depositors. Tier 2 includes credit and finance companies that are not authorized to establish chequing accounts or trade in foreign currency. However, they are authorized to accept customer deposits, manage savings accounts, and extend collateralized and non-collateralized loans to savings and non-savings customers. Tier 3 includes microfinance deposit-taking institutions (MDIs). Tier 4 institutions include savings credit and cooperative organizations (SACCOS). These institutions, save for those in Tier 4, are regulated by the Bank of Uganda under the Financial Institutions Act of 2004, which provides for the regulation, control and discipline of financial institutions by the central bank, and the Bank of Uganda Act of 1993 that streamlines the formulation and implementation of monetary policy by the central bank. This study focuses on Tier 1 banking institutions.

Uganda's banking sector was fully liberalized in 2005 to, among other things, improve efficiency, capitalization and competition. At the time, it was envisaged that this would deepen financial sector development and inclusive finance. The number of banks has since increased from 15 operating 131 branches, to 24 operating more than 550 branches in 2016 (Bank of Uganda, 2016). However, the sector continues to be affected by inefficiencies that have been caused mainly by high levels of concentration and increasing overhead costs over the past decade. These have resulted in high spreads averaging about 22 per cent, and high net interest margins averaging about 11 per cent (Nampewo, 2012; Beck and Hesse, 2006).

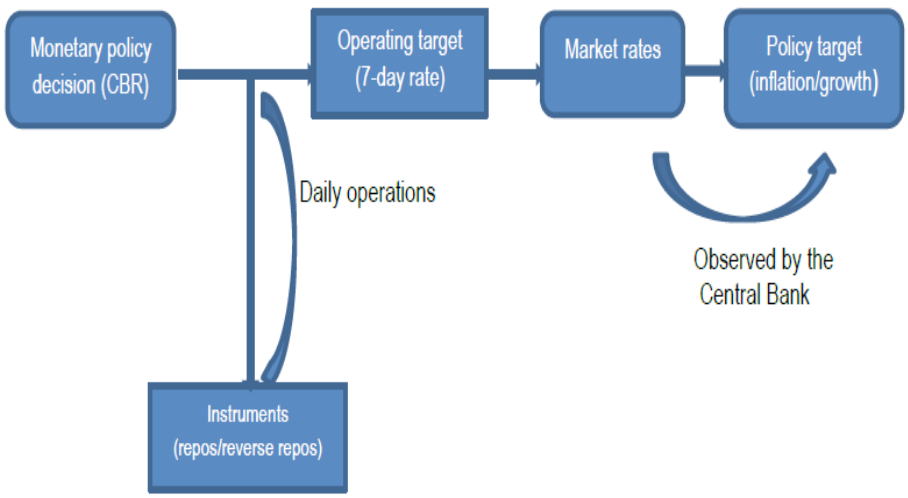
Despite the establishment of a credit reference bureau in 2010 that is aimed at, among other things, improving the transparency of credit information of borrowers, the banking sector is still challenged by high credit risk and high evaluation, monitoring, and enforcement costs. Moreover, bank asset quality has continued to deteriorate, with increasing levels of non-performing loans (World Bank, 2017). Subsequently, non-performing assets increased from 2 per cent in 2005 to about 6.5 per cent in 2017. In addition, the sector remains relatively small, contributing around 2.7 per cent of the GDP, making it difficult to exploit economies of scale and scope. The high cost of financial service provision is further reflected in low ratios of loans to GDP, estimated

at about 13 per cent at the end of 2017.

1.2 Evolution of Interest Rates and Monetary Policy Transmission

During the period following the liberalisation of the banking sector, the treasury bill market changed to a market-based auction system through which interest rates were determined from a pre-determined rate. This was followed by the introduction of the treasury bonds market and the commencement of a new interest rate management regime that used monetary policy instruments with the treasury bill interest rate as the anchor (Nampewo, 2012). These developments led to a reduction in the level of nominal interest rates from a high of 40 percent in 1992 to an average of 20 percent in 2017 and the subsequent extension of the yield curve (Nampewo, 2012). The central bank rate (CBR) was then introduced in 2011 following the implementation of the inflation targeting framework. Under this framework, the Bank of Uganda sets the CBR consistent with the desired monetary policy stance for the month and supplies and/or constrains liquidity conditions in the interbank money market to ensure that the operating target and all the other rates are consistent with the CBR during that period (Opolot, Nampewo, Nyanzi, and Ntumwa, 2013). Figure 1 shows the flow chart that summarises the transmission mechanism of the policy rate to the policy target.

Figure 1: Transmission mechanism from policy rate to policy target

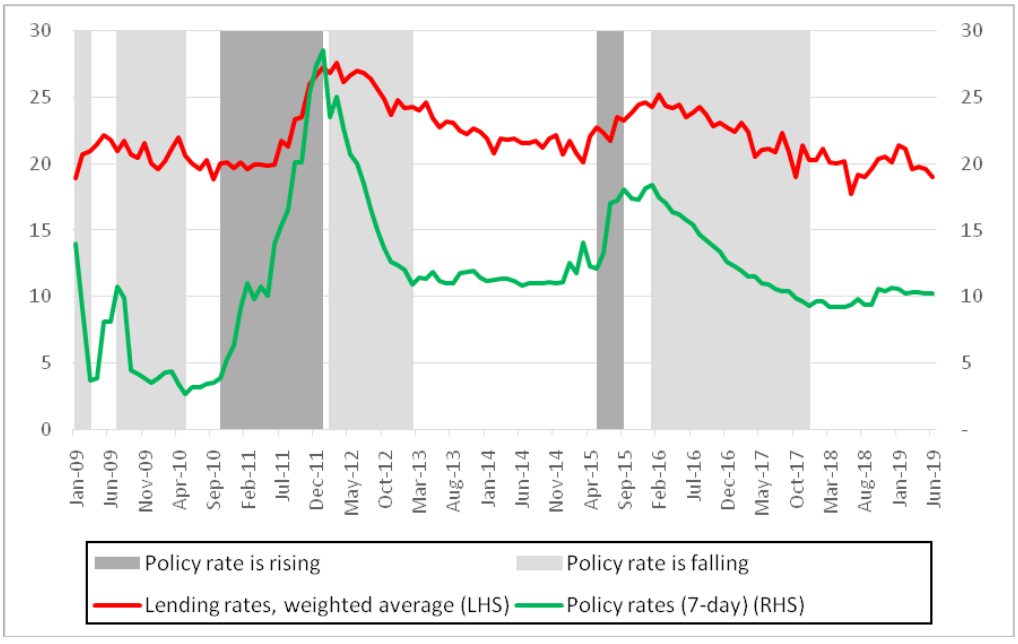


The operating target is the 7 – day interbank rate given its influence on other interest rates in the economy and is less volatile compared to the overnight money market rate. To ensure that the operating target is in line with the monetary policy stance, a set of monetary policy instruments such as; open market operations, and issuance of repurchase agreements (REPOs) and/reverse REPOs are used by the

central bank (BoU,2012). It is then expected that the 7-day interbank money market rate would influence the other market rates and eventually the policy targets which are in this case inflation and growth. Thus, despite its supervisory role, the central bank does not influence the price setting behaviours of other market rates.

Since the onset of the inflation targeting lite (ITL) framework, the interbank money market rates have tended to track the evolution of the CBR and the other market rates. However, the lending rates depict downward asymmetric behaviours with the policy rate, reflecting asymmetry of the monetary policy transmission mechanism, lagged response to monetary policy impulses, structural rigidities in the financial sector and higher risk aversion by commercial banks (BoU, 2014). As shown in figure 2, the weighted average lending rate tends to respond faster when the policy rate is rising than when the policy rate is falling.

Figure 2: Trend of weighted average market interest rates and policy rate



Source: Bank of Uganda,(2009-2015)

This poses challenges for monetary policy implementation, access to credit, and the entire business environment. Indeed, the persistently high and sticky lending rates continue to stifle business growth (Mawejje and Sebudde, 2019) and have resulted into feelings of discontent among various players in the business sector and civil society (Kuteesa and Mawejje, 2016). Consequently, there have been calls upon government to intervene by enacting legislation providing for the capping of interest rates, following Kenya's example (CSBAG, 2016). However, the central bank is committed to maintaining market-determined interest rates (Bank of Uganda, 2017); and hence capping interest rates may not be the solution to the sticky interest rates.

A further structural assessment at the bank-level reveals that the market share of the banking industry is dominated by a few big banks that are mainly foreign-owned with about 50 per cent of their total assets and capital controlled by the foreign sector. Besides, about 80 per cent of the commercial banks are classified as small when using metrics such as the proportion of capital and assets in the overall banking system. This implies that the banking industry is still relatively concentrated with a few big banks controlling about 70 per cent of the market share (Opolot, Nampewo, Nyanzi, and Ntumwa, 2013).

In the domestic interbank money market, segmentation and liquidity re-allocation continue to pose challenges for monetary policy transmission. This mainly arises from the adverse selection problem and asymmetric information about the risk profiles of counterpart banks. This, coupled with lack of clear structure of the operations in the interbank market, may breed liquidity re-allocation challenges in the market and may aggravate the lending rate stickiness problem. Besides, interbank transaction volumes are rationed on the basis of bank size, where the lending rates of bigger banks seem to be less volatile compared to those for smaller banks (Bank of Uganda, 2016). These factors may result in liquidity hoarding especially for the big banks which control most of the liquidity in the market and charge higher interest rates to the smaller banks and hence result in high lending rates.

2. Literature review

2.1 Theoretical Literature

The theoretical literature on asymmetric prices proposes four hypotheses that explain loan rate stickiness. These include the following: adverse selection and moral hazard, switching costs, market concentration, and collusion.

2.1.1 Adverse Selection and Moral Hazard Hypothesis

The adverse selection hypothesis postulated by Stiglitz and Weiss (1981) states that whereas risk-free borrowers are forced out of the market due to increases in loan rates, the bank faces additional costs for riskier loans following an increase in loan rates. Thus, the bank chooses not to increase its loan rates regardless of increases in the policy rates. Lowe and Rohling (1992) further expound this by stating that an asymmetrical information problem arises between the firm (borrower) and the bank, where the firm has perfect information about its projects, i.e., the risk-free and riskier projects, while the bank has imperfect information on the same. This problem poses adverse selection and moral hazard challenges.

The adverse selection problem arises when an increase in loan rates by a bank reduces the expected returns on all projects regardless of whether they are safer or riskier in nature. However, the safer project is likely to be more affected by the reduction in returns compared to the riskier project. Therefore, the safer project will be the first to be withdrawn from the market following a loan rate increase.

The moral hazard problem arises when the borrower chooses to invest in a riskier project in response to a loan rate increase. This implies that the bank may not necessarily earn a proportionate increase in its return due to an increase in its loan rate. This is because the bank's expected return depends on the probability of default from the riskier loan. In this case the bank will choose not to increase its loan rates regardless of increases in the cost of funds. Under such circumstances, the bank will set the loan rate below the market rate and instead opt for credit rationing, which results in upward stickiness of loan rates.

2.1.2 Switching Cost Hypothesis

The switching cost hypothesis postulates that both the bank and the customer incur costs. The bank incurs the cost of obtaining information about the risk profiles of all its customers, which is an expensive activity for the bank (Zhao et al., 2013). The cost incurred by the bank is then passed on to the buyer in the form of increased loan rates. Conversely, the customer incurs costs related to searching for alternative rates charged by the different banks on new loans, filling out loan application forms and the relevant documentation, and the time spent in the evaluation process with the lending agents (Lowe and Rohling, 1992). These costs, in addition to those passed on to the customer from the bank, make it costly for a buyer to switch from one bank to another. Klemperer (1987) classifies these as switching costs and further notes that these costs result in market segmentation, which reduces the elasticity of demand facing each firm and leads to asymmetric prices.

2.1.3 Market Concentration Hypothesis

The market concentration hypothesis arises from the structure-conduct-performance paradigm which postulates that downward rigidity in loan rates is more pronounced in concentrated banking industries (Neumark and Sharpe, 1992; Scholnick, 1999). This can be explained by collusion or uncompetitive market practices.

2.1.4 The Collusion Hypothesis

The collusion hypothesis explains the tendency of banks to ease and cheapen collusion in the market, which may be unfavourable to consumers and could result in inefficiency. This results in high expected costs on the side of the banks, leading to downward rigidities in loan rates in response to policy rates (Scholnick, 1999). The collusion hypothesis requires the use of survey data on banks and is therefore not tested in this study due to data limitations.

These hypotheses tell us that the lending practices and the associated rates of banks depend on the nature of the market, the related costs and the structure of the banking sector. A less competitive banking environment will encourage a monopoly and thus rigidity in market loan rates regardless of monetary policy actions. At the same time, the costs associated with customers switching banks and banks searching for customers' risk profiles may result in market segmentation and collusion in the market. These factors reduce the elasticity of demand facing banks, leading to asymmetric prices.

2.2 Empirical Literature

The dynamics of interest rate behaviour, especially regarding the reaction of bank lending rates to policy rates, has been a subject of continuous debate in the literature.

The possible causes of interest rate stickiness that are highlighted in the existing empirical literature include bank characteristics such as bank size, capitalization, and liquidity. Gambacorta and Mistrulli (2014) as well as Illes et al. (2015) argue that small banks adjust their lending rates to market terms more quickly than large banks, possibly because they have a narrower scope of interest rate setting than other banks. They further stress that lending rates seem to be stickier with well capitalized banks than less capitalized banks. This is because well capitalized banks seem to be less affected by monetary policy shocks compared to less capitalized banks.

Much of the literature shows that lending rate rigidity is more prevalent in concentrated banking sector environments (De Graeve et al., 2007; Duflo et al., 2013; Banerjee et al., 2015). A concentrated banking environment is synonymous with more efficient banks growing faster than less efficient banks. Duflo et al. (2013) finds that more concentrated banks tend to have high interest margins for both loan and deposit rates, and that the same banks are characterized by a sluggish downward adjustment of interest rates and faster adjustment upwards.

The analysis by Zhao et al. (2013) points to high costs incurred by consumers resulting from less competitive and less efficient banks in the loan market. Moreover, apart from the lack of competition, banking inefficiency as reflected in high leverages and significant sunk costs could result in elevated lending rates with excessive risk, thereby increasing banking inefficiency (Apergis and Polemis, 2016). The argument is that banks hedge risk by adjusting their loan pricing formulas to cater for risk-related costs (Angeloni et al., 2015; Bessis and O'Kelly, 2015).

The ownership structure of commercial banks is another important determinant of lending rates stickiness. Grigoli and Mota (2017) highlight that public-owned financial institutions seem to focus more on achieving the policy objectives of governments, and as a result profit maximization is often not their primary aim. Under such circumstances, they note that lending rates are likely to adjust with a delay due to inefficiencies and political interference, hence causing stickiness in interest rate adjustment. Gambarcota (2008) observes that foreign-owned banks adjust slowly to monetary policy shocks compared to domestic-owned banks on the basis that the former are usually well capitalized and may not be as quickly affected by shocks in monetary policy changes.

The macroeconomic environment is a key factor affecting retail rate stickiness. Égert et al. (2007) and Égert and MacDonald (2009) argue that as volatility in the macroeconomic environment increases, the information content of policy signals is reduced causing banks to wait a little longer to adjust their rates. They further note that high economic growth favours a quicker pass-through as banks find it easier to pass on changes when conditions are favourable. In addition, the pass-through is also likely to be faster during high inflation periods as prices are adjusted more frequently. De Bondt (2005) further shows that government borrowing increases loan rate stickiness as banks tend to prefer investing in risk-free government securities as opposed to issuing risky loans. The result is stickier rates for the risky loans.

4. Methods and data

4.1 Model Description

The model specification follows that of Kitamura et al. (2015) and Gambarcota and Mistrulli (2014) to ascertain the existence of downward stickiness and the drivers of the asymmetrical adjustment of lending rates. The analysis proceeds in two steps. In the first step, we investigate the existence of stickiness in the lending rates to changes in the policy rate by assessing the pass-through effect from the policy rate to the individual bank lending rates as specified in a panel error correction representation in equation 1:

$$\Delta L_{it} = \alpha_i + \sum_{k=1}^{n} \beta \, \Delta L_{i,t-k} + \sum_{k=0}^{n} \left(\gamma + \sum \gamma^* X_{i,t-1}\right) \Delta p_{t-2} + \left(\varphi + \sum \gamma^* X_{i,t-1} \sum \varphi^* X_{i,t-1}\right)\left(L_{i,t-k} - p_{t-2}\right) + \sum \varsigma X_{i,t-1} + \phi \bar{Z}_{i,t} + \varepsilon_{i,t} \quad (1)$$

In equation 1, $\mathbf{L_{i,t}}$ is the lending rate of bank i at time t; Δ is the difference operator that captures the change from the previous period; $\mathbf{p_{i,t}}$ is the policy rate at time t; α_i is a constant term to capture fixed effects that influence changes in the lending rate; $X_{i,t}$ is a vector of bank-specific explanatory variables for bank i and time t, which influence the lending rate. $\bar{Z}_{i,t}$ is a vector of control variables including macroeconomic and industry-related factors that influence the changes in the lending rate. These are assumed to affect changes in the lending rate independently from the policy rate variations.

The lagged dependent variable ($\Delta L_{i,t-k}$) is included to control for endogeneity in the model, while the pass-through effect from the policy rate to the lending rates is captured by ($\gamma \Delta p_{t-2}$) . The policy rate in Uganda is changed after two every two months hence a lag of 2 was used in estimating the model.

We account for the pass-through effect of the policy rate changes on the individual bank lending rates through the bank-specific factors by introducing interaction terms between the bank specific variables and changes in the policy rate. This is achieved by splitting the analysis into two. We controlled for the effects of bank-specific factors on lending rates as the first step, and we then we captured the second order effects by introducing the interaction terms to determine the impact of policy rate changes on the effect of the bank-specific control variables.

The differenced part of the equation is the short-run component of the model and the long-run component constitutes the lagged explanatory variables. The long-run multiplier is restricted to one for long-term lending rates (Kitamura et al., 2015). This is so because the reaction of the lending rates for individual banks to variations in the policy rate is assumed to be 100 per cent in the long-run equilibrium. The coefficient γ_k captures the reaction of the lending rate to changes in the policy rate.

In the second step, we assess the asymmetrical adjustment of the lending rates by determining the direction of stickiness in the lending rates and the factors causing it. To this end, the dummies $D_{up,t}$ and $D_{down,t}$ are introduced and estimated separately, in equation 1 to capture the effect of asymmetry between rising and falling episodes of the policy rate on changes in the lending rate. The coefficients on the two dummy variables including $D_{up,t}D_{up,t}$ and $D_{down,t}$ will affirm the presence of either upward or downward asymmetry of the lending rates. Further, the dummies variables ($D_{up,t}$ and $D_{down,t}$) are interacted with the explanatory variables and the policy rate to assess the determinants of either upward or downward asymmetry (stickiness) in the lending rate changes of individual banks to variations in the policy rate as specified in the model in equation 2.

$$\Delta L_{it} = \alpha_i + \sum_{k=1}^{n} \beta\, \Delta L_{i,t-k} + \sum_{k=0}^{n} \left(\gamma + \sum\left(\gamma^{*} D_{up,t} + \gamma^{*} D_{down,t}\right) X_{i,t-1}\right) \Delta p_{t-2} + \left(\varphi + \sum_{m}\left(\varphi^{*}\right.\right.$$
$$\left.\left.\varphi^{*} D_{down,t}\right) X_{i,t-1}\right)\left(L_{i,t-k} - p_{t-1}\right) + \sum \varsigma X_{i,t-1} + \phi \bar{Z}_{i,t} + \varepsilon_{i,t} \quad (2)$$

4.2 Description of Variables

The dependent variable is the change in the lending rate defined as the difference between the current lending rate in period t and the previous lending rate in period $t-1$ for the individual banks. The independent variables include the change in the policy rate proxied by the 7-day interbank rate as a reference rate for monetary policy.[1] As explained earlier, the 7-day interbank market rate is also the official operating target that is used by the central bank. The other explanatory variables include bank-specific characteristics and the control variables.

The bank-specific characteristics include bank size (SIZE), computed as the ratio of total assets of the bank to total assets in the banking system. The banks are categorized into small and big banks using the definition summarized in Equation 3. The capitalization of the bank (CAP), measured as the ratio of total capital of the bank to total assets of that respective bank, is included, as well as the cost to income ratio (CR). The ratio of non-performing loans for each commercial bank to its total assets (RISK) is included to account for the effect of risk on loan

1 The central bank rate, which is the official policy rate, is not used because it was introduced later in 2011, yet the period of analysis is from 2009 to 2017.

prices. This ratio has also been used by Jiménez et al. (2014) and is expected to increase lending rate stickiness. In addition, the ratio of government securities of the individual bank to total assets of the bank (GOV) is included to account for the effect of government borrowing on the loan rate behaviour of banks. The derivations for the bank-specific characteristics are summarized in Equations 3–7.

$$SIZE_{it} = \log A_{it} - \frac{1}{N_t}\sum_i logA_t$$

Where;

$$bigbank_{it} = SIZE_{it} > 0$$

$$smallbank_{it} = SIZE_{it} < 0 smallbank_{it} = SIZE_{it} < 0 \quad (3)$$

$$GOV_{it} = \log securities_{it} - \frac{1}{N_t}\sum_i logA_t \quad (4)$$

$$CAP_{it} = \log CAP_{it} - \frac{1}{N_t}\sum_i logA_t \quad (5)$$

$$RISK_{it} = \log NPL_{it} - \frac{1}{N_t}\sum_i logA_t \quad (6)$$

$$CR_{it} = \frac{cost_{it}}{income_{it}} \quad (7)$$

In addition to bank-specific control variables, the models include both macroeconomic-related factors and industry-specific control variables. The macroeconomic-related variables include the inflation rate (INF) and the natural log of nominal exchange rate (EXRT).

The industry-specific factors include a measure of bank competition. The literature has shown the importance of competition in determining the excellence and soundness of the banking industry both in terms of banking efficiency and economic growth (Apergis and Polemis, 2016). Thus, an optimum condition of competition is ensured in order to accommodate the most supportive banking environment. To this end, the competition scores for the banking industry were computed. The literature suggests different measures of competition, including the Lerner index, the H-statistic, the Bonne index and the Herfindahl-Hirschman index (HHI). This study uses the HHI measure because it considers all banks in the industry and is sensitive to the entry of new banks. The HHI is defined as the sum of squared market shares of banks in the market; it ranges between 0 and 1, where 0 implies perfect competition in the sector and 1 implies imperfect competition (perfect concentration). To control for possible segmentation in the industry, competition scores for small and big banks were computed separately as a robustness check. The representation of the HHI is shown in Equation 8.

$$\mathrm{HHI} = \sum_{i=1}^{N} S_i^{\,2} \quad (8)$$

where: N= Number of banks and S_i = Market share of bank i

4.3 Estimation Procedure

4.3.1 *Panel Unit Root Tests*

The error-correction representations in Equations 1 and 2 necessitate an assessment ofpanel unit root and panel cointegration tests. The study uses both the Levin et al. (2002) and the Maddala and Wu (1999) tests to test for panel unit roots. Both tests follow an AR (1) process described in Equation 9.

$$y_{it} = \mu_i + \tau_i t + \rho_i y_{it-1} + \varepsilon_{it} \quad (9)$$

where t is the time period, μ_i is the bank-specific fixed effects, τ_i is the individual trend, ρ_i is the autoregressive coefficient and ε_{it} is the error term. There is a unit root in y_{it} if $|\rho_i|=1$. The Levin et al. (2002) test assumes ρ_i is constant across cross-sections while the Maddala and Wu (1999) test assumes that ρ_i varies across cross-sections. The null hypothesis for both tests is that there is a unit root in all series. The alternative hypothesis for the Levin et al. (2002) test is that there is stationarity in all the series, and for the Maddala and Wu (1999) test that there are unit roots in some, but not necessarily all the series. The empirical estimates for both tests presented in Appendix A reveal that most of the series are integrated of the first order.

4.3.2 *Panel Cointegration Tests*

As the unit root tests indicate that the variables are integrated of order one, that is, they become stationary after first differencing, the Pedroni test for cointegration is employed. The strength of the Pedroni test is that it allows for heterogeneity in the panel, which accounts for a separate hypothesized cointegration relationships for each group member of the panel and then pools the resulting residuals when conducting the test. The results presented in Appendix B support cointegration among the variables.

4.3.3 *Estimation Procedure*

After ascertaining the order of integration and presence of cointegration, Equations 1 and 2 were estimated using a generalized error-correction model (ECM) in combination with panel data estimates. A standard two-step error correction procedure was used where, as the first step, the error correction term was obtained by saving residuals of separate estimation of the long-run equilibrium in levels. In the second step, a lagged error correction term was included in the final regression.

4.4 Data

The main source of data was Bank of Uganda. The data included bank-specific data for 17 commercial banks, interest rates and the nominal exchange rate. Data on inflation rates were sourced from the Uganda Bureau of Statistics. The analysis covered the period from 2009 to 2017. This period covers two monetary policy regimes, i.e., the monetary-targeting regime and the inflation-targeting regime that was implemented in July 2011. To account for the regime change, a dummy was included in the analysis as a robustness check.

5. Results

5.1 Main Econometric Results

The results of the panel error-correction regressions are provided in table 1. The results of the analysis are presented in panels A and B. Panel A shows results of the first order effects of the bank-specific, industry-specific and macroeconomic control variables on the changes in the lending rates. Panel B shows results for the second order effects after interacting the changes in policy rate with the bank specific control variables to account for the indirect effect of policy rate changes on lending rates.

Table 1: Determinants of Lending rate stickiness

Panel A: No interactions				Panel B: Interaction terms		
Dependent variable: ΔLR				Dependent variable: ΔLR		
	All Banks	Small Banks	Big Banks	All Banks	Small Banks	Big Banks
ΔLR_{t-1}	-0.26***	-0.30***	-0.25***	-0.27***	-0.33***	-0.20***
ΔPR_{t-1}	0.15***	0.16***	0.11***	0.15***	0.15***	0.13***
$ECT_{(-1)}$	-0.19***	-0.25**	-0.16***	-0.21***	-0.31***	-0.17***
Risk	0.03	-0.00	0.18	0.04	0.06	-0.4*
Cost- income	0.03	-0.02	-0.00	0.01	-0.01	-0.01
Govt-borrowing	0.13	-0.15	-0.08	-0.16*	-0.21	-0.09
Risk*Δ PR				-0.07*	-0.08*	-0.09*
Cost- income*Δ PR				-0.15**	-0.15**	-0.03
Govt-borrowing*Δ PR				-0.03**	-0.03	- 0.03***
Foreign-owned*capital*Δ PR				-0.02*	-0.04**	-0.09*
Inflation	0.06***	0.05**	0.04**	0.06***	0.07***	0.01
Exchange rate	0.03***	0.04***	0.00	0.03***	0.04***	0.001
Competition	-0.04***	-0.06***	0.00	-0.04***	-0.06***	-0.03***
Number of observations	1343	790	567	1343	790	567
Coefficients are tabulated; Significance levels: *** =significant at the 1% level, **=significant at the 5% level, *=significant at the 10% level						

The results in both panels A and B reveal negative and highly significant coefficients of the error-correction terms for the three estimated models of small banks, big banks and all banks categories. The results support that there exists a long-run

relationship and provide evidence of cointegration relationships among all bank categories. In addition, the error-correction terms indicate the speed of adjustment at which short-run dynamics converge to the long-run equilibrium relationship. The estimation results indicate that small banks adjust faster to the long run equilibrium than big banks. For instance, the results in panel B after including interaction terms with changes in the policy rate reveal that, the speed of adjustment for small banks increases to 31 per cent which implies an almost complete adjustment of lending rates to the policy rate within one year, compared to 17 per cent for big banks. Nevertheless, the significant coefficients on the error-correction terms support the existence of deviations from long-run equilibrium, caused by sticky adjustments of lending rates in the short run.

The results further reveal that the pass-through coefficient of the lending rate and the policy rate is low. For instance, in panel A, the pass-through coefficient averages at only 0.15, 0.16 and 0.11 for all banks, small banks, and big banks respectively. The introduction of interaction terms in panel B reveals no significant improvement in the pass-through effect for all categories of banks. These findings indicate that although the pass-through from policy rates to lending rates exists, it remains incomplete and thus supporting an incomplete interest rate transmission channel for lending rates and the existence of lending rate stickiness to changes in the policy rates.

Although, the results in panel A reveal no significant effects of the control variables on changes in the lending rates, their effect becomes significant after interacting them with changes in the policy rate. We also note that while the results are consistent with incomplete pass-through of policy to lending rates, adjustment does seem to occur fairly rapidly. Note, for example, that the speeds of adjustment appear much slower for Japan, as estimated in the paper by Kitamura et al (2015).

The empirical results reveal significant negative effect on the interaction terms between risk and changes in the policy rate. This implies a weaker pass-through for banks with higher risk. This finding supports the existence of one of the major challenges in the banking industry in Uganda which is reflected in the increasing trend of non-performing assets for most of the commercial banks. This finding is also consistent with the adverse selection hypothesis arising from information asymmetry and moral hazard whereby riskier projects attract high and sticky lending rates to account for the associated risk (Borio and Zhu, 2008). In addition, these findings are with findings by Apergis and Polemis (2016) who note that excessive risk escalates lending rates because banks hedge risk by adjusting their loan pricing formulas to cater for risk-related costs.

Results further reveal that the pass-through is weaker for banks with higher costs as depicted in the significant negative effect on the interaction terms between bank costs and changes in the policy rate. These findings lend support to a growing strand of the literature calling for improving efficiency in the banking sector with a view of reducing interest rates (see for example De Graeve et al, 2007). The effect of costs on lending rates is twofold: the first relates to the high operating costs incurred by banks; the second relates to the effect of high switching costs on both the bank and

the customer as stipulated in the switching cost hypothesis. Given that customers may incur search costs on new loan contracts, banks may not be incentivised to lower interest rates. These results are in line with Zhao et al. (2013) who argued that the high switching costs incurred by consumers is reflected in high lending rates.

The results depict significant negative effects of the interaction terms on government borrowing and changes in the policy rate, implying a weaker pass-through for banks that prioritise lending to the government. This finding exhibits the preference of banks to invest in risk-free government securities other than lending to the private sector. This further affirms the adverse selection hypothesis and as argued by De Bondt (2005), banks prefer to invest in less risky and more profitable ventures such as investing in more profitable government securities compared to riskier loans. The coefficient on the interaction term between foreign owned banks, capitalisation and changes in the policy rate is negative and statistically significant. This indicates that the pass-through for well-capitalised is weaker implying a low sensitivity of these banks to monetary policy shocks. These results are consistent with Kitamura et al (2015), Gambarcota and Mistrulli (2014) and Gambarcota (2008) who demonstrate that lending rate stickiness is high for banks with high capital, attributable to the less sensitivity of these banks to shocks arising from monetary policy changes.

The Herfindahl-Hirschmann Index (HHI) which measures the level of competition in the banking industry exhibits a significant negative effect on changes in the lending rates, implying a weaker pass-through due to a less competitive market. This finding is consistent with the market concentration hypothesis which postulates that downward rigidity in the lending rates is pronounced in more concentrated banking industries arising from uncompetitive market practises (Neumark and Sharpe, 1992 and Scholnick, 1999).

With regard to the macro-economic factors, results reveal significant positive effects of inflation and the exchange rate on lending rate stickiness. In the case of inflation, the positive effect may imply that as general prices increase, the Bank of Uganda intervenes by increasing the policy rate, consequently, a positive change in the bank lending rates. The effect of the exchange rate can be explained by the implied effect of the exchange rate depreciation on inflation and central bank's tendency to react by increasing the policy rate which prompts positive changes in the commercial banks' lending rates. These results are consistent with Égert et al. (2007) and Égert and Mac-Donald (2009) who note that the pass-through is also likely to be faster during high inflation periods as prices are adjusted more frequently than during episodes of low inflation.

5.2 Asymmetric Response of Lending Rates to Policy Rates

As earlier noted and following from equation 1, the asymmetry in the lending rates response to policy rates is accounted for in equation 2. The panel error-correction regressions results from equation 2 are presented in table 2.

Table 2: Determinants of downward stickiness of lending rates

Panel A				Panel B: Interaction dummy during policy fall			Panel C: Interactions - policy rate change & the dummy		
Dependent variable: ΔLR				Dependent variable: ΔLR			Dependent variable: ΔLR		
	All Banks	Small Banks	Big Banks	All Banks	Small Banks	Big Banks	All Banks	Small Banks	Big Banks
ΔLR_{t-1}	-0.36***	-0.42***	-0.21***	-0.26***	-0.32***	-0.20***	-0.27***	-0.33***	-0.20***
ΔPR_{t-2}	0.16***	0.18***	0.09***	0.17***	0.19***	0.09***	0.15***	0.16***	0.12***
$ECT_{(-1)}$	-0.26***	-0.36**	-0.16***	-0.27***	-0.37***	-0.16***	-0.21***	-0.32***	-0.18***
D_down	0.13	0.12	0.17	0.81	0.35	0.78	0.33	0.38	0.71
D_down*Δ PR							-0.16	-0.31	-0.01
Risk	-0.06	-0.09	0.44*	0.04	0.05	-0.48*	0.05	0.01	-0.05*
Cost- income	-0.05	-0.01	-0.01	0.13	-0.07	-0.01	0.11	-0.00	-0.03
Govt-borrowing	-0.17*	-0.23**	-0.03	-0.16	-0.19*	-0.10	-0.14	-0.15*	-0.12
Foreign-owned banks*capital	-0.03**	-0.06**	0.07*	-0.03**	-0.06***	0.08**	-0.02	-0.04**	0.08*
D_down*Risk				-0.05	-0.12	-0.07**	0.07	-0.12	-0.06*
D_down*Cost-income				-0.09	-0.06	-0.01	-0.13	-0.05	-0.00
D_down*Govt-borrowing				-0.05	-0.23	- 0.34	0.01	-0.22*	-0.39
D_down*Foreign-owned banks*capital				-0.01*	-0.04*	0.05*	0.01	-0.02*	-0.01*
D_down*Risk*Δ PR							-0.11*	-0.09	-0.17**
D_down*Cost-income*Δ PR							-0.10*	-0.08*	-0.04
D_down*Govt-borrowing*Δ PR							-0.04**	-0.04*	- 0.04**
D_down*Foreign-owned banks*capital*Δ PR							-0.02*	-0.02*	0.01
Inflation	0.06***	0.05**	0.05**	0.06***	0.07***	0.05**	0.06***	0.07**	0.02
Exchange rate	0.03***	0.04***	0.01	0.03***	0.01***	0.00	0.03***	0.04***	0.00
Competition	-0.04***	-0.05***	-0.01	-0.05***	-0.05**	0.02	-0.04***	-0.05**	0.02
N	1343	790	567	1343	790	567	1343	790	567

Coefficients are tabulated; t-values are in parentheses. 2) Significance levels: *** = 1% level, **= 5% level, *= the 10% level

The analysis was split into three steps to investigate the asymmetrical response of lending rates to changes in the policy rate. The first steps involved first order estimations of the control variables while including a dummy variable that captured episodes of a fall in the policy rate (Ddown). The results of this analysis are presented in table 2 - panel A. The second step involved second order estimations where we introduced interaction terms of the bank-specific control variables with the dummy variable capturing episodes of a fall in the policy rate. The results are presented in table 2 - panel B. The results of the third step where interaction terms with changes in the policy rate are included are presented in table 2 - panel C.

The results of the error correction terms for all categories of banks are relatively similar to those in equation 1. Similarly, the pass-through of individual bank lending rates to changes in the policy rate is relatively unchanged from equation 1 supporting the existence of the sluggishness of lending rate reaction to policy rates. We however note from the results presented in panel C of table 2, a more sluggish the speed of adjustment and a weaker pass-through effect after including interaction terms with changes in the policy rate with the dummy capturing a fall in the policy rate and the control variables. This implies downward stickiness in the lending rates to changes in the policy rate.

Indeed, the results show positive insignificant coefficients on the D_ down variable, which captures the response of commercial banks' lending rates during a fall in the policy rate. This result implies that, although it is positively signed as expected, it shows no significant effect when policy rates are falling, pointing to the existence of downward stickiness of lending rates to policy rates. The results further reveal negative insignificant coefficients of the interactions between the dummy variable, D_ down with changes in the policy rate. This reveals a weak pass-through effect of policy rate changes to lending rates during a policy rate reduction. This supports the existence of downward stickiness of lending rates to policy rates.

The explanatory variables for downward asymmetry of lending rates remain relatively similar to those obtained in equation 1. For instance, the results in panels A, B and C depict significant negative effects of risk. This implies that risk is an important factor in explaining the weak pass-through effect of policy rate changes to lending rates, especially for the big banks.

The results in panel C further reveal significant negative coefficients on the interaction terms of cost with changes in the policy rate, especially for the small banks. This implies that the high operating costs lead to a weaker pass-through of policy changes to lending rates mainly for the small banks. This is true for Uganda's banking sector where some banks which are classified as small are faced with high inefficiency resulting from high operational costs. This has led to a lower reaction of lending rates of these banks to policy rate changes.

Government borrowing is another important factor to explain why the lending rates are downward sticky. The results depict negative significant

coefficients across all categories of banks notably on the interaction terms of government borrowing with changes in the policy rate. This implies that banks have a higher appetite for lending to government compared to private sector lending and thus, they may not be affected by monetary policy changes.

Results further reveal significant negative effects of foreign-owned and well capitalised bank on changes in the lending rates. This implies that foreign-owned banks which are usually well capitalised are less responsive to monetary policy shocks.

The coefficients on the competition index are negative and significant. Implying that as the competition index increases, the market becomes less competitive and hence contributes to the downward stickiness of lending rates to changes in the policy rate. This mostly affects the small banks as shown in the results in table 2. This could be explained by the fact that Uganda's banking sector is still concentrated with the big banks controlling the market share.

On the other hand, as shown in table 3, the coefficients on D_up, the dummy variable that captures the response of banks' lending rates during a rise in the policy rate and specifically the interaction terms of the dummy D_up with changes in the policy rate are positive and significant. This implies a strong pass-through effect of lending rates to the policy rate. This points to the upward asymmetry in lending rates to policy rate changes.

However, the coefficients on the interaction terms when the policy rate is rising depict insignificant results. This supports that the identified factors in the analysis can be used to explain downward stickiness in the individual banks' lending rates.

Table 3: Determinants of Upward asymmetry of lending rates

Panel A				Panel B: Interactions with the dummy during policy rise			Panel C: Interactions - policy rate change & the dummy		
Dependent variable: ΔLR				Dependent variable: ΔLR			Dependent variable: ΔLR		
	All Banks	Small Banks	Big Banks	All Banks	Small Banks	Big Banks	All Banks	Small Banks	Big Banks
ΔLR_{t-1}	-0.36***	-0.42***	-0.21***	-0.26***	-0.32***	-0.20***	-0.15***	-0.23***	-0.20***
ΔPR_{t-2}	0.28***	0.33***	0.22***	0.29***	0.35***	0.22***	0.32***	0.38**	0.28***
$ECT_{(-1)}$	-0.46***	-0.55**	-0.31***	-0.50***	-0.57***	-0.38***	-0.54***	-0.62***	-0.38***
D_Up	0.74*	0.10**	0.15*	0.74**	0.47**	0.58*	0.29**	0.30**	0.52**
D_Up*Δ PR							0.11**	0.78**	0.20*
Risk	0.04	0.01	0.12	0.03	0.01	0.12	0.05	0.02	0.09
Cost- income	0.09	0.23	0	0.1	0.18	0.01	0.1	0.13	-0.04
Govt-borrowing	0.19	0.88	0.47	0.15	0.74	0.39	0.18	-0.61	0.46
Foreign-owned banks*capital	0.00	0.10	0.08	0.09	0.11	0.08	0.07	0.09	-0.08
D_Up*Risk				0.07	-0.09	-0.01*	0.02	0.09	0.1
D_Up*Cost- income				-0.5	0.12	-0.01	0.08	0.02	-0.00
D_Up*Govt-borrowing				0.01	0.2	0.04	0.07	0.55	0.41
D_Up*Foreign-owned banks*capital				0.00	0.02	0.01	0.01	-0.05	0.09
D_Up*Risk*Δ PR							0.05	0.19	0.12
D_Up*cost- income*Δ PR							0.14	0.07	0.03
D_Up*Govt-borrowing*Δ PR							0.00	0.06	0.03
D_Up*Foreign-owned banks*capital*Δ PR							0.01	0.08	0.2
Inflation	0.01***	0.06*	0.08*	0.05**	0.09**	0.05**	0.04***	0.05**	0.04*
Exchange rate	0.09***	0.02**	0.02	0.03***	0.01***	0.09	0.03***	0.03***	0.02**
Competition	-0.02	0.06	-0.09	0.05	0.04	-0.01	0.02	0.07	0.01
N	1343	790	567	1343	790	567	1343	790	567

Coefficients are tabulated; Significance levels: *** =significant at the 1% level, **=significant at the 5% level, *=significant at the 10% level

5.3 Structural break analysis of the effect of change of the monetary policy regime

The period of analysis is 2009-2017. During this period, there was a transition of the monetary policy framework from monetary targeting to inflation targeting regime. To account for the effect of the transition, a structural break analysis was conducted. We thus introduced, a dummy variable, IT-regime,to account for the change of monetary policy regime. The dummy variable was then interacted with the policy rate to assess the pass-through effect from monetary policy changes. We employed a chow test assessing the two periods before the inflation targeting regime and after. The null hypothesis is that the parameters are equal (same slope and intercept) for the two periods. The null hypothesis that the two periods before the IT regime and after, have equal slopes was rejected (see appendix 3), implying that the inflation targeting (IT) regime has had a significant impact on the pass-through effect of changes in policy rates to changes in the lending rates.

In addition, equations 1 and 2 where re-estimated with the interaction term, IT-regime, to assess the impact on the pass-through effect. Results for equation 1 are presented in table 4.

Table 4: Accounting for monetary policy regime change

Panel A: No interactions				Panel B: Interactions with the policy rate		
Dependent variable: ΔLR				Dependent variable: ΔLR		
	All Banks	Small Banks	Big Banks	All Banks	Small Banks	Big Banks
ΔLR_{t-1}	-0.30***	-0.38***	-0.22***	-0.31***	-0.38***	-0.18**
ΔPR_{t-2}	0.21***	0.24***	0.15***	0.21***	0.23**	0.15***
$ECT_{(-1)}$	-0.26***	-0.35**	-0.18***	-0.28***	-0.42**	-0.19***
Risk	0.03	-0.01	0.19	0.04	0.05	-0.44*
Cost- income	-0.03	-0.02	-0.00	0.01	-0.01	-0.01
Govt-borrowing	-0.16*	-0.20*	-0.09	-0.19*	-0.26*	-0.09
Risk*Δ PR				-0.08**	-0.09*	-0.09*
Cost- income*Δ PR				-0.15**	-0.14*	-0.03
Govt-borrowing*Δ PR				-0.03**	-0.03	- 0.03***
Foreign-owned *capital*Δ PR				-0.02	-0.04**	-0.09*
IT-regime*Δ PR	0.26**	0.35**	0.05	0.27**	0.36**	0.02
Inflation	0.02	0.00	0.01	0.02	0.02	0.01
Exchange rate	0.02**	0.03***	0.00	0.02**	0.03***	0.001
Competition	-0.05***	-0.06***	-0.00	-0.05***	-0.07***	0.02
N	1343	790	567	1343	790	567

Coefficients are tabulated; Significance levels: *** =significant at the 1% level, **=significant at the 5% level, *=significant at the 10% level

Results in table 4 show significant positive coefficients on the dummy that captures change of monetary policy regime, even after interacting the dummy variable with the change in the policy rate, save for the big banks. This implies a stronger pass-through effect of the changes in the policy rate to lending rates after transitioning to the inflation targeting regime as reflected in the higher pass-through coefficients compared to the results in table 1 where we do not account for the monetary policy regime change. We further note a higher speed of adjustment in the results compared to those in table 1. However, the pass-through effect remains incomplete and hence depicting that the stickiness problem of the lending rates still persists. The finding of the insignificant effects of change of monetary policy regime is quite interesting as it seems to confirm our earlier argument that big banks are usually well capitalised and do not seem to react fast to monetary policy actions. Similar results are found after re-estimating equation 2 with an interaction dummy, (IT-regime), capturing the monetary policy regime and changes in the policy rate. The results of equation 2 are presented in appendix 4(a) and 4(b) for downward and upward stickiness, respectively.

Table 5: Determinants of lending rates stickiness using the Central Bank Rates (2011-2017)

Panel A: (2009-2017) Interactions with the policy rate (7-day rate)				Panel B: (2011-2017) Interactions with the policy rate (CBR)		
Dependent variable:	ΔLR			Dependent variable:	ΔLR	
	All Banks	Small Banks	Big Banks	All Banks	Small Banks	Big Banks
ΔLR_{t-1}	-0.27***	-0.33***	-0.20***	-0.27***	-0.41***	-0.20***
ΔPR_{t-1}	0.15***	0.15***	0.13***	0.15***	0.15***	0.14***
$ECT_{(-1)}$	-0.21***	-0.31***	-0.17***	-0.26***	-0.28***	-0.20***
Risk	0.04	0.06	-0.4*	0.02	0.05	-0.36
Cost- income	0.01	-0.01	-0.01	0.03	-0.03	-0.01
Govt-borrowing	-0.16*	-0.21	-0.09	-0.05*	-0.00	-0.09
Foreign-owned banks*capital	-0.02*	-0.04**	-0.09*	-0.04**	-0.08***	-0.06
Risk*Δ PR	-0.07*	-0.08*	-0.09*	-0.03	-0.02	-0.08
Cost- income*Δ PR	-0.15**	-0.15**	-0.03	-0.07	-0.05	-0.04
Govt-borrowing*Δ PR	-0.03**	-0.03	.- 0.03***	-0.11*	-0.01	- 0.03***
Inflation	0.06***	0.07***	0.01	0.01	0.03	0.02
Exchange rate	0.03***	0.04***	0.001	0.02	0.02**	0.001
Competition	-0.04***	-0.06***	-0.03***	-0.03**	-0.03*	-0.02
N	1343	790	567	1343	790	567

Coefficients are tabulated; t-values are in parentheses. 2) Significance levels: *** =significant at the 1% level, **=significant at the 5% level, *=significant at the 10% level

In addition, as a test for robustness of the results, and following a change in the monetary policy regime to inflation targeting in 2011, we re-estimated equations 1 and 2 for the period 2011 to 2017, using the Central Bank Rate (CBR) as the policy rate. Results are presented in table 5 and are compared with the results where we used the 7-day rate as a proxy for the policy rate for the period 2009 to 2017. Overall, the results are not significantly different, although, we note a slightly higher speed of adjustment in the results shown in panel B where used the CBR from 2011 to 2017. This points to the significance of transitioning to the inflation targeting monetary policy regime although the lending rates stickiness challenge remains. The other results assessing the asymmetry in the lending rates response to the policy rate changes using the CBR from 2011 to 2017 are presented in appendix 5 (b).

6. Conclusion and policy implications

6.1 Conclusion

Despite the progress made over the past two decades, Uganda's banking sector is still characterized by high and sticky lending interest rates. The central bank introduced the central bank rate in 2011 to among others implement the inflation targeting framework and improve the credit and interest rate channel of monetary policy transmission. While the other market rates have trended well with the CBR (policy rate), the lending rates remain sticky downwards which poses challenges to monetary policy implementation.

Exploiting the error correction techniques used within dynamic panel estimates, this paper investigates the factors that might explain the lending rate stickiness and the asymmetrical response of lending rates to changes in the policy rates in Uganda's banking sector over the period 2009 to 2017.

Results indicate that the determinants of the downward interest rate stickiness are multifaceted. In general, a combination of bank, industry, and macroeconomic level factors explain interest rate stickiness. Specifically, risk is an important driver of sticky interest rates. Non-performing assets have persistently increased since 2005. These drive the interest rates as banks make provisions for writing off bad loans. In the same line, government borrowing has also been identified as an important factor that causes downward stickiness in the lending rates. This implies that banks prefer to invest in less risky and more profitable government securities, instead of issuing out risky loans. The result is less responsiveness of lending rates to changes in the policy rate.

Other factors include cost efficiency and bank concentration. These results suggest that improving competition in the banking sector while encouraging banks to be more cost efficient will drive down interest rates in line with changes in the central bank rate. In addition, well-capitalised banks are associated with less sensitivity to changes in the policy rates this suggests that these banks can draw on foreign capital to finance their domestic operations without necessarily relying on borrowing from the central bank.

In conclusion, the relatively sticky interest rates in Uganda remain a subject of

debate and continue to pose challenges, particularly in the transmission of monetary policy and ensuring that economic agents access affordable credit. Although banks are continuously innovating to improve their cost-income positions, there is still more that needs to be done, especially in terms of ensuring efficiency. The on-going debate on the introduction of branchless banking, including agency banking and other related provisions will likely go a long way in improving the cost efficiency in the banking sector. Other interventions include a mix of strategies that could range from diversification of products to invest in cost-saving and efficient forms of technology. Although the banking sector was liberalised and opened up to competition, the sector is still highly concentrated and more can be done, especially in terms of breaking market concentration. Within this realm, supporting mostly the small and indigenous banks to compete and penetrate the market as well as measures towards minimizing credit risks. That said, the on-going debate on capping interest rates may not be the best solution for reducing the downward stickiness in the lending rates of commercial banks but the emphasis should be put on ensuring that these factors are addressed.

6.2 Policy Implications

Continuous innovations by banks, including the ongoing debate on the introduction of branchless banking, including agency banking, and other related provisions such as a mix of strategies ranging from diversification of products to investing in cost-saving and efficient technology, will likely go a long way in improving cost-efficiency in the banking sector and thus reduce lending rate stickiness.

Although the banking sector was liberalized and opened up to competition, the sector is still highly concentrated and more can be done, especially in terms of breaking up market concentration. Within this realm, supporting mostly small and indigenous banks to compete and penetrate the market could improve bank competition and banking efficiency. This, coupled with measures towards minimizing credit risk such as enhancing the effectiveness of the credit reference bureau, would help the lending rate stickiness problem.

Measures to improve domestic revenue mobilization could be instrumental in reducing the pressure on domestic government borrowing and the increasing appetite of banks to invest in government securities and the resultant crowding-out effect of private-sector lending due to lending rate stickiness in the loans sectors. That said, the ongoing debate on capping interest rates may not be the best solution for reducing downward stickiness in the lending rates of commercial banks. The emphasis should rather be on ensuring that these factors are addressed.

References

Angeloni, I., E. Faia and M.L. Duca. 2015. "Monetary policy and risk taking". *Journal of Economic Dynamics and Control,* 52: 285–307.

Apergis, N. and M.L. Polemis. 2016. "Competition and efficiency in the MENA banking region: A non-structural DEA approach". *Applied Economics*: 1–16.

Arellano, M. and S. Bond. 1991. "Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations". *The Review of Economic Studies*, 58(2): 277–97

Banerjee, A., E. Duflo, R. Glennerster and C. Kinnan. 2015. "The miracle of microfinance: Evidence from a randomized evaluation". *American Economic Journal: Applied Economics*, 7(1): 22–53.

Bank of Uganda. 2014. *Annual Report 2013/2014*. Bank of Uganda, Kampala.

Bank of Uganda. 2016. *Annual Report 2015/2016*. Bank of Uganda, Kampala.

Bank of Uganda. 2017. Remarks by Prof. Emmanuel Tumusiime-Mutebile, Governor Bank of Uganda at the Uganda Bankers' Association, Annual Bankers' Conference, Kampala, Uganda, 19 July.

Beck, T. and H. Hesse. 2006. "Bank efficiency, ownership, and market structure: Why are interest spreads so high in Uganda?" *Journal of Development Economics,* 88(2): 192–204.

Bessis, J. and B. O'Kelly. 2015. *Risk Management in Banking*, 4th edition. John Wiley & Sons,The Atrium, Southern Gate, Chichester, West Sussex, United Kingdom

Borio, C.E. and W. Fritz. 1995. "The response of short-term bank lending rates to policy rates: A cross-country perspective". Working Paper No. 27. Bank for International Settlements, Basle, Switzerland, May.

Borio, C., and H. Zhu. (2008), Capital regulation, risk-taking and monetary policy: a missing link in the transmission mechanism? Journal of Financial stability, 8(4), pp.236-251.

Civil Society Budget Advocacy Group. 2016. "In whose interest are interest rates priced?Press statement by Civil Society Organisations on the Capping of Interest Rates in Uganda, issued 3 September, CSBAG offices, Kampala. Retrieved from the Civil Society Budget Advocacy Group., *https://csbag.org/?publications=a-press-statement-by-csos-on-the-capping-of-interest-rates-in-uganda-issued-3rd-september-2016-the-csbag-offices-in-kampala*De Bondt, G.J. 2005. "Interest rate pass-through: Empirical results for the Euro Area". *German Economic Review*, 6(1): 37–78.

De Graeve, F., O. De Jonghe and R. Vander Vennet. 2007. "Competition, transmission and bank pricing policies: Evidence from Belgian loan and deposit markets". *Journal of Banking & Finance,* 31(1): 259–78.

Duflo, E., A. Banerjee, R. Glennerster and C.G. Kinnan. 2013. "The miracle of microfinance? Evidence from a randomized evaluation". Working Paper No. 18950, National Bureau of Economic Research, Cambridge, Massachusetts, May.

Égert, B., J. Crespo-Cuaresma and T. Reininger. 2007. "Interest rate pass-through in Central and Eastern Europe: Reborn from ashes merely to pass away?" *Journal of Policy Modelling,* 29(2): 209–25.

Égert, B. and R. MacDonald. 2009. "Monetary transmission mechanism in Central and Eastern Europe: Surveying the surveyable". *Journal of Economic Surveys*, 23(2): 277–327.

Gambacorta, L. 2008. "How do banks set interest rates?" *European Economic Review*, 52: 792–819.

Gambacorta, L. and P.E. Mistrulli. 2014. "Bank heterogeneity and interest rate setting: What lessons have we learned since Lehman brothers?" *Journal of Money, Credit and Banking*, 46: 753–78.

Grigoli, F. and J.M. Mota. 2017. "Interest rate pass-through in the Dominican Republic". *Latin American Economic Review*, 26(1): 4.

Illes, A., M. Lombardi and P. Mizen. 2015. *Why Did Bank Lending Rates Diverge from Policy Rates After the Financial Crisis?* Discussion Paper No. 2015/05, University of Nottingham, Centre for Finance, Credit and Macroeconomics, Nottingham.

Jiménez, G., S. Ongena, J.L. Peydró and J. Saurina. 2014. "Hazardous times for monetary policy: What do twenty three million bank loans say about the effects of monetary policy on credit risk taking?" *Econometrica*, 82(2): 463–505.

Kitamura, T., I. Muto and I. Takei. 2015. How do Japanese banks set loan interest rates? Estimating pass-through using bank-level data. *Working Paper Series* 15-E-6, Bank of Japan.

Klemperer, P. 1987. "Markets with consumer switching costs". *The Quarterly Journal of Economics,* 102(2): 375–94.

Kuteesa, A. and J. Mawejje. 2016. "Between the market and the state: The capacity of business associations for policy engagement in Uganda". *The Journal of Modern African Studies*, 54(4): 617–44.

Levin, A., C.F. Lin and C.S.J. Chu. 2002. "Unit root tests in panel data: Asymptotic and finite-sample properties". *Journal of Econometrics*, 108(1): 1–24.

Lowe, P.W. and T. Rohling. 1992. "Loan rate stickiness: theory and evidence". Economic Research Department, Reserve Bank of Australia.

Maddala, G.S. and S. Wu. 1999. "A comparative study of unit root tests with panel data and a new simple test". *Oxford Bulletin of Economics and Statistics*: 631–52.

Mawejje, J. and Sebudde, R. K. (2019). Constraints or Complaints? Business Climate and Firm Performance Perceptions in Uganda, Journal of Developing Studies, 55(12), pp 2513–2525.

Mishkin, Frederic S. 1996. The channels of monetary transmission: Lessons for monetary policy. Banque De France Bulletin Digest no. 27 (March): 33–44.

Nampewo, D. 2012. "What drives interest rate spreads in Uganda's banking sector?" International Journal of Economics and Finance, 5(1): 76.

Neumark, D. and S.A. Sharpe. 1992. "Market structure and the nature of price rigidity: Evidence from the market for consumer deposits". The Quarterly Journal of Economics, 107(2): 657–80.

Opolot, J., D. Nampewo, A.C. Ntumwa and S. Nyanzi. 2013. "Financial architecture and monetary policy transmission mechanisms in Uganda". Bank of Uganda Working Paper No. 2: Kampala., (March)..

Scholnick, B. 1999. "Interest rate asymmetries in long-term loan and deposit markets". Journal of Financial Services Research, 16(1): 5–26.

Stiglitz, J. and A. Weiss. 1981. "Credit rationing in markets with imperfect information". American Economic Review 71, 393–410.

World Bank. 2017. "Step by step: Let's solve the finance puzzle to accelerate growth and shared prosperity". Uganda Economic Update, eight edition. The World Bank: Washington, D.C.

Zhao, T. K. Matthews and V. Murinde. 2013. "Cross-selling, switching costs and imperfect competition in British banks". Journal of Banking & Finance, 37(12): 5452–62.

Appendix A

Table A1: Panel unit root tests

H0: Variables are non-stationary			
Variables	Levin et al.	Maddala et al	Decision
LR	-2.36 [0.99]	-0.36 [0.64]	Do not reject H0
TB-RATE	-2.73 [0.99]	-10.79 [0.99]	Do not reject H0
7-DAY RATE	-0.62 [0.27]	-0.44 [0.33]	Do not reject H0
SIZE	-0.09 [0.53]	-0.31 [0.38]	Do not reject H0
RISK	-0.91 [0.82]	-1.05 [0.15]	Do not reject H0
EXRT	-3.26 [0.99]	-5.25 [0.34]	Do not reject H0
INFLATION	-2.41 [0.00] **	-4.29 [0.00] ***	Reject H0
GOV	-4.21 [0.74]	-4.47 [0.88]	Do not reject H0
HHI	-3.58 [0.99]	-2.35 [0.99]	Do not reject H0
CAPITAL	-1.47 [0.07] *	-1.46 [0.07] *	Reject H0
COST-INCOME	-0.47 [0.68]	-1.69 [0.04] **	Inconclusive

Note: 1) The coefficients are tabulated; p-values are in parentheses. 2) Significance levels: *** =significant at the 1% level, ** =significant at the 5% level, *=significant at the 10% level, [] are p-values. All trends include fixed effects and trends

Appendix B

Table B1: Panel Cointegration Tests

Variables	ADF	Decision	Conclusion
Residuals	- 5.17 [0.00]***	Reject H0	I(0)

Note: 1) The coefficients are tabulated; p-values are in parentheses. 2) Significance levels: *** =significant at the 1% level, ** =significant at the 5% level, *=significant at the 10% level, [] are p-values

Appendix C

Table C1: Chow test for structural change

	Test statistics	Decision	Conclusion
Chow test	13.75 (0.00)]	Reject H0	The two periods do not have the same slope & intercept
Notes: The coefficients are tabulated; p-values are in parentheses			

Appendix D

Table D1: Accounting for monetary policy regime change during policy fall (Downward asymmetry)

Dependent variable: ΔLR									
Panel A: No Interactions				Panel B: Interactions with the Dummy_down			Panel C: Interactions with the Dummy_down & policy rate changes		
	All Banks	Small Banks	Big Banks	All Banks	Small Banks	Big Banks	All Banks	Small Banks	Big Banks
ΔLR_{t-1}	-0.39***	-0.46***	-0.22***	-0.32***	-0.32***	-0.20***	-0.27***	-0.38***	-0.21
ΔPR_{t-1}	0.21***	0.23***	0.09***	0.21***	0.24***	0.09***	0.21***	0.23***	0.12***
$ECT_{(-1)}$	-0.32***	-0.44**	-0.16***	-0.33***	-0.45***	-0.16***	-0.28***	-0.42***	-0.18***
D_down	0.20	0.21	0.19	0.91	0.86	0.14	0.18	0.69	0.71
D_down*Δ PR							-0.13	-0.27	-0.01
Risk	-0.05	-0.09	0.45	0.04	-0.04	-0.48*	-0.02	0.01	-0.05*
Cost- income	-0.06	-0.02	-0.01	0.12	-0.06	-0.01	0.09	-0.00	-0.03
Govt-borrowing	-0.19*	-0.27**	-0.02	-0.18*	-0.22*	-0.10	-0.00	-0.20*	-0.12
Foreign-owned banks*capital	-0.03**	-0.06**	0.07	-0.03**	-0.06**	0.08	-0.01*	-0.04**	0.08
D_down*Risk				-0.05	-0.13	-0.06**	0.08	-0.13	-0.06*
D_down*Cost-income				-0.06	-0.03	-0.01	-0.11	-0.02	-0.00
D_down*Govt-borrowing				-0.05	-0.23	-0.35	-0.01	-0.23*	-0.39
D_down*Foreign-owned banks*capital				-0.01*	-0.04*	0.05*	0.01	-0.02*	-0.01*
D_down*Risk*Δ PR							-0.11*	-0.10	-0.17**
D_down*Cost-income*Δ PR							-0.10*	-0.08*	-0.04

D_down*Govt-borrowing*Δ PR							-0.04**	-0.04*	- 0.04**
D_down*Foreign-owned banks*capital*Δ PR							-0.02*	-0.02*	0.01
IT-regime	0.24**	0.31**	0.06	0.23**	0.31**	0.02	0.28**	0.36**	0.03
Inflation	0.02	0.01	0.05**	0.06***	0.01	0.05**	0.02	0.03	0.02
Exchange rate	0.02***	0.02**	0.01	0.03***	0.02***	0.01	0.02**	0.04***	0.01
Competition	-0.04***	-0.06***	0.01	-0.05***	-0.06**	0.01	-0.05**	-0.05**	0.02
N	1343	790	567	1343	790	567	1343	790	567

Coefficients are tabulated; Significance levels: *** =significant at the 1% level, **=significant at the 5% level, *=significant at the 10% level

Table D2: Accounting for monetary policy regime change during policy rise (Upward asymmetry)

Dependent variable: ΔLR									
	Panel A No Interactions			Panel B Interactions with the Dummy_up			Panel C Interactions with the Dummy_up & policy rate changes		
	All Banks	Small Banks	Big Banks	All Banks	Small Banks	Big Banks	All Banks	Small Banks	Big Banks
ΔLR_{t-1}	-0.34***	-0.42***	-0.21***	-0.26***	-0.32***	-0.20***	-0.15***	-0.23***	-0.20***
ΔPR_{t-1}	0.41***	0.44***	0.32***	0.42***	0.45***	0.34***	0.40***	0.42**	0.30***
$ECT_{(-1)}$	-0.56***	-0.66**	-0.36***	-0.57***	-0.68***	-0.38***	-0.61***	-0.70***	-0.37***
D_up	0.37*	0.18**	0.11*	0.15**	0.20**	0.35*	0.75**	0.57**	0.91*
D_up*Δ policy rate							0.58**	0.10**	0.95*
Risk	0.05	0.09	0.11	0.06	-0.09	0.10	0.03	0.05	0.09
Cost- income	0.04	0.00	0.00	0.09	-0.03	0.02	0.10	-0.11	-0.02
Govt-borrowing	0.21	0.27	0.31	0.20	-0.38	0.33	0.21	-0.36	0.30
Foreign-owned banks*capital	0.00	0.09	0.07	0.09	0.10	0.06	0.07	0.09	-0.06
D_up*Risk				0.04	-0.04	-0.04	0.07	-0.14	0.05
D_up*Cost- income				-0.2	-0.12	-0.06	0.1	-0.13	-0.04
D_up*Govt-borrowing				0.02	0.17	0.1	0.06	-0.29	0.12
D_up*Foreign-owned banks*capital				0.00	0.03	0.02	0.01	0.02	0.01
D_up*Risk*Δ PR							0.08	0.18	0.11
D_up*Cost- income*Δ PR							0.11	0.05	0.01
D_up*Govt-borrowing*Δ PR							0.02	0.09	0.04
D_up*Foreign-owned banks*capital*Δ PR							0.01	0.03	0.22
IT-regime	0.22**	0.33**	0.03	0.24**	0.31**	0.05	0.29**	0.37**	0.05
Inflation	0.01	0.01	0.04	0.02	0.01	0.01	0.02	0.05**	0.04*
Exchange rate	0.02**	0.03**	0.01	0.04***	0.03***	0.01	0.03**	0.03***	0.02**
Competition	0.02	0.07	0.01	0.06	0.07	0.01	0.02	0.07	0.01
N	1343	790	567	1343	790	567	1343	790	567

Coefficients are tabulated; Significance levels: *** =significant at the 1% level, **=significant at the 5% level, *=significant at the 10% level

APPENDIX E

Table E1: Determinants of lending rate stickiness using the Central Bank Rate (2011-2017)

Dependent variable: ΔLR						
Panel A: No interactions				Panel B: Interactions with changes in the policy rate		
	All Banks	Small Banks	Big Banks	All Banks	Small Banks	Big Banks
ΔLR_{t-1}	-0.31***	-0.34***	-0.38***	-0.27***	-0.41***	-0.20***
ΔPR_{t-1}	0.12***	0.11***	0.10***	0.15***	0.15***	0.14***
$ECT_{(-1)}$	-0.25***	-0.32***	-0.17***	-0.26***	-0.28***	-0.20***
Risk	0.01	-0.02	0.15	0.02	0.05	-0.36
Cost- income	-0.11	-0.08	-0.01	0.03	-0.03	-0.01
Govt-borrowing	0.00	-0.08	-0.09	-0.05*	-0.00	-0.09
Risk*Δ policy rate				-0.03	-0.02	-0.08*
Cost- income*Δ PR				-0.07	-0.05	-0.04
Govt-borrowing*Δ PR				-0.11*	-0.01	- 0.03***
Foreign-owned banks*capital				-0.04**	-0.08***	-0.06
Inflation	0.04***	0.03*	0.05***	0.01	0.03	0.02
Exchange rate	0.02**	0.02**	0.10	0.02	0.02**	0.00
Competition	-0.03*	-0.03*	-0.00	-0.03**	-0.03*	-0.02
N	1343	790	567	1343	790	567

Coefficients are tabulated; t-values are in parentheses. 2) Significance levels: *** =significant at the 1% level, **=significant at the 5% level, *=significant at the 10% level

Table E2: Determinants of lending rate stickiness accounting for asymmetry during policy fall (downward asymmetry)

Dependent variable: ΔLR									
	Panel A No Interactions			Panel B Interactions with the Dummy_down			Panel C Interactions with the Dummy_down & policy rate changes		
	All Banks	Small Banks	Big Banks	All Banks	Small Banks	Big Banks	All Banks	Small Banks	Big Banks
ΔLR_{t-1}	-0.34***	-0.38***	-0.25***	-0.36***	-0.32***	-0.26***	-0.33***	-0.29***	-0.20***
ΔPR_{t-1}	0.13***	0.14***	0.09**	0.13***	0.15***	0.09***	0.16***	0.18***	0.12***
$ECT_{(-1)}$	-0.25***	-0.28**	-0.17***	-0.25***	-0.28***	-0.18***	-0.24***	-0.25***	-0.20***
D_down	0.05	0.14	0.08	-0.01	0.72	0.04	0.11	0.5	0.91
D_down*Δ PR							-0.02	-0.09	-0.08
Risk	-0.01	-0.05	0.39*	0.01	-0.01	-0.40*	0.01	0.04	-0.49*
Cost- income	-0.06	-0.02	-0.01	0.01	-0.01	-0.01	0.01	-0.06	-0.01
Govt-borrowing	-0.04	-0.00	-0.04	-0.05	-0.03	-0.14	-0.05	-0.03	-0.14
Foreign-owned banks*capital	-0.04**	-0.08***	0.07	-0.04**	-0.08**	0.08	-0.03	-0.06***	-0.07*
D_down*Risk				-0.05		-0.07**	0.06	-0.14	-0.06*
D_down*Cost- income				-0.02		-0.03	-0.03	-0.01	-0.02
D_down*Govt-borrowing				-0.00		-0.34	0.02	-0.20	-0.34
D_down*Foreign-owned banks*capital				-0.01*		0.05	0.00	-0.01*	-0.01*
D_down*Risk*Δ PR							-0.06*	-0.04	-0.17**
D_down*Cost- income*Δ PR							-0.03	-0.01*	-0.04
D_down*Govt-borrowing*Δ PR							-0.02*	-0.02	- 0.04**
D_down*Foreign-owned banks*capital*Δ PR							-0.02*	-0.01*	0.01
Inflation	0.04***	0.03	0.06**	0.04**	0.03	0.06**	0.02	0.02	0.04
Exchange rate	0.02***	0.02*	0.01	0.02**	0.02*	0.01	0.02**	0.02**	0.01
Competition	0.02	0.03*	0.01	0.01	0.01*	0.01	0.04***	0.05**	0.02
N	1343	790	567	1343	790	567	1343	790	567

Coefficients are tabulated; Significance levels: *** =significant at the 1% level, **=significant at the 5% level, *=significant at the 10% level

Mission

To strengthen local capacity for conducting independent, rigorous inquiry into the problems facing the management of economies in sub-Saharan Africa.

The mission rests on two basic premises: that development is more likely to occur where there is sustained sound management of the economy, and that such management is more likely to happen where there is an active, well-informed group of locally based professional economists to conduct policy-relevant research.

www.aercafrica.org

Learn More

www.facebook.com/aercafrica

www.instagram.com/aercafrica_official/

twitter.com/aercafrica

www.linkedin.com/school/aercafrica/

Contact Us
African Economic Research Consortium
Consortium pour la Recherche Economique en Afrique
Middle East Bank Towers,
3rd Floor, Jakaya Kikwete Road
Nairobi 00200, Kenya
Tel: +254 (0) 20 273 4150
communications@aercafrica.org