Macro-Imbalances and Bank Lending: A Case of Kenya's Banking Industry

Raphael Agung; Anthony Muli; David Ndwiga and Samantha Njoroge

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Abstract

The paper examines the effect of macroeconomic imbalances on bank lending with emphasis on the exchange rate movement, inflation differential and fiscal deficit. In the study, bank lending is modelled by gross loans and advances, assets quality and risk appetite. The panel GMM model results show that the Kenya shilling depreciation increased bank lending, improved asset quality and increases risk appetite. Inflationary pressures increased bank lending, worsens asset quality and leads to risk aversion. Lastly, fiscal deficit reduces bank lending, improves asset quality and increases risk appetite. This study's findings support bank behaviour during the study period- where the single obligor limits may not have been a consideration given low lending toward capital expenditure. The study found out that uncertainty with regard to policy makers' response to macro-imbalances impairs decision making by economic agents. Thus, it is important for policy makers to provide forward guidance on their possible action path. Additionally, the National Treasury needs to adhere to the fiscal path that it tables every fiscal year. Overall, commercial banks and other business enterprises require predictable guidance from the policy makers to aid in strategy formulation and balance sheet optimization decisions.

1.0 Introduction

1.1   Background of the Study

Macro-imbalances- which arise from unexpected events that disrupt normal functioning of an economy and lead to a sudden and substantial impact on key macroeconomic indicators have gained tremendous attention since the global financial crisis of 2007/2008.** Although macro-imbalances have existed all along (Greenspan, 2011), the global financial crisis and the European sovereign debt crisis uncovered helped bring its empirical analysis to the fore. A global review of these macro-imbalances does suggest that their build up is majorly traced in the United States arising from the financial crisis and later the sovereign risk in the European Union.

In this particular study we argue that the study of macroeconomic imbalances in the context of the financial services is important, justified by the fact that the financial sector does react timely to macroeconomic uncertainties or fluctuations.

Macro -imbalances have been documented to have adverse effects on the banking industry through various channels. They have impacted credit markets, with dislocations spilling over to the real economy. Notably, during the global financial crisis banking industry lending sharply declined leading to a credit crunch which adversely affected the real economy with the advanced economies being hardly hit. However, we note that the effect of the macroeconomic uncertainties on the banking industry performance is not uniform, but dependent on several factors and so are the transmission channels. In addition, the size and the structure of the economy is a major factor here. For instance, for an economy reliant on a few commodities for both fiscal revenues and export receipts, the impact of macro-imbalances on banks' balance sheets could be quite significant.

From a theoretical perspective, the nexus between macroeconomic uncertainties and bank performance, especially bank lending, the pro-cyclical nature of bank lending is normally depicted. First, the observed increase in bank loans during economic expansions is likely to be characterized by the deterioration of bank

loan quality due to over-optimism, risk exposure underestimation and relaxation of lending standards. On the other hand, a macroeconomic shock that reduces economic activity could see banks curtail credit supply and, in the process, amplify cyclical fluctuations (Marcucci and Quagliariello, 2008). This underpins the need for an empirical examination of the impact of macroeconomic uncertainties on bank performance.

Empirical literature largely has consensus that macro imbalances have an adverse effect on the bank lending. The evidence of bank risk increasing in times of economic uncertainty is reported by Wu *et al*, (2002); Salas and Saurina (2002); Soto (2019); Talavera *et al.* (2012); Mikkelsen and Poeschl (2020). Further, Ragnar and Vegard (2022) examined the impact of macro-related uncertainty on bank lending in Norway and found that an increase in general macroeconomic uncertainty reduces bank lending. Moreover, Nguyen (2022) analysed the relationship between bank lending and macroeconomic factors, using panel data on Vietnamese commercial banks and found that the effect of macroeconomic and monetary policy shocks on bank lending behaviour is less pronounced when banks engage in a less competitive environment.

That said, an analysis of the impact of the specific macro variables on bank lending by various studies yields heterogenous results. For instance, a negative effect of inflation on bank lending is reported (Abaidoo and Anyigba, 2020; Saeed, 2014; Ayaydin and Karakaya, 2014 and Francis, 2013). At the same time, a positive effect of inflation on bank lending is also reported (Khan *et al.*, 2014]; Tan and Floros,

2012). Thus, evidence inconclusiveness from the findings on the effect of macro-imbalance from inflationary pressures on bank lending.

In the Kenyan context, there is scanty and limited empirical work on the impact of macro – imbalances on the bank lending. Existing studies in this area fail to provide empirical analysis into specific macro – variables imbalances and bank lending but rather provide a general examination of the relationship between banks performance and macroeconomic factors (Wainaina, 2013; Kigamwa and Mutwiri, 2023). This limited empirical evidence in Kenya is despite the current macroeconomic downside risks emanating from sharp shilling depreciation, high fiscal deficits amid very narrow fiscal space and high debt burden and high market interest rates.

This calls for empirical research on topical area in the Kenyan context amid the heightened macro-imbalances in Kenya in the recent past. Moreover, adverse impact stemming from macro shocks and its consequent effect on banking industry performance underpins the crucial need for empirical studies. Against this background, we justify the need for this study in the Kenyan context for the Q42020 to Q12024 period.

1.1.1 Stylized Facts on Macroeconomic Imbalances in Kenya as Section

A review of Kenya's economic performance over time in attempt to trace macro - imbalances reveals that Kenya registered good economic performance in the 1960s and early 1970s supported by the coffee boom. During this period, economic growth averaged 5.7

per cent in 1960s, accelerating in the 1970s to 7.2 per cent. However, this performance was not sustained in 1980s and 1990s following the economic shocks that hit the economy that saw growth average to 4.2 per cent and 2.2 per cent in the 1980s and 1990s, respectively (World Bank 2015). In 1970 and 1971, the excessively expansionary policies led to a balance of payments crisis in 1971 though swiftly controlled through credit, price, and exchange rate controls.

The macro-imbalances were exacerbated in 1980s where poor export performance and deteriorating terms of trade, rising public sector deficits, and structural rigidities in the economy became evident. The inability of the government to carry through some of the adjustments agreed with the donors compounded the problems. In addition, the current account deficits began to build up in 1980s occasioned by the trade liberalization policies implemented by the government as part of the Structural Adjustment Programmes in the late 1980s.

On the debt side, gross public debt increased from 48.6 percent of GDP at end-2015 to an estimated 69 percent of GDP in 2023, partly driven by spending on large infrastructure projects, and in 2020 by the COVID-19 spend. The imbalance saw the review of the Shs 9.0 Trillion debt ceiling in 2019 with the debt having ballooned significantly from Sh1.89 Trillion in 2012.

Figure 1: Kenya's Public Debt Growth 1999 - 2024

1(a): Public Debt (Kes Billions) and Public Debt Growth

1(b): Public Debt, Kes Billions


Source: National Treasury, Kenya.
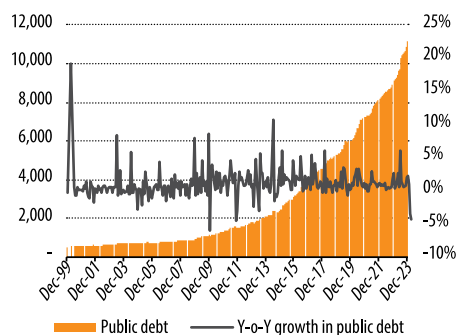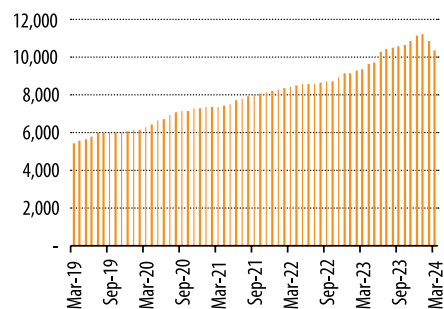
On the exchange rate, we note that Kenya has undergone several exchange rate regimes. From the 1960 to 1970s, fixed exchange rate was maintained, which was later pegged to the US dollar until 1974. This resulted to an erratic movement of nominal exchange rate relative to the dollar. The regime later changed to crawling peg at the end of 1982 until 1990 when a dual exchange rate system was embraced that lasted until October 1993. Historical movements in the exchange rate indicate that the 1976 – 77 tea and coffee boom led to shilling appreciation. However, this period saw the rapid expansion in domestic credit, money supply and fiscal expansion, with the country's indebtedness level rising. To address the macroeconomic disequilibrium arising from the boom, the first foreign exchange policy shift from fixed exchange rate to a crawling peg was implemented.

Kenya has experienced major misalignments. In 1993, the official exchange rate was abolished and further liberalization in the forex market implemented. Resultantly, there was a high depreciation of the real exchange rate in 1993 following the general elections. Further, in 2011, the local currency registered significant depreciation sliding to a low of 107 against the US dollar. Thereafter, in 2022 – 2024, the shilling registered approximately 22 percent depreciation against the US dollar between March 2022 and January 2024 (**figure 2**).

Figure 2: Kes/Usd Exchange Rate (1993 - 2024)

2(a): USDKES Y-o-Y Depreciation %
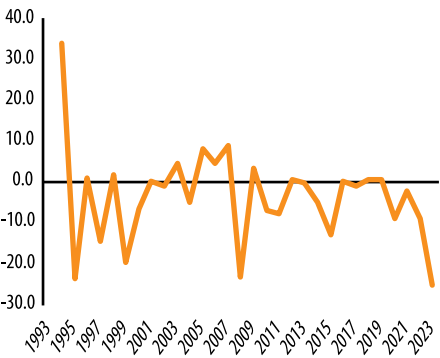
2(b): USDKES Y-o-Y Depreciation %
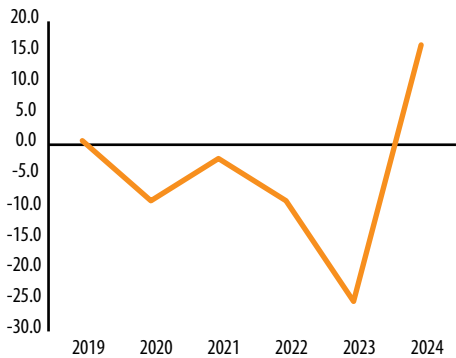
Regarding inflation, an historical review reveals that during the first decade of Kenya's independence, the rate of inflation averaged 3% , with the exchange rate fixed and thus inflation was considered to be of less policy concern. Initial inflationary pressures set in 1970s following the first oil price shocks and balance of payments problems. The 1980s saw inflation significantly rise, occasioned by the shilling's devaluation, accelerated money supply growth and erratic weather conditions. (Killick and Mwega 1989).

The rate of inflation, remained high through most of 1993, exceeding 50% in the 12-month period ended September 1993 mainly triggered by the two large devaluations in March and April 1993 (**figure 3**). High inflationary pressures in 1994 were attributed to high food prices amid the drought that year. Later the decline in inflationary pressures are attributed to tighter monetary policy stance, appreciation of the

shilling, reduction in excise duties and import tariffs, and the positive supply response, most notably in the manufacturing sector. Food prices also benefited from the bumper grain crop that followed the good long rains in 1994. A closer look at the recent past years indicates that inflationary pressures have largely remained within the target band with a spike above 7.5% upper bound registered between June 2022 – June 2023. From June 2023 onwards, the inflation has been largely within the Central Bank of Kenya target bound.

Further, this review shows that macroeconomic management policies implemented in solving some imbalances have had adverse effects on the other macroeconomic fundamentals. Additionally, the imbalances seem to have heightened in the recent past with fiscal deficit being pronounced and the currency being relatively weak against global major

Figure 3: Kenya's Inflation Rate 1985 - 2024

3(a): Percentage Inflation Rate (YoY)

3(b): Percentage Inflation Rate (YoY)

Source: Kenya National Bureau of Statistics
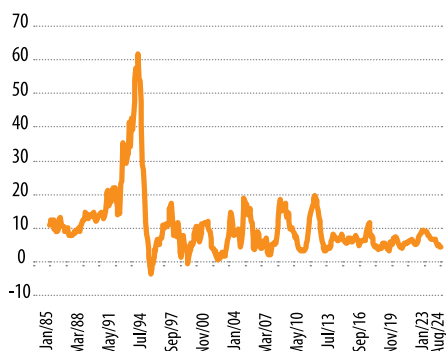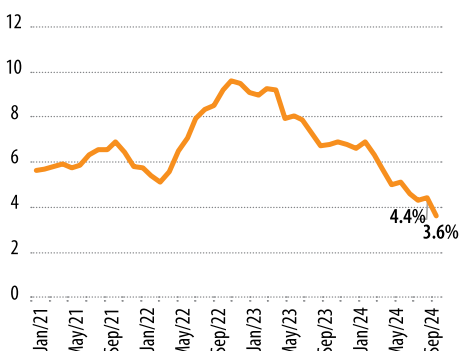
currencies- though stable. Therefore, given that the depth of markets in 1970s is different from today, the dynamics of these imbalances are different as well. In Kenya, the existing studies on the imbalances seem outdated, with scanty empirical work in the recent decade.

Overall, such studies on Kenya seem to focus on the development of the imbalances while remaining largely mute on their effects on the real economy. Against this backdrop, this study seeks to bridge this gap be examining the macro imbalances in recent times in Kenya and how these imbalances affect bank lending for the Q42020 to Q12024 period that has been characterised by sharp depreciation of the Kenya shilling against global hard currencies, very narrow fiscal space occasioned by reduced revenue generation hence high fiscal deficits; high debt servicing expenditure and debt burden as well as reasonably high inflation rate and intertest rates.

1.2   Problem Statement

Macro-imbalances have been documented to have adverse effects on the banking industry mainly through the bank credit channel, with lending sharply declining. However, we note that the effect of the macro-imbalances on the banking industry performance is diverse and dependent on several factors and so are the transmission channels. Additionally, the size and the structure of the economy is a major factor here in determining the macroeconomics imbalances – banking industry performance nexus.

Moreover, empirical literature largely has consensus that macro imbalances have adverse effect on the bank lending. However, there is evidence inconclusiveness on the findings regarding the effect of inflationary pressures on bank lending.

In the Kenyan context, there is scanty and limited empirical work on the impact of macro – imbalances on the bank lending. Existing studies in this area fail to provide empirical analysis into specific macro – variables imbalances and bank lending but rather provide a general examination of the relationship between banks performance and macroeconomic factors (Wainaina, 2013; Kigamwa and Mutwiri, 2023).

This calls for empirical research on this topical issue in the Kenyan context amid the heightened macro-imbalances in Kenya in the recent past. Moreover, adverse impact stemming from macroeconomic shocks and its consequent effect on banking industry performance underpins the crucial need for this empirical study. Against this background, we evaluate macro-imbalances and bank lending in Kenya for the Q42020 to Q12024 period.

1.3   Study Objectives

The study objective is to examine the impact of macroeconomic imbalances on bank lending.

1.4   Significance of the Study

The study findings would significantly contribute to commercial banks' assets and liability management specifically with regard to balance sheet optimization.

Macro-imbalances impact on bank lending, assets quality and risk appetite call for an empirically driven decision process. Additionally, on policy formulation, the study findings are crucial in providing empirical evidence in support of the macro prudential policies in managing these macro-imbalances. Evidence on how the macro-imbalances interact with the real economy do provide an objective basis underpinning the call for formulation and implementation of macroeconomic prudential policies by the relevant authorities.

2.0 Literature Review

2.1 Theoretical Review

This study is based on the Portfolio Balance Model by McKinnon (1969). The model underpins commercial bank's decisions on asset allocation to loans and bonds. According to Baum *et al.* (2005), in determining the optimal portfolio, banks assess the signals on expected returns of investments, then, accordingly, their lending decisions. Macroeconomic uncertainty arising from any imbalances, by making the signals to be noisier, prompts banks to reallocate their assets away from risky loans toward safer bonds signalling risk aversion. Therefore, based on this theoretical perspective the loan-to-asset ratio declines following the increase in macro uncertainty implying that the optimal share of loans in the asset portfolio is distorted as a result of increasing uncertainty (Quagliariello, 2009). To this extend modelling the macroeconomic uncertainty-bank lending nexus points is crucial to inform the role of bank lending in transmitting financial shocks and to the real sector.

Further, Baum *et al.* (2009) asserts that in times of high macroeconomic uncertainty, banks are likely to act more homogeneous in their portfolio decisions whereas in periods of low macroeconomic uncertainty, the lending behaviour of banks may be more heterogeneous. The macroeconomic uncertainty incapacitates bank managers to forecast returns accurately, leading to more conservative credit decisions across all banks (Baum *et al.* 2009). Moreover, the works by Bernanke & Gertler (1995) gives a vital theoretical underpinning on studies linking macroeconomic uncertainties and bank lending. To this effect Bernanke & Gertler (1995) bring forth the crucial credit channel theory through which macroeconomic uncertainties arising from the monetary policy developments feed into bank lending: the balance sheet channel and the bank-lending channel.

2.2 Empirical Review

Vast empirical literature on macroeconomic uncertainties and bank performance exists. Macro – imbalances effect on bank lending is examined in Italy by Quagliariello (2009). The investigation sought to examine the banks' allocation between loans and risk-free assets in the context of heightened macroeconomic uncertainties. Evidence

of significant effect of macro – imbalance on the banks' investment decision is reported. The study finds that uncertainties posed by the macro – imbalances adversely affects bank ability to accurately forecasts returns on the investments resulting into herding behaviour hence reduced bank lending.

Košak et al (2015) studied bank lending behaviour amid macro – imbalances posed by the global financial crisis. Important to the study was the role of the bank capital during the crisis. He found out that tier 2 capital and interbank deposits failed to support the banks' lending during the crisis despite them being effective in supporting lending in normal periods. The key conclusion from the study was that during the crisis periods, bank high quality capital offers competitive strength to withstand the shock. Similar findings are reported by Berger and Bouwman (2013) in the US banking sector who found that capital increases the survival probability and market share of banks during crisis. In so far as the role of bank capital is concerned in determining lending during crisis, Berger and Bouwman (2013) asserts that during crisis, bank capital directly helps small banks whereas large banks gain a competitive advantage against less capitalized competitors.

Simpasa and Nandelenga (2022) in examining the global shocks, macroeconomic uncertainty and bank lending report that global shocks and macroeconomic uncertainty raise bank risk aversion, reduces lending and tightens credit. This response was reported to be more pronounced both during the global financial crisis and Covid -19 periods. The respond of the banking industry to global shocks and macroeconomic uncertainty is found to hold even after controlling for

banks' size in the study. In addition, the crowding out effect of government borrowing from the banking sector is reported while monetary and other policy interventions mitigate the effect of uncertainty in the credit market.

In Malaysia, Ibrahim and Shah (2012) explores how bank lending is influenced by macroeconomic and financial uncertainty. The study found evidence of a long run positive relationship between real output, bank lending and stock prices. Further, it reported that heightened uncertainty adversely affects economic output in the long run leading to depressed bank lending and reduction in real stock prices. In the Euro zone, Calza *et al.* (2003) estimates bank lending in the context of macro uncertainties arising from growth fluctuations and real loan short-term and long-term interest rates. A long run positive relation between real loans and real GDP and a negative relation between real loans and both interest rate measures is reported. The study results indicate that credit overhangs/shortfalls can last for an extended period based on the extent and tenure of the macro-imbalances in the Euro zone.

Talavera *et al.* (2012) examines the relationship between macroeconomic uncertainty and bank lending in Ukraine. The study findings indicate that banks decrease their lending ratio in times of substantial economic volatility fuelled by macro-imbalance. This would be explained by higher risk aversion of bank managers. Additionally, small and least profitable banks are less likely to be affected by changes in the macroeconomic environment compared to their large and most profitable peers. This outcome is robust with respect to the different

measurements of macroeconomic uncertainty.

Abaidoo and Anyigba (2020) examines bank performance variability and strands of inflationary conditions. The main focus was on how banking industry is affected by the inflationary related conditions specifically inflation expectations, inflation uncertainty and realized inflation, macroeconomic uncertainty and the likelihood of recessionary conditions. The study found evidence that inflation expectations and macroeconomic uncertainty tend to have much more constraining impact on return on equity, than on return on assets in the US banking sector. Further, bank net interest margin was reported to be least vulnerable bank to macro uncertainty.

Similarly, Nier and Zicchino (2005) concluded that in economic downturns signalling macroeconomic uncertainty, banks tend to experience significant losses through reduced profitability and high loans defaults. Moreover, from the inflationary trends' perspective, empirical evidence by Saeed (2014); Ayaydin and Karakaya (2014) and Francis (2013) found a negative effect of inflation on bank performance. However, on the contrary, Khan *et al.* (2014); Tan and Floros (2012); Pasiouras and Kosmidou (2007); Flamini *et al.* (2009) and Garcia-Herrero *et al.* (2009) report a positive relationship between inflationary pressures and bank profitability and lending revealed through increased return in equity, improved return on assets and increase in the net interest margin.

Macroeconomic uncertainty and bank assets quality is examined by Kamal *et al* (2024) in Bangladesh. In this study macroeconomic uncertainty is measured by high and volatile Gross Domestic Product and inflation,

continuous exchange rate devaluations, and shallow financial markets. A positive relationship between economic uncertainty and NPL in the long run is confirmed in the findings. Regarding loan allocation by commercial banks in Barbados, Bynoe (2010) examines the relationship between macroeconomic uncertainty and the allocation of commercial bank lending. The study reports a statistically significant negative relationship between macroeconomic uncertainty and the cross-sectional dispersion of the loan-to-assets ratios of commercial banks.

In Norway, increase in general macroeconomic uncertainty is reported to reduce bank lending. According to the study, the macroeconomic uncertainty is largely driven by monetary policy uncertainty, suggesting that uncertainty about the monetary policy stance is key for understanding why macro-related uncertainty impacts bank lending (Vegard, et al, 2022). Further, Mikkelsen and Poeschl (2020) brings forth an interesting nexus between macroeconomic uncertainty and bank risk. They found that, bank risk increases macroeconomic uncertainty. In particular, they report that higher probability of a banking panic increases macroeconomic uncertainty in the aggregate economy. The study found that banking panic-driven uncertainty amplifies business cycle volatility and increases risk premia on asset prices. A countercyclical capital buffer lowers both the probability of banking panics and aggregate uncertainty (Mikkelsen and Poeschl, 2020).

Stein & Kashyap (2000) asserts that changes in monetary policy create macroeconomic uncertainty on interest rates which affects aggregate bank lending volume, hence confirming that the bank-lending

channel exists. Soto (2019) examines bank operations amid uncertainties by constructing an uncertainty index. The index reveals that higher uncertainty is associated with lower bank lending and higher bank liquidity levels in the successive periods, suggesting active management of uncertainty.

Economic uncertainty and bank risk in 34 emerging economies is examined by Wu *et al,* (2002). The findings are consistent with the evidence that bank risk increases as economic uncertainty increases. The study investigates possible mechanisms whereby economic uncertainty is translated into bank risk and found the uncertainty-bank risk nexus is more attributable to the option value of waiting, search-for-yield strategies and bank herding behaviours than various demand-side effects. Salas and Saurina (2002) observe that macroeconomic shocks are quickly transmitted to Spanish banks balance sheets. During economic booms, banks expand their lending activity, often relaxing their credit selection criteria. Conversely, in the following downturns, bad loans remarkably increase, producing losses.

2.3   Summary and Research Gap

The empirical work around banking industry performance and macroeconomic uncertainties seem to have concurrence that macroeconomic uncertainties do affect the bank performance with regard to bank lending. (Talavera *et al.* 2012; Košak et al, 2015; Simpasa and Nandelenga, 2022). Moreover, macroeconomic uncertainties seem to adversely affect ability to forecast returns hence complicating bank investment decisions. (Quagliariello, 2009). However, empirical literature has little work on the developing economies with more robust work being evident in the advanced economies mainly US and the Euro Zone.

Further, studies seem to emphasize the bank industry performance from the bank lending aspect. However, given that current period lending is normally informed by the quality of the previous period's lending quality, there is need to investigate the quality of the lending too. Overall, existing studies seem to focus on the single aspect of bank lending. This study seeks to fill this gap by examining how macroeconomic uncertainties affect bank lending, quality of lending and further the bank risk taking behaviour in the Kenyan context.

3.0 Research Methodology

3.1   Theoretical Perspective

In modelling macroeconomic uncertainty and bank lending, the study employed the Baum et al. (2009) model that links macroeconomic uncertainty and banks' portfolio decisions. Within the model, it is assumed that banks maximize profit by allocating resources to either loans or securities or a combination of both. Securities are assumed to provide a risk-free rate of return $r_{f,t}$ while the return on loans is determined by a time-varying risk premium which can be represented as $r_{i,t}=r_{f,t}+premium_{i,t}$. The expected risk premium is $E(premium_{i,t}) = p$ and its variance is $Var(premium_{i,t}) = \delta_{\varepsilon,t}^2$

The return on risky loans is modelled as follows:

$$r_{i,t} = r_{i,t} + p + \varepsilon_{i,t} \text{ Where } \varepsilon_{i,t} \sim N(0,\delta_{\varepsilon,t}^2)$$

However, we note that the bank managers cannot observe the risk premium. They only observe a noisy signal of the risk premium. This noise is a proxy for the degree of macroeconomic uncertainty. Therefore, in times of greater turmoil in the economy, a higher variance of noise (uncertainty) will render bank managers' estimates of the time returns on risky loans less accurate and vice versa. Therefore, total conditional expected returns will consider the uncertainties captured by the bank managers. Thus, as the macroeconomic uncertainty increases, the cross-sectional variance of the loan-to-asset ratio decreases. Therefore, using the model of the return on risky loans, we model the net loans and advance by the bank as a function of macroeconomic uncertainties and bank-level factors.

3.2   Empirical Model

Based on the Baum *et al.* (2009) model, we contextualise that a bank with distribute its lending based on the expected returns and risk of the lending. Therefore, the bank will lend either to the private sector or government based on the expected returns and risk. In the study we contextualize that macro imbalances are key determinants to returns on bank lending. Therefore, bank managers will distribute bank lending

based on the potential risk arising from the macro imbalances. However, in the model we consider that bank level characteristics that are likely to trade-off some macroeconomic imbalances risks. Therefore, based on the theoretical model, bank lending will be determined by macro – imbalance risks, bank level factors and economic performance. We model that this relationship be a dynamic panel model defined as follows:

$$y_{it} = \beta' x_{i,t} + \gamma y(_{i,t-1}) + \delta_i + \varepsilon_{i,t} \ ....[1]$$

Where: y_{it} is the dependent variable i at time t, $x_{i,t}$ is the set of independent variables, $y_{i,t=1}$ is the one period lag dependent variable, δ_i is the within-entity error term; $\varepsilon_{i,t}$ is the idiosyncratic error or time-varying unobserved heterogeneity and ($\delta_i + \varepsilon_{i,t}$) is the composite error term. β and γ are model parameters.

From the general model, the specific model is defined as follows:

$$Lending_{it} = \beta' \ Macroimbalances_t + \gamma Lending_{i,t-1} + \lambda' \ Bankfactors_{i,t} + \delta_i + \varepsilon_{i,t} \ .... [2]$$

Where: $Lending_{it}$ is the dependent variable i at time t, $Macroimbalances_t$ is the set of independent variables, $Lending_{i,t=1}$ is the one period lag bank lending; δ_i is the within-entity error term; $\varepsilon_{i,t}$ is the idiosyncratic error or time-varying unobserved heterogeneity and ($\delta_i + \varepsilon_{i,t}$) is the composite error term.

3.3   Econometric Approach

The study employs the Generalized Method of Moments (GMM) regression technique in modelling macroeconomic imbalances – bank performance nexus. Specifically, the study will apply a panel GMM. First, the application of GMM is anchored on the significance of the lagged dependent variable in influencing the dependent variable. In practice, bank lending in the current period is largely determined by the previous lending since banks review the previous lending performance to influence its future lending. Further, the previous period non-performing loans (NPLs) which define bank assets quality will inform current period bank lending. In addition, the bank current risk appetite will be informed by the bank's previous risk appetite. Within the panel GMM estimation, one way to determine whether you have a dynamic model is to estimate a dynamic model by adding lagged dependent variables and testing whether the lagged dependent variables are significant. If the lagged dependent variables are significant, then a dynamic panel GMM model and a dynamic panel estimator is more appropriate. However, if the lagged dependent variables are not significant, then a standard panel (fixed effects) GMM estimator is appropriate.

The advantage of application of GMM estimation that justifies its application in the study is the fact that the model does not require distributional assumptions, like normality. Therefore, unlike the other estimation methods like maximum likelihood estimation, the GMM estimation allows "automatically" for non-normality, this is not an assumption that has to be

subjected to diagnostic testing. Secondly, the model can allow for heteroskedasticity of unknown form. In this case, for the GMM estimation, the effects of heteroskedasticity can be overcome by means of the "robust" estimator.

In addition, the GMM dynamic panel estimators are appropriate for large N and small T (Roodman, 2009 and Greene, 2007). In the study, the panels are 33 for 14 quarters an evidence of large cross-sections and small time series. If the time aspect (T) is large, GMM estimators can become unreliable because the number of instruments becomes large and the instrumented variables can be overfitted. Thus, it may not remove the endogenous components of the lagged dependent variable(s) as intended.

However, we note that under the GMM estimation approach, the assumption of the error terms being autocorrelated does not hold. Therefore, if the error terms are correlated, then, the lagged error terms cannot be independent of the instruments; and, in that case, the GMM instruments are not valid. Therefore, accordingly, before interpreting the results of GMM estimation, we test the validity of the instruments, which includes testing for autocorrelated error terms (Arellano and Bond, 1991). The Arellano-Bond test is done for the consistency of the estimates obtained from the GMM process. Secondly, we use the Sargan or Hansen test of over-identifying restrictions.

The actual econometric study empirical model is defined accordingly in equation 3,4 and 5

$$GLA_{it} = \beta_0 + \beta_1\,GLA_{it\text{-}1} + \beta_2\,Exch_{it} + \beta_3\,Inflationdev_{it} + \beta_4\,USinflationdev_{it} + \beta_5\,Fiscaldebt_{it} + \beta_6\,Corecapital_{it} + \beta_7\,Excess\ liquidity_{it} + \beta_8\,Banksize_{it} + \beta_9\,GDPGrowth_t + \delta_i + \varepsilon_{it}\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\text{[3]}$$

$$Asset\ Asset = \beta_0 + \beta_1\,Assets\ quality_{it\text{-}1} + \beta_2\,Exch_{it} + \beta_3\,Inflationdev_{it} + \beta_4\,USinflationdev_{it} + \beta_5\,Fiscaldebt_{it} + \beta_6\,Corecapital_{it} + \beta_7\,Excess\ liquidity_{it} + \beta_8\,Banksize_{it} + \beta_9\,GDPGrowth_t + \delta_i + \varepsilon_{it}\dots\dots\dots\dots\dots\dots\dots\dots\text{[4]}$$

$$Risk\ taking_{it} = \beta_0 + \beta_1\,Assets\ quality_{it\text{-}1} + \beta_2\,Exch_{it} + \beta_3\,Inflationdev_{it} + \beta_4\,USinflationdev_{it} + \beta_5\,Fiscal\ debt_{it} + \beta_6\,Core\ capital_{it} + \beta_7\,Excess\ liquidity_{it} + \beta_8\,Bank\ size_{it} + \beta_9\,GDPGrowth_t + \delta_i + \varepsilon_{it}\dots\dots\dots\dots\dots\dots\dots\text{[5]}$$

Where: **GLA** is the gross loans and advances; **Risk taking** is the bank risk taking behaviour, **Exch** is the exchange rate; **Inflationdev** is the Kenya inflation rate deviation; **USinflationdev** is the US inflation rate differential and **GDP** is the Gross Domestic Product.

3.4   Definition and Measurement of Variables

Within the study, the definition and measurement of the study variables is provided in table 3.1 as follows:

Table 3.1: Definition Of Variables

Variable	Definition	Measurement
Bank lending		
Loans and advances	Total loans and advance by the bank to the private sector	Quarterly bank gross loans and advances to private sector
Asset quality	Refers to the quality of the bank's loan portfolio in terms of repayment performance	Ratio of quarterly gross non – performing loans to quarterly gross loans and advances
Risk taking behaviour	Refers to bank appetite in lending signifying bank risk arising from borrower's inability to meet repayment obligations	The Z-Score of a bank credit risk in a given quarter.
Macroeconomic Imbalances		
Fiscal deficit	The difference between government total revenue and total expenditure in a quarter	Growth in Quarterly government domestic borrowing.
Exchange rate movement	The exchange rates movement between Kenya shilling and US dollar in a quarter	Quarterly mean exchange rate of Kenya shilling against the US dollar
Inflation deviation	Deviation of quarterly mean inflation rate from the 5% CBK inflation target	Quarterly mean inflation net off 5% inflation target
US Inflation deviation	Deviation of the quarterly mean inflation from the 2% FOMC inflation target	Quarterly mean US headline inflation net of 2% inflation target
GDP Growth	The value of goods and services produced in the economy	Quarterly real GDP growth rate

Variable	Definition	Measurement
Bank specific factors		
Core capital	The minimum amount of capital the bank should hold as per the CBK statutory requirement	Banks quarterly Tier 1 capital comprising of shareholders' equity and retained earnings
Bank size	Refers to the total assets base of the bank	Natural log of bank total assets in a certain quarter
Excess liquidity	The level of bank liquidity ratio above the statutory requirement of 20%	Liquidity ratio in a certain quarter net of 20% liquidity statutory requirement

3.5   Study Data and Sources

The study covers the period Q42020 – Q12024 and utilizes secondary quarterly data. It covers 33 commercial banks that have complete data points for 14 quarters (Q42020 – Q12024) resulting into 462 observations. Data on the macroeconomic variables for computation of the macro – imbalances is obtained from Central bank of Kenya. Bank level data is obtained from audited bank quarterly financial statements.

4.0 Results and Findings

4.1 Descriptive Statistics

The study covered 33 commercial banks for 14 quarters (Q42020 – Q12024) resulting into 462 observations. Descriptive statistics presented in table 4.1 indicate the mean natural logarithm of gross lending to private sector of the study period was 17.41 with a minimum of 14.95 and maximum value of 20.42. The asset quality measured by the ratio of gross non – performing loans to total gross loans has a mean of 16.04 percent. Risk appetite behaviour measured by zscore finds that mean zscore is 27.76 with a high value of 182.66. On the macro economic variables, the mean exchange rate of Kenya shilling to US dollar averaged at 123.92 quarterly with a minimum and maximum of 107.730 and 156.90 respectively.

Kenya's quarterly inflationary averaged at 6.95 percent with the quarterly deviation from the 5 percent target averaging at 1.95 percent. On the other hand, the mean US headline inflation deviation from the 2 percent target is 3.14 percent. Further, the mean year – on – year quarterly fiscal deficit growth is 47.32 percent with a quarterly minimum and maximum growth of 4.5 percent and 114.59 percent, respectively. For bank control variables, the natural logarithm of core capital averaged at 16.070 quarterly with then bank size mean value being 18.036. Bank excess liquidity had a mean of 32.39 percent.

Table 4.1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Ln loans	462	17.431	1.45	14.949	20.42s
Asset quality	462	16.041	8.12	0.390	53.62
zscore	462	27.760	31.59	-2.790	182.66
Fx (USD/KSH)	462	123.928	16.132	107.73	156.90
Inflation rates	462	6.951	1.307	5.26	9.38
Inflation deviation (ke)	462	1.951	1.307	0.26	4.38

Variable	Obs	Mean	Std. Dev.	Min	Max
US inflation deviation	462	3.144	2.302	-0.73	6.67
Fiscal deficit growth	462	47.315	31.22	4.58	114.59
Lncore capital	462	16.070	1.385	14.00	18.70
Excess liquidity	462	32.394	20.527	0.01	88.60
Bank size	462	18.036	1.571	10.65	21.08
GDP Growth	462	5.679	2.317	2.00	10.30

4.2   Unit Root Tests Results

Prior to estimation of the model, determination of the variable order of integration used the Levin-Lin-Chu unit-root test and Im-Pesaran-Shin unit-root test for robustness check. The Levin-Lin-Chu unit-root test results reveal that the Adjusted t* statistics for all the respective model variables are all greater that the respective values of Unadjusted t statistic with their respective p-values being less that the 5 percent significance level for all the variables. This implies that all the variables are stationary at level meaning all the variable are stationary at level. Similar results are reported when the Im-Pesaran-Shin unit-root test is applied for all the model variables. Thus, we conclude that all the variables are stationary at level or integrated or order zero. The unit roots tests results are presented in **table 4.2**.

Table 4.2: Unit Root Test Results

Variables	Levin-Lin-Chu unit-root test – At level			Im-Pesaran-Shin unit-root test				Order of integration
	Unad-justed t statistic	Adjusted t* statistic	P - value	Z statistics	Critical Values			
					At 1% sig.	At 5% sig.	At 10% sig.	
Ln loans	-30.5550	-15.7856	0.000	-9.7082	-2.480	-2.380	-2.330	I(0)
Asset quality	-32.2502	-17.7962	0.000	-10.2656	-2.480	-2.380	-2.330	I(0)
zscore	-28.6467	-14.6779	0.000	-9.7833	-2.480	-2.380	-2.330	1(0)
Fx (USD/KSH)	-31.3169	-14.3910	0.000	-9.7315	-2.480	-2.380	-2.330	I(0)
Inflation rates	-33.8298	-20.7242	0.000	-10.5145	-2.480	-2.380	-2.330	I(0)
Inflation deviation (ke)	-33.8298	-20.7242	0.000	-10.5145	-2.480	-2.380	-2.330	I(0)

	Levin-Lin-Chu unit-root test – At level			Im-Pesaran-Shin unit-root test				
US inflation deviation	-31.6425	-19.2444	0.000	-10.9693	-2.480	-2.380	-2.330	I(0)
Fiscal deficit growth	-9.5049	3.7924	0.009	-5.9375	-2.480	-2.380	-2.330	I(0)
Core capital	-28.7911	-14.2999	0.000	-9.7545	-2.480	-2.380	-2.330	I(0)
Excess liquid-ity	-29.4123	-15.3111	0.000	-10.3525	-2.480	-2.380	-2.330	I(0)
Bank size	-30.9573	-15.6680	0.000	-9.8054	-2.480	-2.380	-2.330	I(0)
GDP	-20.9049	-5.3157	0.000	-12.6200	-2.480	-2.380	-2.330	I(0)

4.3   Panel GMM Estimation Results

4.3.1 Bank lending Model Results

The panel Generalized Moments Method was used to estimate the empirical model. Three empirical models were estimated notably, the bank lending, the quality of the lending measured by asset quality and the bank risk taking behaviour which is the bank z-score model. The loan model results indicate that one quarter lag has a negative effect on the current quarter lending with the effect being significant at 1 percent significance level. The finding implies that previous quarter lending has a negative effect on current quarter lending. This finding could be explained in the context of the study period (Q42020 – Q12024) where slowdown in lending could have been informed by low credit demand in Covid period as well as the heightened risks during the post Covid recovery period where the recovery has been largely volatile. Further, the period covered by the study was characterised by significant loan restructuring and increased loan provisioning arising from the

Covid pandemic. Regarding the effect of the macro uncertainty, we find that exchange rate movements in terms of shilling depreciation against the US dollar has a positive effect on bank lending. This finding could infer to increased Kenya shilling conversion equivalent of foreign currency loans as well as increased overall value of imported raw materials that need to be financed by local corporates and other enterprises.

Further, inflation deviation from the target inflation increases bank lending with the effect being significant at 1 percent significance level. Increased positive inflationary deviations arising from high inflationary pressures could lead to consumers borrowing more following higher commodity prices.

US inflation deviation was found to positively increase lending by banks. High US inflation rate deviations deviation, imply tighter monetary policy stance. The

explanation stems from the likelihood of high average global commodities prices that would imply that importers of commodities would face a higher cost, hence need for more borrowing to meet their working capital or even consumption requirements. Moreover, through the diaspora remittances channel, high US inflation rate deviations leads to tight monetary policy hence low diaspora remittance to Kenya. This would then imply more borrowing by the remittance recipients to bridge the difference between remittance receipts and their financial requirements.

An increase in the government's fiscal deficit reduces bank lending significantly with the effect being significant at 1 percent significance level. The results imply that increased domestic borrowing which the study uses to measure the government fiscal deficit leads to private sector crowding out effect with a higher balance sheet allocation toward government paper.

The bank control factors reveal that the bank core capital was found to have a negative effect on bank lending, though insignificant. During the study period, capital expenditure lending was very low given the risks and high market uncertainties leading to the negative effect of core capital on bank lending.

Excess liquidity reduces bank lending significantly at 1 percent significance level. The computation of the excess liquidity in the study considers holdings in government securities. Therefore, the findings indicate that during the study period time, banks focused on being more liquid as opposed to lending to the private sector.

Finally, the bank size was found to have a positive effect

on bank lending. The finding is supported by the fact that large banks tend to be capable of growing their loan book even in difficult economic periods compared to small banks. Therefore, larger banks are capable of lending more given their ability to mobilize more deposits for lending. Further, larger banks are capable of offering competitive lending rates especially to their corporate clients compared to small banks hence the positive effect of bank size on bank lending. Economic growth is found to increase bank lending which conforms to theoretical expectation on good economic performance leading to more demand for loans.

4.3.2 Assets Quality Model Results

The assets quality model results posit that one quarter lag of the asset quality measure has a negative effect on the current quarter assets quality with the effect being significant at 1 percent significance level. The finding is valid for the period under the study (Q42020 – Q12024). The results are similar to the lending model results. The period witnessed regulator-led loan restructuring which we think masked the impact of prior lending and prior period NPL on the current period decisioning.

The exchange rate was found to have a positive effect on asset quality which could be explained by an increase in the denominator in quarters when loan growth accelerated in tandem with currency depreciation.

However, increased inflation deviation was found to worsen asset quality. With high inflation, real disposable incomes decline relative to price increases of general commodities, hence reduced loan repayment ability. Additionally, lending rates could only go up on the back

of tight monetary policy, resulting in higher debt service pressure for existing loans. Similar findings are reported for the US inflation rate deviations whose transmission channel is linked to local monetary policy tightening leading to an upward revision in the loan rates hence possibility for defaults.

Fiscal deficit is found to improve asset quality. This finding could imply that increased government domestic borrowing could improve the asset quality if such borrowing is deployed in for example, payment to suppliers / pending bills which in turn improves private sector loans repayment.

For bank control factors, core capital is found to have a significant negative effect on the asset quality. Excess liquidity leads to deterioration of bank assets quality significantly at 5 percent significance level. We think that this merits further evaluation in future studies. On bank size, an increase in bank total assets leads to deterioration of bank assets quality. To explain this, the study period context plays a bigger role. In this period, asset quality is quite heterogeneous across the key sectors of the economy. Notably, more pressure on NPL is recorded for the manufacturing, transport and the hospitality sectors. Large banks seem to command a higher share of the portfolio in these sectors, hence higher NPL for larger banks. Economic growth is found to improve assets quality which conforms to the expectation in practice since good economic performance implies better loans repayments.

4.3.3 Bank Risk Taking Model Results

Regarding the bank risk taking behaviour, we find that one quarter lag of z-score (bank risk measure) has a

negative effect on the current quarter z-score with the effect being significant at 1 percent significance level. The finding is consistent with the practice since previous risk will imply slowing down risk appetite in the present one.

On the macro side, exchange rate depreciation was found to have a positive effect on bank risk appetite signifying the positive impact of exchange rate volatility- which means that banks earn more income during periods of exchange rate volatility. Inflation pressures have a negative effect on bank risk taking. This implies that high inflation could imply tight monetary conditions leading to tight credit standards revealed through high lending costs. In this scenario, banks would prefer government paper. Fiscal deficit is found to increase bank risk appetite implying that increased opportunities for government domestic borrowing leads to more bank investment in government securities as the government seeks to finance the deficit domestically.

On the bank control factors, bank core capital was found to have a positive effect on bank risk appetite, indicating conformity to theory. Excess liquidity increases bank risk appetite significantly at 1 percent significance level. Excess bank liquidity leads to either increased lending and or investment in securities with a view to optimise the balance sheet. Similarly bank size is found to increase the bank risk taking behaviour implying large banks are more likely to have a high-risk appetite. Economic growth is found to increase banks risk appetite which conforms to the expectation in practice since good economic performance implies more demand for loans and better loans repayments.

Table 3 Panel GMM estimation Results

	Loans Model		Assets Quality model		Zscore Model	
	Coef.	t-value	Coef.	t-value	Coef.	t-value
Loans (-1)	-0.249*** (0.132)	-1.88	-	-	-	--
Asset quality (-1)	-	-	-0.053*** (0.024)	-2.21	-	-
Zscore (-1)	-	-	-	-	-0.062*** (0.026)	-2.38
Fx (USD/KSH)	0.004** (0.002)	1.70	0.072*** (0.029)	2.49	0.001*** (0.001)	0.64
Inflation deviation (ke)	0.028*** (0.019)	1.47	-0.461*** (0.231)	-1.99	-0.017*** (0.007)	-2.36
US inflation deviation	0.009*** (0.009)	1.00	-0.128*** (0.125)	-1.03	-0.009 (0.005)	-1.69
Fiscal deficit growth	-0.021*** (0.01)	-1.96	0.191*** (0.151)	1.26	0.018*** (0.008)	2.12
Core capital	-0.695 (0.175)	-3.98	-0.675*** (1.593)	-0.42	0.11** (0.043)	2.56
Excess liquidity	-0.004*** (0.004)	-0.86	-0.953** (0.609)	-1.56	0.015*** (0.022)	0.68
Bank size	0.014*** (0.023)	0.61	0.522* (0.683)	0.76	0.083* (0.043)	1.95
GDP Growth	0.006** (0.004)	1.62	0.005** (0.073)	0.07	0.005** (0.003)	1.78
No. of observations	396		396		396	
Number of instruments	57		57		57	
F statistics	F (9,33) =31.81 Prob > F = 0.000		F (9, 33) = 54.55 Prob > F = 0.000		F (9, 33) = 81.30 Prob > F = 0.000	
Arellano-Bond test for AR(1) in first differences	z = -2.58 Pr > z = 0.397		z = -1.98 Pr > z = 0.480		z = -2.95 Pr > z = 0.397	

	Loans Model	Assets Quality model	Zscore Model
Arellano-Bond test for AR(2) in first differences	z = -3.33 Pr > z = 0.352	z = -2.13 Pr > z = 0.330	z = -3.09 Pr > z = 0.000
Hansen test of overid. restrictions	Chi2(44) = 31.70 Prob > chi2 = 0.917	chi2(59) = 30.30 Prob > chi2 = 0.942	chi2(59) = 29.36 Prob > chi2 = 0.956

Note: *** p<.01, ** p<.05, * p<.1; Standard Errors in parenthesis

The Arellano-Bond test for AR (1) in first differences results conclude the absence of the autocorrelation of order 1 since Prob (chi2) > 0.05. Similar results are evidenced by Arellano-Bond test for AR (2) in first differences results. These two conclude the absence of the serial correlation in idiosyncratic error term across the three models. The results for the Hansen test of overidentification restrictions for all the models lead to accepting the null hypothesis implying that the models do not suffer from overidentification problem since Prob (chi2) > 0.05. Thus, the model instruments are valid and that the models do not suffer from misspecification.

The study findings are consistent with Simpasa and Nandelenga (2022) who found that the banking industry impact from global shocks and macroeconomic uncertainty holds even after controlling for bank size in the study. Further, the crowding out effect of government borrowing from the banking sector is confirmed. The finding of the positive effect of inflationary pressures on bank lending is consistent with the findings by Khan *et al.* (2014); Tan and Floros (2012); Pasiouras and Kosmidou (2007); Flamini *et al.* (2009) and Garcia-Herrero *et al.* (2009) who report a positive relationship between inflationary pressures and bank lending. Further, the findings by Kamal *et al* (2024) in Bangladesh on the macroeconomic uncertainty and bank lending are similar to our findings. The study reports a positive effect of continuous exchange rate devaluations bank NPLs.

5.0 Summary of Findings, Conclusion & Policy Implications

5.1 Summary of the findings

The study sought to examine the effects of macroeconomic uncertainty on bank lending. To this effect, three empirical models were estimated namely: lending, assets quality and the bank – risk taking behaviour model. The three models entailed explanatory variables consisting of macroeconomic variables and bank level variables. The model results indicate that macroeconomic uncertainties significantly affect bank lending, quality of the lending and banks' risk-taking behaviour.

Specifically, exchange rate movements has a positive effect on bank lending, improves asset quality and increases bank appetite for risk taking. This finding could infer to increased Kenya shilling conversion equivalent as well as increased overall value of imported raw materials that need to be financed by local enterprises. Currency depreciation could imply improved export earnings among the exporters- and better repayment of loans, hence the improvement in the asset quality.

Inflationary deviations arising from high inflationary pressures lead to consumers borrowing more as they factor in inflation when deciding on the amounts to borrow. However, inflation pressure was found to worsen asset quality. With high inflation, real disposable incomes decline relative to price increases of general commodities, hence reduced loan repayment ability.

Domestic inflation deviations effects and US inflation deviation were found to positively increase lending by banks. The explanation stems from the likelihood of high average global commodities prices that would imply that importers of commodities would face a higher cost, hence need for more borrowing to meet their working capital or even consumption requirements. The US inflation rate deviations whose transmission channel is linked to local monetary policy tightening leads to an upward revision in the loan rates hence possibility for defaults thus the deterioration effect on the assets quality.

The government's fiscal deficit was found to reduce bank lending significantly with the effect being significant at 1 percent significance level. The results imply that increased domestic borrowing which the study uses to measure the government fiscal deficit leads to private sector crowding out effect with a higher balance sheet allocation toward government paper. However, Fiscal deficit is found to improve asset quality implying increased government domestic borrowing could be deployed in recurrent expenditure such as payment to suppliers, which in turn improves private sector loans repayment.

5.2   Conclusion

Macroeconomic uncertainties are found to significantly affects bank lending in the Kenyan context albeit with mixed outcomes. These findings are consistent with findings of other empirical studies in this area of study. From the findings, the effect of inflationary pressures and the government deficit appear to be more pronounced across the three models with 1 percent significance levels.

5.3   Policy Implications

Based on the study findings that uncertainty with regard to policy makers' response to macro-imbalances impairs decision making by economic agents. Thus, it is important for policy makers to provide forward guidance on their possible action path, for example the monetary policy committee communication by the Central Bank of Kenya.

Moreover, with the negative effect of fiscal deficit on private sector lending, the need for fiscal discipline is underscored, especially at the national government level, given the already constrained fiscal space.

Additionally, the National Treasury needs to adhere to the fiscal path that they provide guidance to every fiscal year. Notably, targets on fiscal consolidation path, domestic and external borrowing.

Overall, commercial banks and other business enterprises require predictable guidance from the policy makers to aid in better projections/forecasts for strategy formulation.

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Kenya Bankers Association
13th Floor, International House, Mama Ngina Street
P.O. Box 73100– 00200 NAIROBI
Telephone: 254 20 2221704/2217757/2224014/5
Cell: 0733 812770/0711 562910
Fax: 254 20 2221792
Email: research@kba.co.ke
Website: www.kba.co.ke

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