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David Ndwiga and Geraldine Makunda

Abstract

The study investigates the effects of macro imbalances on the banking sector performance in Kenya from the financial intermediation cost perspective for 2020q4 – 2024q1 period. Employing dynamic panel GMM model, the study finds that inflation pressures above the upper bound target, external debt unsustainability, monetary policy tightening and current account deficit to GDP ratio lead to increase in the intermediation cost. The findings call for need to anchor the inflation rate below the upper bound target, exercise prudence fiscal measures, effective application of the monetary policy instruments and development of a matrix of interlinkages between the macro – imbalances.

1.0 Introduction

1.1 Background of the Study

Overtime, the linkage between macroeconomic development and banking industry has been extensively examined. In the recent past, it can be deduced that the 2007-2009 global financial crisis revealed the necessity for the countries to identify and contain risks to the financial system. As a result, any central banks adopted the use of prudential tools and established macroprudential policy frameworks to promote financial stability. All these developments were occasioned by the realization that the macro economic developments do have eminent and far reaching effects on the financial sector at large and if not well addressed could be detrimental to the financial sector stability in the long run. The development came with the recognition on the need for buffers and contain vulnerabilities that make the financial system susceptible to shocks. This reduces the probability that shocks to the financial system disrupt the provision of financial services and cause serious negative consequences for the economy.

Empirical works on the macro – imbalances and banking industry performance seem to yield mixed findings. However, much of the current empirical work in this area seem to point out that focus on the linkage between the two is very crucial. Kohlscheen ***et al.*** (2018) find that higher long-term interest rates tend to boost profitability, while higher short-term rates reduce profits by raising funding costs. Bikker and Hu (2002) assert that bank's profits appear to move up and down with the business cycle as determined by macroeconomic fundamentals, allowing for accumulation of capital in boom periods. Further, they report that provisioning for credit losses rise when the cycle falls, but less so when net income of banks is relatively high, which reduces procyclicality. Bank lending fluctuates with the business cycle too, but appears to be driven by demand rather than by supply factors such as shortage of capital, which contradicts the assumptions underlying capital crunch theory.

This study is anchored on the premises that since banks perform financial intermediary functions for the real sector, they are exposed to business cycle conditions that largely determine the aggregate performance of the real sector. Therefore, as economic conditions worsen during stagnation and recession periods, the riskiness of intermediation in them banking industry tends to rise. However, it's prudent to be cognizant of the reality that economic cyclical downturns are not always the cause of higher riskiness in banking, but they can also help reveal weaknesses in bank risk structures that were built up during business cycle upturns. There is evidence that financial systems tend to behave procyclical, implying that business and financial cycles co-move. This therefore calls for frequent modelling of macro – economic environment – baking industry performance nexus.

The role of banking industry in the financial intermediation in an economy cannot be underscored. Its notable that the cost and efficiency of intermediation plays a crucial role in determining the depth and breadth of the banking system. High costs of financial intermediation are associated with credit rationing and thus a lower level of credit channelled to borrowers (Stiglitz and Weiss, 1981). Its therefore of paramount importance to ensure the cost of intermediation is not only effective but a also affordable to majority of the financial services users. Within the banking industry, the cost of intermediation is largely measured by the Net Interest Margin (NIM). The measure is the difference between interest income and interest expenses. Efficient intermediation is one of the most important functions of the banking system in supporting economic growth. To avoid high NIMs, banks need to be both efficient and competitive.

A global review of the topical issues posits that the nexus between macro – imbalances and banking industry financial intermediation has received much attention to policy makers since the Global Financial Crisis. For instance, higher sovereign risk since late 2009 arising from huge fiscal deficits has pushed up the cost and adversely affected the composition of some euro area banks' funding, with the extent of the impact broadly in line with the deterioration in the creditworthiness of the home sovereign. Banks in Greece, Ireland and Portugal have found it difficult to raise wholesale debt and deposits, and have become reliant on central bank liquidity. The increase in the cost of wholesale funding has spilled over to banks located in other European countries, although to a much lesser extent leading to high intermediation cost. These banks have retained access to funding markets. Banks in other major advanced economies have experienced only modest changes in their wholesale funding costs.

High intermediation costs have far reaching effects on the growth of an economy as it works against the development of financial intermediation by discouraging savers. it discourages savings and investments, on the one hand, and raises concerns about the effectiveness of the bank-lending channels of monetary policy, on the other (Khawaja & Din, 2007). Output and employment are also affected adversely by high intermediation costs. This is because large spread diminishes savings, which in turn narrows levels of borrowing and, thus, narrows investment in the economy. Consequently, the interest rate spreads in an economy is an indicator of inefficiency and has important implications for the growth and development of such economy (Folawewo and Tenant, 2008). A more efficient banking system

benefits the real economy by allowing higher returns for savers and lower borrowing costs for investors. Hence, a higher spread limits financing for potential borrowers (Ndung'u & Ngugi, 2000).

In this study, we note that macro – imbalance arising from fiscal distress affect the cost of financial intermediation via several channels given the pervasive role of government debt in the financial system. First, losses on holdings of government debt weaken banks' balance sheets, increasing their riskiness and making funding costlier and more difficult to obtain. In this case, banks' exposure is mostly to the home sovereign. Second, fiscal distress arising from higher sovereign risk reduces the value of the collateral banks can use to raise wholesale funding and central bank liquidity (Carney, 2011). Third, sovereign downgrades arising from fiscal distress generally flow through to lower ratings for domestic banks who hold sizeable portion of government securities, increasing their wholesale funding costs, and potentially impairing their market access. Sovereign downgrades have direct negative repercussions on the cost of banks' debt and equity funding. Owing to strong links between sovereigns and banks, sovereign downgrades often lead to downgrades of domestic banks. Rating downgrades generally cause banks to pay higher spreads on their bond funding, change in composition of bank funding and may also reduce market access leading to increased cost of funding (Aretzky, Candelon and Sy, 2011). Fourth, a weakening of the sovereign reduces the funding benefits that banks derive from implicit and explicit government guarantees.

Calice and Zhou (2018) examined the determinants of bank financial intermediation costs measured by the net interest margins for 14,000 banks across 160 countries. Intermediation costs were found to be high in Latin America and the Caribbean and Sub-Saharan Africa on the back drop of higher overhead, credit risk, higher risk aversion, higher opportunity costs arising from reserve requirements, lower competition, higher interest rate volatility and higher inflation. Therefore, against this backdrop an examination of the macro – imbalance and banking industry performance from the cost of financial intermediation perspective is crucial from the Kenyan perspective given the recent build-up of these imbalances that have seen subsequent sovereign ratings downgrades in the recent past.

1.1.1 Stylized Facts on Macroeconomic Imbalances in Kenya

A keen review of Kenya's macroeconomic imbalances points that Kenya's macro – economic landscape albeit largely stable has in the recent past exhibited substantial macro – imbalances that call for an in-depth examination given the economic challenges they pose. The key macro – imbalances evidenced over years in Kenya include but not limited: persistent fiscal deficits, high public debt, high interest rates, currency depreciation and persistent current account deficits. These imbalances continue to wane down on the macroeconomic fundamentals of the economy with economic forecast focusing on some of them as the key macroeconomic down side risks that call for a keen watch.

Figure 1: Trends in Inflation Rate, Lending Rates and Public Debt Growth in Kenya (2001 - 2024)

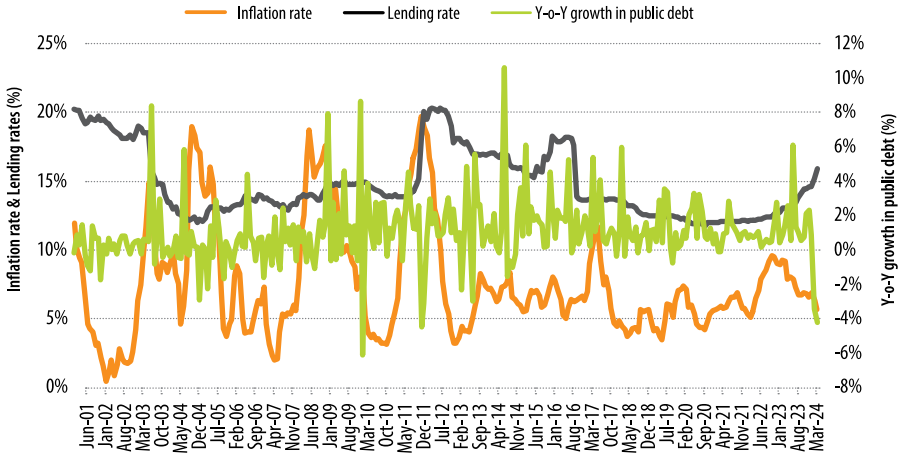

Figure 1 presents the trends in inflation rates, lending rates and growth in public debt from January 2001 to march 2024. Trends in the inflation levels points out periods of persistent prolonged inflationary pressures in 2003 where monthly inflation touched a high of 14.9% in May 2003. August 2004 to July 2005 saw inflation hit double digit figure to a high of 19% with the average inflation for the period being 15.4%. Further, double digit figure inflation is recorded and heightened in February 2008 to April 2009 with the inflation for the period being 15.2%. Similar outcome of heighted double – digit inflation is reported for April 2011 to May 2012 with an average inflation for the period being 15.95%. Further, period July 2013 to October 2017 saw high inflation pressures with inflation levels being on the upper bound target for 52 months consecutively. Similar trends of inflation being on the upper bound of the mid target for November 2020 to March 2024 with the average inflation for this period being 7%.

On the public debt front, trend indicates that sharp spikes in the public debt growth. The highest year – on – year growth on the public debt was in June 2014 at 10.63 percent. The data indicates that the total public debt has had a positive growth for the entire of 2014 to January 2024 with a handful months registering negative growth during the period. The interest rates trend imply that the average lending rates have been reasonably high recording the peak on March 2012 at 20.28 percent (**figure1**). This scenario high average lending rates could have been partly occasioned by tight monetary policies in pursuance of managing high inflationary pressures. Therefore, its evident that macro – imbalances arising from the macroeconomic fundamentals' downside risks are eminent in Kenya.

Therefore, against this backdrop, this study seeks to bridge the research gap by examining the macro imbalances in recent time in Kenya and how these imbalances affect bank lending for Q42020 to Q12024 period that has been characterised by reasonably high depreciation of the Kenya shilling, very narrow fiscal space amid high debt burden as well as reasonably high inflation rate and interest rates.

1.2 Problem Statement

Macro – imbalances have received a considerable attention in the macro environment owing to their role in economic and business cycles globally. The main focus has been on the macro – imbalances: -the fiscal deficits whose deteriorations wane down the growth prospects given their effects on the aggregate demand. For instance, addressing fiscal deficits through the expenditure fiscal consolidation approach has a significant negative effect on the aggregate demand and future tax revenue prospects that also potentially affect the banking industry performance through deterioration in assets quality. To the contrary, the revenue fiscal consolidation approach tends to raise taxes hence adversely affecting disposable income, business performance and thereafter loan repayment.

From the banking industry operations perspective financial intermediation costs have largely in the empirical literature being concluded to be counter-cyclical and their changes have significant effects at the country-level. However, the literature is silent on what drives their cyclicality. Previous studies have examined costs using cross-sectional or low frequency data and thus cannot capture dynamic macroeconomic effects across time.

Global historical perspective of the macro – imbalances posits that with the high inflationary pressures globally, the evidence of shift from global tailwinds to global headwinds is undoubted signalling the end of low rates in 2023. Tighter financial conditions are a reality with financial markets volatility compounding the financing challenge in indebted nations facing narrow fiscal space to accommodate any debt financing. Further, the sharp cuts in budget aid especially among the Sub Saharan economies have seen increased budget cuts as well as a turn to alternative costlier financing which aggravate the imbalances further. At the core of these macro – imbalances are the financial sector which is perceived as a fall back in providing the key service of financial intermediation. However, the pertinent question would be the financial sector is to support the fragile economic status at what cost? The answer to this question ins important since banks will finance recovery and correction of these imbalances in line with the prevailing cost of financial intermediation. In this case its notable that the cost of financial intermediation will have considered the macro – imbalance effect. This scenario points out the possibility of the financial sector being unable to support the economic recovery due to high intermediation cost caused by the macro – imbalances. Such eventuality would lead to the sector being ineffective in undertaking its core role of financial intermediation and in some instances even lead to financial resources misallocation. Therefore, against this backdrop is the need to examine the effect of macro – imbalance on banks' cost of financial intermediation.

Macro – imbalances – bank performance nexus studies have been undertaken with the studies

addressing various selected macro – imbalances and various banks performance measures. Review of empirical works in this area evidence some research gaps the call for further research. First, vast of studies have been undertaken in the developed economies. Global developments indicate that developing economies are the hardest hit by these imbalances with their economic outlooks being largely negative. Much of these macro – imbalance in the developing economies pose serious downside risks calling for urgent need for macroeconomic prudential tools. Further, the fragile post – Covid economic rebound in the developing economies remain weak at best amid these macro – imbalances perhaps a reflecting unpredictability. The ability of the banking industry to fund the recovery is based on the intermediation cost since banks will allocate assets based on the existing and expected intermediation cost. Therefore, empirical analysis of macro - imbalance and banking industry intermediation cost in the developing economies is crucial given the banking industry's exposure to global financial markets development and further given the fact the sector in developing economies is largely banking industry dominated.

Cost of financial intermediation is the net interest margin between the income on loan and advance and cost paid to banks' savers (Bernanke, 1991). This cost is increasingly important aspect that needs to address bank risk and efficiency. Moreover, consideration of the cost of financial intermediation is also significant in determining the financial institution's sound health and stability. Angori et al. (2019) asserts that the cost of financial intermediation as a gauge of banks protecting health and stability.

The adverse effect of the high cost of financial intermediation in the banking industry cannot be overemphasized. High intermediation cost amplifies shocks that affect banks' net worth. High intermediation cost makes it costlier for banks to fund themselves, a reduction in net worth weakens the supply of credit and reduces the economy's output. Moreover, high intermediation cost amplifies the effect on output of capital-destruction shocks, commonly studied in the literature on financial crises. This persistence comes from banks' funding costs rising alongside credit spreads, implying banks' net worth is rebuilt very slowly in contrast to models with a leverage constraint. Furthermore, the increase in fragility due to scarcer net worth gives banks an incentive to demand more liquid assets hence generating a countercyclical liquidity premium. The effects are therefore likely to be amplified during heightened shocks arising from macro – imbalances. Therefore, against this backdrop of the adverse effects of high intermediation cost on the banking industry, an examination into macro – imbalances effects on intermediation cost is underscored.

Kenya's macro – economic landscape albeit largely stable has in the recent past exhibited substantial macro – imbalances that call for an in-depth examination given the economic challenges they pose. The key macro – imbalances evidenced over years in Kenya include but not limited: persistent fiscal deficits, high public debt, high interest rates, currency depreciation and persistent current account deficits. These imbalances continue to wane down on the macroeconomic fundamentals of the economy with economic forecast focusing on some of them as the key macroeconomic down side risks that call

for a keen watch. Against this background, the study models the nexus between selected macroeconomic uncertainties and cost of financial intermediation in Kenya given the key role the financial sector plays in financial intermediation. Moreover, undertaking of this study is anchored on the fact that Kenya's financial sector remains to be bank – industry led thus the need for ensuring banking industry stability. Based on this fact, the effect of macroeconomic imbalances to the cost of financial intermediation is likely to have a repo effect on the industry with much ramification effects to the wider economy.

1.3 Research Objective

This study main objective is to determine the effect of selected macro - imbalances on the banks' cost of financial intermediation in Kenya?

1.4 Contribution of the Study

The study findings contributions are two – fold. First is the policy perspective. Study findings are crucial in providing empirical evidence in support of the macro prudential policies in managing the 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 macro – economic prudential policies that are cost of intermediation sensitive to promote financial sector deepening and economic growth support at large. Secondly is the contribution to the bank operations mainly in the Assets and Liability Management. Macro – imbalances effect on intermediation cost is crucial in banks performance in so far as funded income is concerned. Therefore, study findings are crucial to banks' decision of pricing decisions as well as devising mechanisms of converting bank's liabilities to assets in optimal time possible based on the prevailing macro environment. Further, this is core in informing banks' decision in income earning assets diversification between funded and non – funded income streams.

2.0 Literature Review

2.1 Theoretical Review

The study is based on the financial intermediation theory by Gurley and Shaw (1960). The theory is based on the concept of financial resource allocation by the financial institutions based on perfect and complete markets by suggesting that it is frictions such as transaction costs and asymmetric information that are important in understanding intermediation. The financial intermediation theory is based on the theory of informational asymmetry and the agency theory. Informational asymmetry lead to the emergence of some specific forms of transaction costs. Therefore, financial intermediaries have emerged exactly to eliminate, at least partially, these costs.

The seminal work by Ho & Saunders (1981), views the bank simply as an intermediary between the final loan taker (firms) and the final lender (households). However, this intermediation activity is subject to two types of uncertainty. Firstly, there is uncertainty due to lack of synchronisation between deposits and loans that entails an interest rate risk for the bank. Therefore, the bank encounters unexpectedly high loan demand, exceeding the volume of deposits and its free reserves. In this case, it will be forced to finance the surplus credit demand on the interbank market, thus incurring a refinancing risk in the event the interest rate rises (Maudos & Guevara). Conversely, if the bank encounters unexpectedly high deposit supply, exceeding the volume of loans granted by the bank in the same period, it will then have to apply those surplus funds on the inter-bank market. In that way, the bank will be incurring a reinvestment risk in the event the interest rate falls

Further, we note that in undertaking the financial intermediation role, the bank is exposed to uncertainty regarding the rate of return on loans. That uncertainty results from the fact that a part of its loans will not be recovered because of non-payment, voluntary or otherwise, by loan takers. The percentage of non-performing loans, however, is not a variable known ex-ante by the bank, which can only estimate a likelihood of default. Given this scenarios, commercial

banks is at liberty to free to set the interest rates charged on credit operations and paid on deposits. However, this is not the case given the high level of regulation that the banking industry is subjected to.

Ho & Saunders (1981) approach grants a room for the influence of macroeconomic variables in determining banking spread. The volatility of interest rates levied on loans on the inter-bank market is a direct reflection of the country's macroeconomic stability. For instance, the less stable a country's economy, greater the variation in the inflation rate and exchange rate – the greater will be the resulting volatility of the basic interest rate and, consequently, the greater the banking spread. However, with the macro – imbalances arsing from various macroeconomic variables and with them being interlinked, the question will be how do various macro – imbalances arising from various macro variables influence banks in their undertaking of the financial intermediation role? In this regard, we model the cost faced by banks in their intermediation role as a function of bank specific determinants and macroeconomic determinants. However, for the macroeconomic determinants, we deviates from the basic macroeconomic variables but instead apply macroeconomic variables' deviations from the economic policy set thresholds since these deviation exceeding the set thresholds are what would amount to macro imbalances.

2.2 Empirical review

Chiu and Meh (2011) the interaction between banking and monetary policy and how this interaction affects allocation and welfare. The study is anchored on the need for understanding of financial intermediation in the context of liquidity and inflation. The study concludes that with banking, inflation generates lower welfare costs. Lowering inflation was found to improve welfare not just by reducing consumption/production distortions, but also by avoiding financial intermediation costs. Therefore, understanding the nature of financial intermediation is critical for accurately assessing the welfare gain from lowering the inflation rate. On the monetary policy front, the study established that when the inflation is low, banking is not active in channelling liquidity; when inflation is high, banking is active and improves welfare; and when inflation is moderate, banking is active but reduces welfare.

The macroeconomic and banking determinants of financial intermediation in Brazil is undertaken by Antunes and Moraes (2017). The study investigates the behaviour of financial intermediation through the analysis of a panel of 101 Brazilian banks. For that, we develop a measure that expresses the financial intermediation and analyse macroeconomic and banking determinants of financial intermediation. The results indicate an increase in non-performing loans and a tight monetary policy increases financial friction, and then leads to a reduction in financial intermediation. The results indicate an increase in non-performing loans and a tight monetary policy increases financial friction, and then leads to a reduction in financial intermediation. Further, a negative reaction of financial intermediation to depreciation of exchange rate is reported.

Mohammed et al. (2021) examines the impact of trade openness on the cost of financial intermediation

and bank performance from the BRICS countries. Using data from 885 banks in BRICS countries spanning for 18 years (2000–2017), the study results showed that embedding higher trade openness reduces financial intermediation costs and improves banks' performance. Higher trade openness helps induce competition, which lowers the cost of financial intermediation and consequently reduces the bank's performance. Similar argument is held by Cakan (2017) who asserts that openness to trade can reduce these rents by promoting reforms in the financial sector and providing access to international financial markets.

Were and Wambua (2014) examined determinants of interest rate spreads in Kenya's banking sector based on panel data analysis. The findings assert that show that bank size, credit risk as measured by non-performing loans to total loans ratio, return on average assets and operating costs, all of which positively influence interest rate spreads. On the other hand, higher bank liquidity ratio has a negative effect on the spreads. On average, big banks have higher spreads compared to small banks. The impact of macroeconomic factors such as real economic growth is insignificant. The effect of the monetary policy rate is positive but not highly significant. The results largely reflect the structure of the banking industry, in which a few big banks control a significant share of the market.

In Indonesia, Rachman (2023) examined Interest Rate Spread determinants with a focus on monetary instrument variables, macroeconomic conditions and event structural changes. The results of the analysis show that in the long run broad money supply, total credit and inflation have a negative effect on bank Interest Rate Spread. However, in Ghana, exchange rate volatility, fiscal deficits, economic growth and public sector borrowing from commercial banks are reported to increase the interest rate spread both in the long and short term (Obeng & Sakyi 2016).

Regarding the impact of macroeconomic variables on the interest rate spread a positive and statistically significant relationship between inflation and interest rate spread is reported in Suriname (Xanegay, 2023). Higher inflation causes banks to increase their interest rates to maintain the real value of their profit margins. Moreover, higher inflation is often an indicator of growing economic uncertainty, for which the banks seek compensation via higher spreads. Further, government borrowing is positively associated with higher spreads. The outcome indicates that public sector involvement could cause inefficiency in financial intermediation with the rise in lending rates.

In Brazil, Silva et al. (2017) examines the macroeconomic determinants of banking spreads. results evidence that interest rate levels and, to a lesser degree, the inflation rate are the main macroeconomic determinants of high banking spread in Brazil. Earlier study in Brazil among the 142 Brazilian banks was undertaken by Afanasieff et al. (2012) on the bank-level and macro-economic variables as determinants of interest margin spread. The study found intermediation cost to be largely determined by bank size, opportunity cost, operating cost output growth, inflation, the market rate of interest, and the volatility of interest rate.

Khan and Jalil (2020) found that operational exposure, credit risk, inflation inversely affect the

cost of financial intermediation. Sirait and Rokhim (2019) asserts that regulatory capital as a significant determinant of banks' cost of financial intermediation and risk-taking. The authors assert that incremental regulatory capital requirement reduces the risk-taking and cost of financial intermediation of banks. Tennant and Folawewo, A. (2009) examined the macroeconomic and market determinants of banking sector intermediation costs measured by spreads among the low- and middle-income countries. The empirical results suggest that only one market specific factors: - the banking sector reserve requirement, significantly and positively affects the Interest Rate Spread

Rahman et al (2017) asserts that over last two decades, emerging and developing nations have desperately endeavoured for efficient banking sectors. Within the study, they argue that bank efficiency generates incentives that can impact banks' capital holdings and the cost of financial intermediation among the 1190 banks from BRICS. The study finds that cost efficiency had a marginal positive impact on bank capital during the global financial crisis of 2007–2009. Further, its observed that on average, banks increased the cost of financial intermediation during the crisis, however, greater efficiency helped banks to not charge higher intermediation costs.

In Egypt, Naceur and Kandil (2019) find that the increase in the minimum capital requirements by the Central Bank of Egypt led to higher cost of intermediation and profitability. Moreover, the study notes that prior to the capital requirement revision, high intermediation cost was caused by higher capital requirements, the reduction in implicit cost, and the increase in management efficiency, improvement of bank liquidity and a reduction in inflation. Rahman et al. (2023) examines the role of trade openness on the cost of financial intermediation and bank performance in the wake of developed and developing countries pursuit for trade openness to achieve higher bank performance with less intermediation costs. The study findings were that higher trade openness reduces financial intermediation costs and improves banks' performance.

2.3 Summary of Literature.

Empirical review reveals that though some empirical studies exist on financial intermediation cost much of the work is on the financial intermediation cost – economic growth nexus. These studies try to examine how financial intermediation cost impacts on the economic growth. However, the review also evidence that studies on the financial intermediation cost and macro variables tend to model the relationship between the two whereby the authors model how macroeconomic variable affects financial intermediation cost. Specifically, Rahman et al. (2023) examines the effect of trade openness on financial intermediation cost; Naceur and Kandil (2019) examine effect of inflation on financial intermediation cost; Afanasieff et al. (2012) cites the effect of GDP and inflation on financial intermediation cost; Were and Wambua (2014) examines effect on monetary policy on financial intermediation cost; Rachman (2023) models the effect of broad money supply and inflation and Obeng & Sakyi (2016) studies effect of exchange rate volatility, fiscal deficits, economic growth and public sector borrowing on financial intermediation cost.

From these studies scanty evidence is provided for on how the macro imbalances arising from the movements and developments in the macroeconomic variables affect financial intermediation cost. For instance, instead of examining the effect of inflation on financial intermediation cost, how would the inflation rate deviation from the target range influence financial intermediation cost? This study seeks to fill in this research gap by examining how the macroeconomic deviations from the target ranges and policy thresholds impact on the banking industry performance from the financial intermediation cost perspective.

3.0 Research Methodology

3.1 Theoretical Approach

Our empirical analysis is based on the framework of the Ho and Saunders (1981) model and its subsequent extensions. We note that the empirical modelling oi the cost of intermediation in the banking industry is anchored on the bank dealership model developed by Ho and Saunders (1981). However, a revised framework for the bank dealership model is given by Maudos and Fernandez de Guevara (2004), in which the theoretical motivated drivers of the net interest margins comprise operating costs, managerial risk aversion, credit risk, liquidity risk, interest rate risk, bank size, and market structure. Therefore, we supplement the Maudos and Fernandez de Guevara by adding macro imbalances in the model.

$$y_{it} = \beta' x_{i,t} + \gamma y_{i,t-1} + \delta_i + \varepsilon_{i,t} \quad \text{..... [1]}$$

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. Similar model was applied by Silva et al. (2017) in examining macroeconomic determinants of banking industry spread in Brazil.

3.2 Empirical Model

Our empirical analysis is based on the framework of the Ho and Saunders (1981) model and its subsequent extensions. We note that the empirical modelling of the cost of intermediation in the banking industry is anchored on the bank dealership model developed by Ho and Saunders (1981). However, a revised framework for the bank dealership model is given by Maudos and Fernandez de Guevara (2004), in which the theoretical motivated drivers of the net interest margins comprise operating costs, managerial risk aversion, credit risk, liquidity risk, interest rate risk, bank size, and market structure. Therefore, we supplement the Maudos and Fernandez de Guevara by adding macro imbalances in the model.

$$y_{it} = \beta y_{i,t-1} + \lambda M_{i,t} + \gamma X_{i,t} + \delta_i + \varepsilon_{i,t} \quad \text{..... [2]}$$

The empirical specification of the augmented dealership model is defined by equation 2.

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 by equation 3.

$$NIM_{it} = \alpha + \beta NIM_{i,t-1} + \lambda Macroimblances_{i,t} + \delta Bank\text{-}factors_{i,t} + \delta_i + \varepsilon_{i,t} \quad \text{..... [2]}$$

3.3 Econometric Approach

The study employs the Generalized Method of Moments (GMM) regression technique in modelling macro – imbalances – bank performance nexus. Specifically, the study applies a dynamin panel GMM model. The adoption of GMM is underpinned on the significance of the lagged dependent variable in influencing the dependent variable. In practice, the cost of financial intermediation in the current period is largely determined by the previous cost of financial intermediation. 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 most appropriate. However, if the lagged dependent variables are not significant, then a standard panel (fixed effects) GMM estimator is most appropriate.

The advantage of application of GMM estimation that justifies its application in the study is the fact that the model does not 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. Is 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 and so may not remove the endogenous components of the lagged dependent variable(s) as intended.

However, we note that 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, test the validity of the instruments, which includes testing for autocorrelated error terms (Arellano and Bond, 1991). The Arellano-Bond test is used test the consistency of the estimates obtained from the GMM process. Secondly, is the Sargan or Hansen test of over-identifying restrictions.

The actual econometric study empirical model is defined accordingly in equation 4.

$$NIM_{it} = \beta_0 + \beta_1 NIM_{it-1} + \beta_2 Inflationdev_t + \beta_3 DSTRdev_t + \beta_4 DSTEdev_t + \beta_5 CAD/GDPt_t + \beta_6 CBR_t + \beta_7 Corecapital_{it} + \beta_8 CRisk_{it} + \beta_9 RAversion_{it} + \beta_{10} GDP_t + \beta_{11} Size_{it} + \delta_i + \varepsilon_{it} \quad [4]$$

Where: NIM is the Net Interest Margin; $Inflationdev$ is the inflation deviation; $DSTRdev$ is the debt service to revenue deviation; $DSTEdev$ is the debt service to exports deviation; $CAD/GDPt$ is the current account deficit to Gross Domestic Product; CBR is the Central Bank Rate; $CRisk$ is the Credit Risk; is the Risk Aversion; GDP is the Gross Domestic Product and is the bank size. δ_i is the within-entity error term and is the overall error term.

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
Cost of financial intermediation		
Net Interest Margin	Percentage of net interest income to average interest-earning assets	NIM is the ratio of net interest margin to the sum of GLA, placement in government securities and placement in other banks $NIM = (Net\ Interest\ Margin)/(GLA + Pgovtsecurities + Potherbanks)$ Where: GLA is the gross loans & advances net of provisions, $Pgovtsecurities$ is the placement in government securities and $Potherbanks$ is the placement in other banks

Variable	Definition	Measurement
Macroeconomic Imbalances		
Inflation deviation	Deviation of quarterly mean inflation rate from the 7.5% CBK inflation upper bound target	Quarterly mean inflation net of 7.5% inflation upper bound target
Fiscal distress	External debt servicing unsustainability	• Quarterly deviation of debt service to revenue from the 18% threshold • Quarterly deviation of debt service to export earnings from the 15% threshold
Central Bank Rate	The policy used by the central bank of Kenya to anchor inflationary pressures in the economy.	Central bank rate within the quarter
Current Account Deficit	The external balance of the country evidenced in the balance of payment	Quarterly Current Account Deficit as proportion of GDP
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
Credit risk	The possibility of loss due to a borrower's defaulting on a loan	Ratio of gross non – performing loans to gross loans and advances in a quarter
Risk aversion	The tendency of the bank avoiding risk that adversely affects bank's operation	Ratio of bank equity to total assets in a quarter
Bank size	Refers to the total assets based of the bank	Natural log of bank total assets in a certain quarter
GDP	The value of final goods and services produced in a country in a given period of time	Quarterly GDP growth rate

3.5 Study Data and Sources

The study utilises bank level data for banks operating in Kenya in the period between 2020Q4 to 2024Q1. The bank's Net Interest margin, computed from bank level data obtained from the audited financial statements over years from Kenya Bankers Association database using the formula outlined in measurement of the variables. In addition, data on the bank – level control variables: - bank core capital, bank size total assets), risk aversion (equity to total assets ratio) are sourced from the audited quarterly financial statements. Macro – imbalances data on inflation rate, Central Bank Rate, fiscal debt sustainability and the current account deficit are obtained from the Central Bank of Kenya. In addition, the quarterly GDP growth rate is obtained from the Central Bank of Kenya.

4.0 Results Interpretation and Discussion

4.1 Descriptive Statistics

The descriptive statistics for the period under analysis indicate that the mean net interest margin is 3.54% with the minimum being 0.28% and maximum net interest margin being 13.76%. The mean inflation rate is estimated at 6.96% with a minimum and maximum inflation rate being 5.26% and 9.38% respectively. However, for the inflation rate deviation from the upper target bound of 7.5% results indicate that the mean of inflation deviation rate is -0.54% with a minimum and maximum deviation being -2.24% and 1.88% respectively. Regarding the fiscal imbalance debt service to revenue ratio mean is 17.65% with a maximum of 28.30%.

The mean of deviation of debt service to revenue ratio from the threshold of 18% was estimated to be -0.35% with the maximum of 10.30%. in addition, the mean of deviation of debt service to export ratio from the threshold of 15% was estimated to be 8.06% with the minimum of -3.40% and a maximum of 18.30%.

The mean of current account deficit to GDP ratio is estimated at 6.04% while the mean CBR being 8.75% having a minimum of 7.0% and a maximum of 13.0% percent. For bank level variables, the mean natural logarithm of bank core capital is 16.07. The mean credit risk is estimated at 0.19 with a minimum and maximum of 0.10 and 1.82 respectively. The risk aversion measured by the ratio of equity to total assets has a mean of 15.94 with a maximum of 35.80 percent. The mean quarterly GDP is estimated at 5.68%. Lastly, the mean bank size measured by natural logarithm of total assets is 18.04 with a minimum of 10.65 and maximum of 21.08

Table 4.1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
NIM	462	3.54	2.104	0.28	13.76
Inflation	462	6.95	1.307	5.26	9.38
Inflation deviation	462	-0.54	1.307	-2.24	1.88
Debt service to revenue (DSTR) (18%)	462	17.65	6.456	7.20	28.30
Debt service to revenue ((DSTR) deviation	462	-0.35	6.456	-10.80	10.30
Debt service to exports (DSTE) (15%)	462	23.06	5.819	11.60	33.30
Debt service to exports (DSTE) deviation	462	8.06	5.819	-3.40	18.30
CAD to GDP	462	6.04	1.526	3.65	9.18
CBR	462	8.75	2.055	7.00	13.00
Core capital	462	16.07	1.385	14.00	18.70
Credit risk	462	0.19	0.226	0.10	1.82
Risk aversion	462	15.94	5.880	-0.80	35.80
GDP	462	5.68	2.317	2.00	10.30
Bank size	462	18.04	1.571	10.65	21.08

4.2 Correlation Matrix

The Pearson correlation coefficient result indicate that the net interest margin is positively correlated with inflation deviation, current account deficit, central bank rate, core capital, credit risk, risk aversion and bank size. However, the net interest margin is negatively correlated to debt servicing to revenue deviation, debt servicing to export deviation and GDP. The Pearson correlation coefficient among variables indicates that no variables are strongly correlated to each other.

Table 4.2: Correlation matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) NIM	1.000										
(2) Inflation deviation	0.088	1.000									
(3) DSTR deviation	-0.262	0.371	1.000								
(4) DSTE deviation	-0.389	0.331	0.928	1.000							
(5) CAD to GDP	0.235	0.029	-0.129	-0.253	1.000						
(6) CBR	0.077	0.278	0.610	0.426	-0.084	1.000					
(7) Core capital	0.269	0.019	0.028	0.020	-0.003	0.039	1.000				
(8) Credit risk	0.022	-0.021	0.104	0.058	-0.023	0.204	0.070	1.000			
(9) Risk aversion	0.026	-0.042	-0.033	-0.014	-0.007	-0.048	-0.088	-0.057	1.000		
(10) GDP	-0.020	-0.148	0.040	0.069	-0.313	-0.182	-0.004	0.011	0.016	1.000	
(11) Bank size	0.228	0.041	0.059	0.038	-0.008	0.088	0.847	-0.014	-0.236	-0.014	1.000

4.3 Unit Root Test

Prior to estimation of the model, determination of the variables' order of integration. In this case the Levin-Lin-Chu unit-root test and Im-Pesaran-Shin unit-root test. The two tests were used 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.

Table 4.3: Unit Root Test Results

Variables	Levin-Lin-Chu unit-root test – At level			Im-Pesaran-Shin unit-root test				Order of intergration
	Unadjusted t statistic	Adjusted t* statistic	P - value	Z statistics	Critical Values			
					At 1% sig.	At 5% sig.	At 10% sig.	
NIM	-22.484	-8.189	0.00	-7.776	-2.48	-2.38	-2.33	I(0)
Inflation deviation	-33.830	-20.724	0.00	-10.5145	-2.48	-2.38	-2.33	I(0)
DSTR deviation	-35.292	-23.056	0.00	-6.924	-2.48	-2.38	-2.33	1(0)
DSTE deviation	-44.302	-32.632	0.00	-6.7827	-2.48	-2.38	-2.33	I(0)
CAD to GDP	-14.341	-3.699	0.00	-10.2916	-2.48	-2.38	-2.33	I(0)
CBR	-30.921	-13.777	0.00	-8.4092	-2.48	-2.38	-2.33	I(0)
Core capital	-28.791	-14.300	0.00	-9.7545	-2.48	-2.38	-2.33	I(0)
Credit risk	-32.001	-17.692	0.00	-10.3599	-2.48	-2.38	-2.33	I(0)
Risk aversion	-26.539	-12.265	0.00	-9.3398	-2.48	-2.38	-2.33	I(0)
GDP	-20.904	-5.319	0.00	-12.6183	-2.48	-2.38	-2.33	I(0)
Bank size	-30.957	-15.668	0.00	-9.8054	-2.48	-2.38	-2.33	I(0)

4.4 GMM Estimation Results

The study covered q42020 to q12024 period with 33 commercial banks being included in the analysis amounting to 462 data points. The empirical model was estimated using the Generalized Moments Method (GMM). Specifically, two – step system GMM was applied. The results found that the one quarter lag in net interest margin has a positive effect in current quarter net interest margin. This finding asserts that higher cost of financial intermediation in previous quarter is followed by a higher cost of financial intermediation in the successive quarter.

The macro – imbalance results indicate that with regard to inflation, deviation of inflation above the upper target bound of 7.5% leads to increase in the cost of financial intermediation. High inflation leads to factoring out of the inflation in the market pricing thus leading to inflation adjusted prices. Thus, the lending rates with rise with the rise in the inflation rate. Notably also, the interest expense is likely to rise as the corporate deposits attract higher deposit rates to account for inflation as the corporate depositors seek for higher real return from their deposits. The effect of the inflation deviation from the upper bound target on the cost of financial intermediation is significant at 5 percent significance level.

The effect of fiscal distress indicates that the deviation of debt service to revenue ratio from the threshold of 18 percent has positive effect on the cost of financial intermediation. Therefore, as the debt service to revenue ratio deviates away from the 18 percent threshold, the cost of financial intermediation rises. The finding suggests that with a high debt service to revenue ratio above the 18 percent threshold, the government is faced with a very narrow fiscal space. As such since debt service to revenue ratio is a measure of external debt sustainability, the government is prompted to borrow more perhaps in the domestic market when faced with external debt sustainability challenges. This triggers the rise in the cost of financial intermediation in the domestic market. The effect is significant at 5 percent significance level. Similar results are reported for the debt service to export ratio deviation from the 15 percent threshold.

The current account deficit to GDP ratio has a positive effect on the net interest margin though insignificant. The finding could be reflecting how the deficit is funded. The deficit is mainly funded from the export's earnings and remittances from the capital account. However, the insignificance of the current account deficit in the cost of financial intermediation could be informed by the fact that the ratio has been relatively stable for the period under that study.

The effect of monetary policy was found to have a positive effect on the cost of financial intermediation. Monetary policy tightening increases the cost of financial intermediation significantly. Monetary policy tightening through an increase in central bank rates increases the market interest rates substantially. This finding on the effect of the Central Bank Rate support the bank lending channel of monetary policy tightening. Through this channel, the policy tightening affects the bank supply of loans via increased bank funding costs. In this case the policy tightening increases the cost as which banks can access and mobilize funds for lending. This is then passed through to the cost of financial intermediation. Therefore, high rates arising from policy tightening increases the opportunity cost of holding the most liquid assets – overnight deposits – compared with less liquid assets such as term deposits or securities. Moreover, the unwinding of asset purchases and long-term refinancing operations currently lead to a direct decline in the liquidity available to banks, limiting their capacity to supply credit and where available, such credit is supplied at a higher intermediation cost.

At bank level, increase in credit risk increases the intermediation cost. With the deterioration in the bank asset quality, banks will tend to factor in the risk in their loan pricing to cushion them from possible losses. This leads to increase in the lending rates hence high intermediation cost. Similar findings are reported for the risk aversion measured by the proportion of equity to total assets. When banks are risk averse, they tend to tighten their credit standards leading to higher intermediation cost. The effect is significant at 5 percent significance level. Economic growth is estimated to reduce the intermediation costs as indicated by the coefficient of GDP. Improvement in the economic activity increases demand for loans and advances that comes with competition hence reduction in intermediation cost. Similar results are reported for the bank size where large banks are found to have lower intermediation costs.

Table 4.4: GMM Estimation Results

NIM	Coef.	t-value
NIM (-1)	0.638*** (0.327)	1.95
Inflation deviation	0.078*** (0.044)	1.77
DSTR deviation	0.049*** (0.049)	1.69
DSTE deviation	0.122*** (0.064)	1.91
CAD to GDP	0.008 (0.011)	0.67
CBR	0.11*** (0.046)	2.39
Core capital	0.79 (0.475)	1.66
Credit risk	1.246* (0.68)	1.83
Risk aversion	0.29*** (0.175)	1.66
GDP	0.001 -(0.01)	-0.14
Bank size	-1.503 (0.599)	-2.51
No. of observations		396
Number of instruments		57
F statistics		**F (11, 33) = 105.47**
Arellano-Bond test for AR (1) in first differences	**z = -2.28**	**Pr > z = 0.220**
Arellano-Bond test for AR (2) in first differences	**z = -0.78**	**Pr > z = 0.433**
Hansen test of overid. Restrictions	**chi2(41) = 27.98**	**Prob > chi2 = 0.940**

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. This essentially mean the model instruments are valid. Therefore, the models do not suffer from misspecification.

5.0 Conclusion and Policy Implications

5.1 Conclusion

The study sought to examine the effect of macro imbalances on the banks' performance specifically from the cost of financial intermediation perspective. In this regard, the study examined how the macro – imbalances affect the bank's net interest margin as a measure of financial intermediation cost. The study is underpinned on the crucial role of the bank in financial intermediation given that this is the core business of commercial banking. Moreover, the cost of financial intermediation is crucial in determining financial depth in a country in terms of access to finance, cost of finance as well as the economic growth at large.

To this effect, the study relied on the financial intermediation theory in its conceptualization. To model the nexus between macro – imbalances and cost of financial intermediation, the bank dealership model developed by Ho and Saunders (1981) was adopted. However, the revised version of the dealership model Maudos and Fernandez de Guevara (2004), in which the theoretical motivated drivers of the net interest margins comprise operating costs, managerial risk aversion, credit risk, liquidity risk, interest rate risk, bank size, and market structure was adopted. We extend the model to include macro – imbalances as a determinant of the bank's net interest margin.

Within the study, various measures of macro - imbalances are adopted. Most importantly is the deviations of the macro balances from the set thresholds since the deviations past the set threshold amounts to tipping points possibilities. Specifically, for inflation imbalance, the deviation of quarterly mean inflation from the 7.50% upper bound target is used. For fiscal distress, the deviation of external debt sustainability from the respective target are applied (deviation of Debt service to revenue from 18% target and deviation of debt service to exports earnings from the 15% target). For the monetary policy, movements in Central Bank Rate is applied while for the open

account imbalance, the current account deficit to GDP ratio is applied.

The empirical model estimation results find that all the macro – imbalances measures applied in the study have a positive effect in the cost of financial intermediation. Increase in inflation rate, external debt unsustainability, monetary policy tightening and current account deficit to GDP ratio lead to increase in the intermediation cost. The positive effect of all the macro – imbalances measures on the intermediation cost are significant except the effect of current account deficit.

5.2 Policy Implications

Based on the study findings several policy implications are proposed. First, the significant positive effect of inflationary pressures on intermediation cost call for the need to anchor the inflation within the target bound as much as policy through various monetary policy instruments. Further, is the need to consider the effect inflation rate on the short – term and long – term market rates and the transmission mechanism since the market tend to fact in the inflation in pricing of credit and assets prices in the long run. There is therefore the need for the monetary policy authority to strive to anchor the inflation rate below the 7.50% upper bound target.

Secondly, the positive and significant effect of fiscal distress on the intermediation cost call for the need to exercise fiscal prudence to ensure that debt sustainability. The deviation of the debt servicing sustainability beyond the set threshold's adversely affects the financial intermediation costs. With the narrowing fiscal space, commitment to adherence to debt thresholds is core. This therefore calls for prudence fiscal measures such as budget rationalization through cutting down on expenditure wastages, consideration for fiscal consolidation with a mix of revenue generation fiscal consolidation and wasteful / unnecessary expenditure cut down fiscal consolidation.

Third, is the need for the effective application of the monetary policy instruments mainly the Central Bank Rate. Continued monetary policy tightening by retaining high Central Bank Rate even when inflationary pressures have been contained adversely affects intermediation costs. Therefore, there is the need for the monetary policy authority to reconsider the negative effects of sustained monetary policy affects amid already contained inflationary pressures.

Lastly, is the need for the policy makers to develop a matrix of interlinkages between the macro – imbalances. This policy intervention is informed by the fact that no macro-imbalance policy is a fit all solution. In quest to address a certain macro – imbalance may lead to creation or worsening another macro – imbalance. Therefore, where possible development of macro – imbalance interlinkage matrix would be ideal.

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