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The impact of adopting Basel III liquidity coverage ratio, stable funding ratio, and leverage ratio on lending in the Malawian banking sector

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Abstract

This paper examines the impact of adopting Basel III Liquidity Coverage Ratio, Stable Funding Ratio, and Leverage Ratio on lending in the Malawian banking sector. Malawi's banking industry regulators are planning to transition to Basel III from the current Basel II regime. This paper pioneers an assessment of the implications of this move for the banking industry. The study uses monthly data for the period January 2010 to December 2022, the Feasible Generalised Least Square (FGLS) Panel Regression model with bank-specific variables (X) and macroeconomic controls (Z). The study finds that Tier 1 has a positive and significant impact on Malawi's banking sector lending growth, while Tier 2 has a negative and insignificant impact on banking sector-wide lending growth effects. The non-risk weighted asset Basel III leverage ratios have significant and negative impacts on Malawi's bank sector lending growth. And that the liquidity coverage ratio (LCR) had a positive and significant effect in explaining variability in lending in Malawi banking overall, while the introduction of the stable funding ratio (SFR) had a positive and significant impact on banking sector-wide lending growth effects. The study also found that the Basel III Capital and Liquidity Rules have different effects on firm-level lending for the 8 banks in Malawi.

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Leverage ratio
Liquidity coverage ratio
Stable funding ratio
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1. Introduction

Malawi adopted the Basel I Capital Regulation in January 2000 and subsequently implemented Basel II in January 2014 as part of its efforts to achieve international harmonisation of financial systems. Presently, the

country is preparing for the forthcoming adoption of Basel III, which is slated for formal implementation in January 2024 or 2025. The key features of Basel III have been the introduction of stricter liquidity standards, namely the Liquidity Coverage Ratio (LCR) and the Stable Funding Ratio (SFR). Basel III also further introduced a non-risk-weighted asset capital ratio known as the Leverage Ratio (LR); this is in addition to compliance with the existing risk-weighted capital ratios of Tier I and Tier II. In Basel III, the only modification to risk-weighted capital ratios has been to increase them from 8% to 10%. The introduction of Basel III will mean that financial institutions will have to increase the levels of capital they hold with the aim of strengthening the capacity of their balance sheets to absorb losses emanating from their own risk-taking behaviour or volatilities in business cycles. Further, these financial institutions will be required to hold high-quality liquid assets (HQLA) and a stable level of funding that will cushion the financial institution's ability to withstand adverse liquidity shocks and funding withdrawals. However, the key question remains; how will these additional liquidity and capital regulatory frameworks for banks affect the ability of banks to optimise their balance sheets for compliance, intermediation, and profitability purposes?

Much of the existing body of literature has heavily narrowed on the effects of capital ratios on lending, and presumably so because Basel I and II pillars placed heavy capital compliance on banks, and very few studies have zoned in on the effects of Basel I, II, and III liquidity measures on bank risk-taking behaviour. Hence, empirical works that research the impact of Basel III liquidity indicators on intermediation and bank performance are regarded as novel, and for Malawi, to the best of our knowledge; this paper pioneers such a strand of empirical works. The main objective of this study is to analyse the potential implications associated with the adoption of an enhanced liquidity and capital framework, namely the liquidity coverage ratio, stable funding ratio, and leverage ratio as stipulated in Basel III, within the financial system of a developing economy like Malawi. This research has significant relevance in light of the general lack of depth in the capital and financial markets in Malawi, together with the constrained supply of liquidity.

The study found that the introduction of the Basel III liquidity coverage ratio (LCR) had a significant and negative effect on lending practises within Malawi's banking sector. In contrast, the implementation of the stable funding ratio (SFR) had a notable and favourable impact on the overall expansion of lending activities within the banking industry, these were also consistent with the results of Berger and Bouwman (2009). This study also found that the introduction of Basel III non-risk weighted asset capital ratio of leverage ratios, has had a significant and negative implications for the lending progress within Malawi's banking sector. The study further found that Basel II risk-weighted capital ratio, namely Tier 1, has a statistically significant and positive impact on the lending expansion of the banking sector in Malawi. On the contrary, Tier 2 capital has a statistically negligible and adverse impact on the aggregate loan expansion within the banking industry.

Our study, just like those of Gambacorta and Mistrulli (2004) found that Basel III liquidity and capital rules affected banks differently in Malawi, we split the banks into two big banks, four middle banks, and two smaller banks. Our study, like that of Bernanke and Lown (1991) in addition to splitting the banks into similar structures as those used by regulators for stress testing purposes, deployed seven models to test the varying effects of different model structures on bank lending. The detailed results are in Section 5. This research adds to the current scholarly understanding of the banking sector in Malawi, with a special focus on the potential outcomes associated with the adoption of Basel standards, namely Basel III, in Malawi. To the best of our current understanding, this study represents the first attempt to investigate this subject within the specific setting of Malawi in an empirical manner.

The rest of the paper is organised as follows: Section 2 reviews empirical literature; Section 3 discusses the modelling framework used in the study; Section 4 expounds on the data used in the model and their sources; Section 5 discusses the results of the model; and Section 6 concludes.

2. Selected Empirical Literature Review

The adoption of Basel I and II in the early 1990's and 2000s, generated a lot of research interest among scholars. Much of the empirical work centred on examining the effects of introducing these capital rules on banks' lending in both domestic and international markets. The selected studies below used panel data analysis and summarised the effect of capital ratios and liquidity on bank lending.

Bernanke and Lown (1991) found that there was a positive association between Basel I and II risk-adjusted capital ratios and growth in bank lending. They also found that there was a significant relationship between changes in employment and bank lending growth when they incorporated macroeconomic factors other than bank-specific variables. Peek and Rosengren (1997) and Peek and Rosengren (2000) found that the implementation of risk-based capital requirements, specifically related to the Japanese stock market shortage, led to a notable reduction in lending activities by Japanese banks in the United States. This decline in lending was shown to have both economic and statistical significance. Gambacorta and Mistrulli (2004) concluded that banks that are well capitalized can withstand monetary policy shocks that affect their available deposit pool for lending; mainly on account of the fact that well capitalized banks have a wider alternative to non-deposit sources of financing such as bonds, and other capital enhancing financial instruments that augment the banks' capital position. In conclusion, the authors emphasized the fact that the effects of Basel I and II capital accords affected banks differently, hugely depending on their level of capitalization and appetite for risk. Berrospide and Edge (2010) found that bank capital ratios affected loan growth between six and ten times larger than the

standard results they had found using panel data regressions. Kishan and Opiela (2000) found mixed results depending on the size of the banks' balance sheet, level of capitalization and effects on lending growth. Their study concluded that regulators should consider the distribution effects of monetary policy on different banks' ability to lend when designing macroprudential policies.

Beatty and Liao (2011) found that when Basel risk-weighted capital accords were implemented; banks that had a greater time lag or delay in implementing the International Financial Reporting Standards (IFRS)9 expected credit losses reduced their ability to advance credit during recessions more when compared with banks that adopted the IFRS 9 expected credit loss model and recognised credit losses without delays. They also found that banks that had greater delays were more prone to capital shocks during recessions and that banks with fewer delays were less pro-cyclical for both well-managed banks and poor-managed banks. They also concluded that bigger banks were more vulnerable to capital shocks when compared to smaller banks. Carlson, Shan, and Warusawitharana (2013) found that irrespective of location, size, and business characteristics, banks with higher capital ratios had stronger loan growth in the 2008 and 2009 financial crisis, and there was no relationship between these two factors during the pre- and post-financial crisis years. Their findings were like those of Berger and Bouwman (2009) and Demirguc-Kunt, Detragiache, and Merrouche (2010) who also found that there was a link between bank capital and other items such as equity prices and market share, which were prominent during banking crises.

Bridges et al. (2014) found that changes in capital requirements for banks affected both capital and lending in United Kingdom. With increasing capital requirements, banks in their model also gradually increased capital ratios and reduced loan origination in the year following an increase in capital requirements. Labonne and Lame (2014) examined the different potential effects of bank capital ratios on loan growth using bank level analysis. They concluded that regulatory capital requirements induced non-linear reaction in proportion to the share of capital with which a bank is funded for French banks. They also showed that non-linearity is also prevalent in the ratio of non-performing loans to total loans. They concluded that the observed variation of the impact of both capital and non-performing loans exacerbated by regulatory capital constraints should be considered when regulators are designing macroprudential policy mix for the banking sector.

Olszak, Pipieńb, Roszkowskac, and Kowalskad (2014) concluded that for the European Union (EU) region, the impact of capital ratios on loan growth was stronger than was earlier reported in similar studies. They also investigated the extent to which different jurisdictions bank regulation and supervision affected banks' ability to originate loans during economic recessions; they concluded that when banking and supervisory regimes are very restrictive, it reduces the restrictive effects of capital ratios on lending. The other component of their study was to investigate the procyclicality of loan loss provisions in income smoothing for banks in the EU; here they concluded that income smoothing with loan loss provisions may encourage loan growth. Košak, Li, Lončarski, and Marinč (2015) differentiated between Tier I, Tier II, customer, and interbank deposits as sources of bank funding; they found a significant and positive effects of Tier I on lending growth during the financial crisis; this effect was prominent among small banks and for banks in Brazil, Russia, India, China, and South Africa (BRICs) and non-Organisation for Economic Cooperation and Development (OECD) countries. They also found that customer deposits positively influenced lending growth under banking crisis conditions. They also established a weak but positive influence of Tier II interbank deposits on lending growth in non-banking crisis conditions, and conversely, under banking crisis conditions, interbank deposits negatively affected bank loan origination. They also found out that bank ownership had an influence on lending growth; they noted that commercial and foreign-owned banks cut loan origination during crises and those government-owned financial institutions weathered the storm of banking crises and supported loan growth. Alper, Hulagu, and Keles (2012) concluded that bank liquidity position was an important determinant of bank loan origination efforts. They also concluded that the interplay between interest rates and bank liquidity positions was insignificant, rejecting the findings of Kashyap and Stein (1995) about the existence of bank lending channels in Turkey as shown by the Turkish banking data. Allen and Paligorova (2015) found that Canadian public firms experienced a significant cut in the availability of bank credit when compared with private firms and that they were impacted by the costs of banks wholesale funding in the pre-crisis times. Berger and Bouwman (2009) constructed four measures of bank liquidity for all US Banks from 1993 to 2003 to measure the effects of bank liquidity and capital on bank lending. They concluded that bank liquidity was positively correlated with an increase in bank value. They also found that bank liquidity and capital ratios had a significant positive relationship for big banks and a negative relationship for smaller banks.

3. Modelling Framework

3.1. Empirical Modelling Framework

The purpose of the empirical specification is to examine the influence of capital and liquidity on bank lending in Malawi. This analysis incorporates novel measures that draw inspiration from the Basel III regulatory framework, therefore expanding upon the factors previously explored in the available literature. Panel data estimation methods will be used to estimate a static regression model. The underlying assumption of this model is that the current bank-lending behaviour may be elucidated by considering both bank-specific factors and macroeconomic variables.

The model specification is presented in the following manner:

$$\Delta L_{i,t} = \alpha_i + \sum_{j=1}^{j} \beta_j X_{ji,t-1} + \sum_{k=1}^{k} \beta_{ki} X_{ki,t} + \varepsilon_{i,t} \quad (1)$$

This model framework in Equation 1, used in this study, is consistent with those used in the studies of Berrospide and Edge (2010); Bernanke and Lown (1991); Gambacorta and Mistrulli (2004); Kashyap and Stein (1995) and Kishan and Opiela (2000). The variable $\Delta L_{i,t}$ represents the loan origination growth of bank i at time t, which represents a month-on-month growth in loans denominated in Malawi Kwacha. The use of a growth rate model is justified due to the integration of variables in levels, which has been proven by conducting the Im-Pesaran-Shin test for cross-sectional variables and a conventional Dickey-Fuller test for the time series. Gambacorta and Mistrulli (2004) and Kashyap and Stein (1995) in their studies, adopted the use of loan growth rate to avoid spurious correlation among variables. The variables denoted as Xji and Xki represent the jth and kth factors, either particular to individual banks or related to macroeconomic conditions that have been identified as predictors of bank lending in previous scholarly research. We use a Feasible Generalized Least Square (FGLS) panel estimator with bank-specific fixed effects in our analysis.

3.2. Robustness Check

The summary of model robustness checks is presented in Table 1:

Our data had heteroscedasticity; therefore, we utilized the generalized least squares estimator (GLS), which incorporates heteroskedasticity, cross-sectional, and serial correlations directly into the estimate process. Academic literature recognises the efficiency of Generalised Least Squares (GLS) above Ordinary Least Squares (OLS). To operationalize the GLS in our model, we analysed feasible generalized least squares (FGLS). Hansen (2007) used FGLS estimation to solve serial correlation and clustering difficulties in fixed effects panels and multilevel models.

4. Data and Sources

Table 2 presents the dependent variables used in the study, their expected signs, and the sources of data used in the analysis.

This research employs monthly panel data, which entails aggregating the data from commercial banks in Malawi from January 2010 to December 2022. The data used in this study was obtained from the Reserve Bank of Malawi Website Database, as well as the yearly financial statements of the banks operating in Malawi. These sources were selected to gather information on particular bank features. The research uses Stata 15.0 software for doing econometric estimates.

5. Empirical Results and Discussions

5.1. The Impact of Basel III Capital Ratios on the Banking Sector

The regression results are shown in Table 3. When examining capital ratios, it is seen that the risk-weighted capital ratio, namely Tier 1, has a positive influence on the growth of lending in the banking sector of Malawi. However, its impact on overall loan growth is found to be significant. On the other hand, Tier 2 capital ratio has a negative effect on the growth of lending in the banking sector as a whole, although this effect is not statistically significant. The implementation of non-risk-weighted asset Basel III leverage ratios has been shown to have substantial and adverse effects on the development of lending in the banking industry of Malawi. When examining liquidity ratios, it is observed that the implementation of the liquidity coverage ratio (LCR) has a statistically significant negative impact on the variability of lending in the overall banking sector of Malawi. Conversely, the introduction of the stable funding ratio (SFR) has a statistically significant positive effect on the growth of lending in the banking sector as a whole.

When segmented banks are examined by asset size, the risk-weighted capital ratio, especially Tier 1, positively affects the lending growth of two major banks, four medium banks, and two small banks. However, Tier 2 significantly reduces loan growth for Malawi's two major and two small banks. However, it significantly boosts the loan growth of the four midsize banks. Basel III leverage ratios, which ignore asset risk weighting, have reduced loan growth in Malawi, affecting two major banks, four medium-sized banks, and two small banks. Implementing the liquidity coverage ratio (LCR) has a statistically significant negative impact on the lending variability of two large banks and a positive impact on the lending behaviour of four medium-sized banks and two small banks in Malawi. In contrast, the stable funding ratio (SFR) has a statistically significant negative effect on the loan growth of two major banks and four medium-sized banks in Malawi, while it positively impacts two small banks. Table 4 presents the regression results of the study when banks are segmented by asset size, as discussed above.

5.2. The Impact of Additional Non-Basel III Factors on the Banking Industry

Various empirical studies have shown that credit risk, bank size, cost of financing, nominal GDP growth rate, mergers, bank size, return on equity, return on assets and equity, and loan-to-deposit ratio affect bank lending in various nations. Tables 5 and 6 summarise our results on these influences on Malawi's banking industry and fragmented banking sector.

Table 1. Model robustness check results.

Type of test	Method used	Null hypothesis	Result	Way forward
Panel unit root test	Levin-Lin-Chu (2002), Haris-Tzavalis (1999), Breitung (2000), Breitung and Das (2005), Im-Pesaran-Shin (2003), Fisher-type (Choi, 2001) and Hadri (2000) Lagrange multiplier (LM)	The null hypothesis tests are that all panels have a unit root.	The data strongly rejects the unit root null hypothesis, indicating stationarity for all model variables.	-
Model selection test	Hausman specification test, Durbin-Wu-Hausman (DWH)	The null hypothesis states that the model uses random effects, while the alternative hypothesis states that it uses fixed effects (FE)	The data substantially defied the null hypothesis that the preferred explanation is random effects. Thus, the fixed effects model is best. The low p-value (0.05) rejected the null hypothesis.	We carried further robustness check to reaffirm whether the FE model was indeed appropriate, such as Heteroskedasticity and Contemporaneous Correlation
Endogeity test	Hausman specification test, Durbin-Wu-Hausman (DWH)	This test looked for panel endogeneity or model misspecification	FE was a recommended and not mis specified model	Further FE robustness test were done
Cross-dependence and contemporaneous test	Breusch-Pagan Lagrange multiplier test of independence was done Pesaran CD (Cross-sectional dependence)	The B-P/LM test of independence null hypothesis states that residuals across entities are uncorrelated The null hypothesis states that residuals are uncorrelated.	The test results showed that the null hypothesis could not be rejected due to the low p-value (0.05). This conclusion was obtained due to a significant p-value over 0.05. Thus, there was no association between panels, showing no cross-sectional dependency.	-
Heteroscedasticity test	Stata performed the xttest3 heteroscedasticity test	The test null hypothesis is homoscedasticity, suggesting constant variance	It was found that panels are heteroskedastic.	Given heteroskedasticity, we changed the model.

Table 2. Variables, expected signs, and data sources.

Variable name	Variable description	Expected signs	Rationale	Source
Tier1ratcpi	Tier 1 ratio	+	An increase in capital levels should lead to increased lending	Banks AFS
Tier2ratcpi	Tier 2 ratio	+	An increase in capital levels should lead to increased lending	Banks AFS
Levcpi	Leverage ratio	-	An increase in leverage should lead to a decrease in lending	Calculated using banks AFS data
LCRratcpi	Liquidity coverage ratio	-/+	An increase in liquidity should lead to an increase in lending	Calculated using banks AFS data
SFRratcpi	Stable funding ratio	-/+	An increase in stable funding should lead to an increase in lending	Calculated using banks AFS data
ROAcpi	Return on assets	+	An increase in return on assets should lead to an increase in lending	Calculated using banks AFS data
ROEcpi	Return on equity	+	An increase in return on equity should lead to an increase in lending	Calculated using banks AFS data
TAcpi	Total bank size	+	The bigger the bank size should lead to more lending	Calculated using banks AFS data
GDPcpi	GDP	+	The higher the GDP, the higher should be the share of credit/Lending in the economy	NSO

Table 3. Summary of effects of Basel III capital and liquidity regulations on banks' lending.

Bank name	Tier 1 ratio (Tierratcpi)	Tier 2 ratio (Tier2ratcpi)	Leverage ratio (Levratcpi)	Liquidity coverage ratio (LCR)	Stable funding ratio (SFR)
All big banks	+ve *(Sig)	-ve (Insig)	-ve ***(Sig)	+ve ***(Sig)	+ve ***(Sig)

Note: *** p<0.01, * p<0.1.

Table 4. Summary of effects of Basel III capital and liquidity regulations on banks' lending.

Bank name	Tier 1 ratio (Tierratcpi)	Tier 2 ratio (Tier2ratcpi)	Leverage ratio (Levratcpi)	Liquidity coverage ratio (LCR)	Stable funding ratio (SFR)
2 big banks	+ve ***(Sig)	-ve ***(Sig)	-ve ***(Sig)	-ve ***(Sig)	-ve **(Sig)
4 Middle banks	+ve ***(Sig)	+ve *(Sig)	-ve ***(Sig)	+ve ***(Sig)	-ve **(Sig)
2 Small banks	+ve **(Sig)	-ve **(Sig)	-ve ***(Sig)	+ve (Insig)	+ve *(Sig)

Note: *** p<0.01, ** p<0.05, * p<0.1.

Table 5. Summary of effects of other non- Basel III factors on banks' lending.

Bank name	Impairments (Impaircpi)	Bank size (TAcpi)	Return on equity (ROE)	Return on assets (ROA)	Loan to deposit ratio (LDR)	Gross domestic product (GDP)	Merger dummy	Basel dummy
All banks	+ve *(Sig)	+ve ***(Sig)	-ve ***(Sig)	+ve ***(Sig)	-ve **(Sig)	+ve ***(Sig)	+ve **(Sig)	+ve ***(Sig)

Note: *** p<.01, ** p<.05, * p<.1

Table 6. Summary of effects of other non-Basel III factors on banks' lending.

Bank name	Impairments (Impaircpi)	Bank size (TAcpi)	Return on equity (ROE)	Return on assets (ROA)	Loan to deposit ratio (LDR)	Gross domestic product (GDP)	Merger dummy	Basel dummy
2 big banks	+ve ***(Sig)	+ve ***(Sig)	-ve ***(Sig)	+ve (Insig)	+ve ***(Sig)	+ve ***(Sig)	-ve ***(Sig)	+ve ***(Sig)
4 middle banks	+ve (Insig)	+ve ***(Sig)	-ve ***(Sig)	+ve ***(Sig)	+ve (Sig)	+ve ***(Sig)	-ve ***(Sig)	+ve (Insig)
2 small banks	+ve ***(Sig)	+ve ***(Sig)	-ve (Insig)	+ve ***(Sig)	-ve **(Sig)	+ve ***(Sig)	-ve ***(Sig)	+ve ***(Sig)

Note: *** p<.01, ** p<.05,

The loan growth within the Malawian Banking Sector is significantly and positively influenced by the credit risk associated with banks. The findings of our study align with the empirical findings of Berrospide and Edge (2010); Alhassan, Brobbey, and Aamoah (2013) and Cucinelli (2015) which concluded that credit risk has a negative impact on banks' capital position, hence, in order to preserve the capital position, banks oftentimes reduce lending. In all jurisdictions, credit risk assets form a bigger component of risk weighted assets. The impact of bank credit risk on bank lending varies across different categories of banks in Malawi. Specifically, the influence is found to be substantial and positive for two major banks and two small banks in the country. However, for four middle banks in Malawi, the effect is deemed minimal, however favourable.

The size of banks has a substantial and favourable influence on the expansion of lending within the banking sector of Malawi. This observation indicates that smaller banks in Malawi have a tendency to approve a higher number of loan applications. Stein (2002) found that smaller banks had inherent strengths in generating qualitative information due to their extensive client networks, hence facilitating the expansion of their lending operations. The results of this study indicate that major financial institutions possess a greater capacity to mitigate their loan operations in response to external demands to downsize their asset portfolios. Large banks in Malawi predominantly lenders on the interbank market and have accumulated financial investments. They engage in securitization lending and market operations compared to small banks; loan origination is not their primary business. The impact of bank size risk on bank lending is shown to be statistically significant and positively correlated for a sample of two (2) large banks, four (4) medium-sized banks, and two (2) small banks operating in the banking sector of Malawi.

The loan growth in the Malawian Banking Sector is significantly and adversely affected by the return on equity (ROE). The influence of return on assets (ROA) on loan growth in the Malawian Banking Sector is both considerable and favourable. The lending expansion of the Malawian Banking Sector is shown to be insignificantly and negatively affected by the loan-to-deposit ratio (LDR). The impact of Return on Equity (ROE) on bank lending is found to be noteworthy and adverse for two major banks and four mid-sized banks in Malawi. However, the effect is deemed statistically negligible and negative for two small banks in Malawi. The impact of Return on Assets (ROA) on bank lending is shown to be statistically significant and positive for four middle banks and two small banks in Malawi. However, for two big banks in Malawi, the effect of ROA on bank lending is found to be statistically insignificant but still positive. The loan-to-deposit ratio (LDR) exhibits a notable and favourable impact on bank lending for two prominent banks, as well as four intermediary banks, within the context of Malawi. However, it demonstrates a large and adverse influence on lending activities for two smaller banks in the same region.

Additionally, it is worth noting that the growth rate of nominal GDP has a noteworthy and favourable influence on the loan growth within the banking sector of Malawi. In light of enhanced economic circumstances, financial institutions exhibit a preference for extending their credit operations, as they provide better rates of return in comparison to alternative asset classes that produce lesser profits. In contrast, during periods of economic decline, banks reduce their lending activities in order to mitigate the risk of non-performing loans. The presence of a low-interest rate environment and a fiercely competitive banking market may result in a reduction of banks' interest margins, hence diminishing their inclination to engage in credit expansion endeavours. The impact of gross domestic product (GDP) on bank lending is shown to be statistically significant and positively correlated for a sample of two large banks, four medium-sized banks, and two small banks operating in the Malawian financial sector.

Lastly, it can be seen that the merger and Basel dummies have a noteworthy and favourable influence on the increase in lending in the Malawian Banking Sector. The merger dummy variable has a substantial and adverse impact on the lending activities of two major banks, four intermediate banks, and two little banks in the context of Malawi. The Basel dummy variable has a statistically significant and positive impact on bank lending for two large banks and two small banks in Malawi. However, its influence on lending for four medium-sized banks in Malawi is shown to be statistically negligible, albeit favourable.

5.3. Results from Model Comparisons

Table 7 exhibits the results from nesting seven models together and varying various variables.

As discussed in Section 5 above, it is observed that the risk-weighted capital ratio, specifically Tier 1, still has a significant and positive influence on the lending growth of the banking sector in Malawi, even across all the seven nested models where the only difference was the alteration of variables. Tier 2 exhibits a negative and significant impact on lending growth for the banking sector in Malawi in all seven models as well. The Basel III leverage ratios, which do not take into account the risk weighting of assets, have been shown to have notable and adverse effects on loan growth in Malawi, across models 1 to 4, and insignificant but negative effects in models 5 to 7. It is observed that the implementation of the liquidity coverage ratio (LCR) has a statistically significant negative impact on the lending variability for models 1 to 3 and 7. On the other hand, the introduction of the stable funding ratio (SFR) has a statistically insignificant positive impact on the lending growth in models 1 to 4.

Table 7. Model comparison results.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Model1	**Model2**	**Model3**	**Model4**	**Model5**	**Model6**	**Model7**
Tier1ratcpi	0.0282***	0.0283***	0.0286***	0.0277***		0.0248***	0.0297***
	(0.0037)	(0.0037)	(0.0037)	(0.0037)		(0.0035)	(0.0037)
Tier2ratcpi	-0.0221***	-0.0221***	-0.0223***	-0.0214***		-0.0189***	-0.0239***
	(0.0038)	(0.0038)	(0.0038)	(0.0038)		(0.0035)	(0.0038)
Levcpi	-0.0013**	-0.0013**	-0.0011**	-0.001*		-0.0005	-0.0008
	(0.0006)	(0.0006)	(0.0006)	(0.0005)		(0.0005)	(0.0005)
Lcrratcpi	-0.0002**	-0.0002**	-0.0002*	-0.0001	-0.0001		-0.0003***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)		(0.0001)
Sfrat2cpi	0.0003	0.0003	0.0002	0.0003	-0.0001		0.0002
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0002)		(0.0002)
Lmdlbimpaircpi	0.0016***	0.0016***	0.0016***	0.0016***	0.0021***	0.0017***	0.0018***
	(0.0005)	(0.0005)	(0.0005)	(0.0005)	(0.0006)	(0.0005)	(0.0005)
Lmdpatcpi	0.0061**	0.0061**	0.0061**	0.0061**	0.0063**	0.0055**	0.0059**
	(0.0024)	(0.0024)	(0.0024)	(0.0024)	(0.0025)	(0.0024)	(0.0024)
Roecpi	-0.0017***	-0.0017***	-0.0018***	-0.0019***	-0.0017***	-0.002***	
	(0.0005)	(0.0005)	(0.0005)	(0.0004)	(0.0005)	(0.0004)	
Roacpi	0.0015**	0.0015**	0.0014**	0.0014**	0.0019***	0.0012**	
	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	(0.0006)	
Ldrcpi	0.0005	0.0006	0.0005	0.0003	0.0014**		0.0004
	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)		(0.0007)
Lmdgdpcpi	1.3851***	1.3847***	1.3793***	1.3834***	1.3859***	1.385***	1.3858***
	(0.0199)	(0.0195)	(0.0198)	(0.0195)	(0.0205)	(0.0201)	(0.02)
Ldinb	0	0	-0.0001	-0.0002	0	0	0
	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)	(0.0007)
Merger dummy	0.0006**	0.0006**			0.0007**	0.0002	0.0006**
	(0.0003)	(0.0002)			(0.0003)	(0.0003)	(0.0003)
Basel dummy	0		0.0003		-0.0004	-0.0003	0
	(0.0003)		(0.0002)		(0.0003)	(0.0003)	(0.0003)
_Cons	0.0002	0.0002	0.0002	0.0003	0.0004	0.0006**	0.0002
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0002)	(0.0003)
Observations	1248	1248	1248	1248	1248	1248	1248
Pseudo R^2	. z	. z	. z	. z	. z	. z	. z
Basel dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Merger dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors are in parentheses.
*** p<.01, ** p<.05, * p<.1

6. Conclusion

The consequences of the results presented in this paper have significant relevance for the development of policies and the establishment of regulatory frameworks within the banking sector. The impact of new capital and liquidity regulatory frameworks on banks' intermediation activities widely depends on the prevailing economic conditions in jurisdictions, and the size and depth of financial markets that are sources of bank liquidity. In certain cases, these frameworks may prove to be ineffective or even harmful to the general intermediation role that banks play in economies, or indeed, banks might switch the allocation of assets to optimise compliance and profitability, thereby denying the sectors that need credit to spur economic growth. The potential consequences of establishing capital and liquidity regulatory frameworks that are universally applicable to all banks may result in unintended outcomes, perhaps restricting banks from lending to certain economic segments within the economy. The study's primary finding suggests that regulators should take into account the diverse characteristics and behaviours of banks when implementing these stricter Basel III Liquidity Standards, perhaps by applying segmentation criteria as a roadmap to adoption of these standards and allowing banks with different sizes a compliance window waiver. This approach is crucial for financial stability, both for micro and macroprudential purposes, as it will allow many financial institutions to survive and avoid market consolidations that bring in unnecessary monopolistic tendencies in the industry.

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Appendix 1 presents the results for the FGLS Regression model.

Appendix 1. FGLS regression model.

Banking sector impact
Cross-sectional time-series FGLS regression

lmdglbcpi	Coef.	St. err.	T-value	P-value	[95% Conf	Interval]	Sig.
tier1ratcpi	0.005	0.003	1.72	0.086	-0.001	0.011	*
tier2ratcpi	-0.001	0.003	-0.20	0.84	-0.007	0.005	
levcpi	-0.005	0	-11.50	0	-0.006	-0.004	***
lcrratcpi	0	0	-3.74	0	0	0	***
sfrat2cpi	0.001	0	5.89	0	0.001	0.001	***
lmdlbimpaircpi	0.001	0	1.92	0.055	0	0.002	*
lmdtacpi	0.577	0.021	27.75	0	0.536	0.618	***
roecpi	-0.002	0	-6.75	0	-0.003	-0.002	***
roacpi	0.005	0.001	9.82	0	0.004	0.006	***
ldrcpi	-0.001	0.001	-2.42	0.015	-0.003	0	**
lmdgdpcpi	0.615	0.032	19.17	0	0.552	0.678	***
ldinb	0	0.001	0.30	0.766	-0.001	0.001	
mergerdummy	0	0	0.51	0.613	0	0.001	

lmdglbcpi	Coef.	St. err.	T-value	P-value	[95% Conf	Interval]	Sig.
baseldummy	0.001	0	3.76	0	0	0.001	***
Constant	0	0	-0.97	0.331	-0.001	0	
Mean dependent var.		0.001	SD dependent var			0.007	
Number of obs		1248	Chi-square			9793.317	
Prob > chi2		0.000	Akaike crit. (AIC)			-11440.612	

Note: *** p<.01, ** p<.05, * p<.1

Banks by asset category threshold

Cross-sectional time-series FGLS regression: compXX = 2 big banks

lmdglbcpi	Coef.	St. err.	T-value	P-value	[95% Conf.	Interval]	Sig.
Tier1ratcpi	0.044	0.011	3.94	0	0.022	0.066	***
Tier2ratcpi	-0.039	0.01	-3.87	0	-0.058	-0.019	***
Levcpi	-0.044	0.007	-6.24	0	-0.057	-0.03	***
Lcrratcpi	-0.002	0.001	-3.12	0.002	-0.003	-0.001	***
Sfrat2cpi	-0.002	0.001	-2.34	0.019	-0.004	0	**
Lmdlbimpaircpi	0.028	0.006	4.41	0	0.016	0.041	***
lmdtacpi	0.237	0.042	5.60	0	0.154	0.319	***
Roecpi	-0.014	0.003	-5.67	0	-0.019	-0.009	***
Roacpi	0.022	0.013	1.61	0.107	-0.005	0.048	
ldrcpi	0	0.001	0.29	0.773	-0.001	0.002	
lmdgdpcpi	0.909	0.045	20.04	0	0.82	0.998	***
ldinb	0	0	-1.63	0.103	0	0	
Mergerdummy	-0.001	0	-5.27	0	-0.001	-0.001	***
Baseldummy	0.001	0	6.27	0	0.001	0.001	***
Constant	0.017	0.003	4.88	0	0.01	0.023	***
Mean dependent var		0.000	SD dependent var			0.006	
Number of obs.		156	Chi-square			105043.236	
Prob > chi2		0.000	Akaike crit. (AIC)			-2146.532	

Note: *** p<.01, ** p<.05

Cross-sectional time-series FGLS regression: compXX = 2 small banks

lmdglbcpi	Coef.	St. err.	t-value	p-value	[95% Conf	Interval]	Sig
tier1ratcpi	0.038	0.017	2.27	0.023	0.005	0.071	**
tier2ratcpi	-0.02	0.01	-2.07	0.039	-0.04	-0.001	**
levcpi	-0.106	0.018	-5.92	0	-0.141	-0.071	***
lcrratcpi	0	0.001	0.43	0.668	-0.001	0.001	
sfrat2cpi	0.002	0.001	1.79	0.074	0	0.004	*
lmdlbimpaircpi	0.075	0.012	6.17	0	0.051	0.099	***
lmdtacpi	0.312	0.066	4.70	0	0.182	0.441	***
roecpi	-0.017	0.01	-1.61	0.108	-0.037	0.004	
roacpi	0.336	0.112	3.00	0.003	0.116	0.555	***
ldrcpi	-0.005	0.003	-2.04	0.041	-0.011	0	**
lmdgdpcpi	0.96	0.091	10.57	0	0.782	1.138	***
ldinb	0	0.001	0.04	0.971	-0.002	0.002	
mergerdummy	-0.004	0.001	-6.66	0	-0.005	-0.003	***
baseldummy	0.007	0.001	10.50	0	0.006	0.008	***
Constant	0	0	-0.06	0.953	0	0	
Mean dependent var		0.002	SD dependent var			0.007	
Number of obs.		156	Chi-square			7230.813	
Prob > chi2		0.000	Akaike crit. (AIC)			-1678.909	

Note: *** p<.01, ** p<.05, * p<.1

Cross-sectional time-series FGLS regression: compXX = 4Middle banks

lmdglbcpi	Coef.	St.err.	T-value	P-value	[95% conf.	interval]	Sig.
Tier1ratcpi	0.039	0.007	5.26	0	0.024	0.053	***
Tier2ratcpi	0.012	0.007	1.79	0.074	-0.001	0.026	*
Levcpi	-0.041	0.009	-4.27	0	-0.059	-0.022	***
Lcrratcpi	0.001	0	3.16	0.002	0.001	0.002	***
Sfrat2cpi	-0.002	0.001	-2.52	0.012	-0.003	0	**
Lmdlbimpaircpi	-0.006	0.013	-0.47	0.64	-0.032	0.02	
Lmdtacpi	0.451	0.038	11.75	0	0.376	0.526	***
Roecpi	-0.008	0.002	-3.48	0.001	-0.012	-0.003	***
Roacpi	0.003	0.007	0.41	0.684	-0.01	0.016	
Ldrcpi	0.016	0.002	10.17	0	0.013	0.019	***
Lmdgdpcpi	0.743	0.05	14.88	0	0.645	0.841	***
ldinb	0	0	-1.09	0.278	-0.001	0	
Mergerdummy	-0.002	0	-8.29	0	-0.002	-0.001	***
Baseldummy	0.001	0	7.60	0	0.001	0.002	***
Constant	-0.012	0.003	-4.46	0	-0.018	-0.007	***
Mean dependent var		0.001	SD dependent var			0.006	
Number of obs.		156	Chi-square			70509.242	
Prob > chi2		0.000	Akaike crit. (AIC)			-2076.311	

Note: *** p<0.01, ** p<0.05, * p<0.1

Appendix 2 presents formulas used in the manuscript for the calculation of Tier I, Tier II, Risk Weighted Assets and Leverage ratio. Calculation Formula's for capital and liquidity ratios.

Appendix 2. Calculation formulas used in the manuscript for the calculation of Tier I, Tier II, Risk Weighted Assets and Leverage ratio. Calculation Formula's for capital and liquidity ratios.

$$Tier\ I = \frac{\sum_{t=0}^{\infty} Prudential\ Equity\ Capital}{\sum_{t=0}^{\infty} Risk\ Weighted\ Assets} \geq 10\%$$

$$\sum_{t=0}^{\infty} Risk\ Weighted\ Assets = \sum_{t=0}^{\infty} Credit\ Risk + \sum_{t=0}^{\infty} Market\ Risk + \sum_{t=0}^{\infty} Operational\ Risk$$

$$Tier\ II = \frac{\sum_{t=0}^{\infty} Adjusted\ Prudential\ Equity\ Capital}{\sum_{t=0}^{\infty} Risk\ Weighted\ Assets} \geq 15\%$$

$$Leverage\ ratio = \frac{\sum_{t=0}^{\infty} Tier\ I\ Capital}{\sum_{t=0}^{\infty} Exposure\ or\ Total\ Assets} \geq 3\%$$

The calculation of the necessary stable funding is initiated by applying an RF factor, ranging from 0% to 100%, to the balance sheet carrying value of the bank's assets based on the level of illiquidity. Illiquid assets, such as intangible assets, property plant and equipment, other assets, and commercial loans, are given a risk-free rate (RF) of 0%. Assets with high liquidity, such as Cash and cash equivalents, Unencumbered Treasury assets, and Trading assets, are designated with a Risk Factor (RF) of 100% (1). In the context of Required Funding calculations and the determination of High-Quality Liquidity Assets (HQLA), loans are often regarded as having low liquidity. Specifically, consumer loans are given a Risk Factor (RF) of 25% (0.25), whereas other loan types are allocated an RF of 0%.

Table 8. Basel III asset and liability liquidity factors assigned risk factors for HQLA and ASF, SFR calculations.

Balance sheet asset class		Balance sheet liability class	
Required stable funding (High-Quality liquid assets (HQLA))	**Factor**	**Available stable funding (ASF)**	**Factor**
Cash and cash equivalents	1	Demand and savings deposits	0.7
Trading securities	1	Time deposits	1
Consumer loans	0.25	Short term borrowings	0
Commercial loans	0	Long term borrowings	1
Other loans	0	Derivative liabilities	0
Intangible assets	0	Other liabilities	1
Fixed assets	0	Subordinated debentures	1
Other assets	0	Total equity	1

Source: Stable funding ratio (SFR) refers to the proportion of available stable funding (ASF) to required stable funding (RSF), as previously discussed.