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Bank Loan Loss Provisions, Investor Protection and the Macroeconomy

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Abstract

This study investigates the non-discretionary determinants of bank loan loss provisions in Africa after controlling for macroeconomic fluctuation, financial development and investor protection. We find that non-performing loans, loan-to-asset ratio and loan growth are significant non-discretionary drivers of bank provisions in the African region. We observe that bank provision is a positive function of non-performing loans up to a threshold beyond which bank provisions will no longer increase as non-performing loans increases. Also, bank loan-to-asset ratio is a significant driver of bank provisions when African banks have higher loan-to-asset ratios. Also, larger banks in financially developed African countries have fewer loan loss provisions while increase in bank lending leads to fewer bank provisions in countries with strong investor protection. Finally, higher bank lending is associated with higher bank provisions during economic boom. The findings have implications.

JEL classification: C23, G21, G28, M41.

Keywords: Loan Loss Provisions, Africa, Income Smoothing, Procyclicality, Economic Cycle, Investor Protection, Banks, Macroeconomy, Credit Risk, Financial Development.

1. Introduction

This study investigates the determinants of non-discretionary loan loss provisions among banks in Africa. Loan loss provision is an amount that banks set aside to mitigate expected loss on bank loan portfolio as part of their credit risk management function (Laeven and Majnoni, 2003). The component of loan loss provisions that bank managers have control over is termed ‘discretionary’ loan loss provisions which they can use for income smoothing, capital management, signalling and tax management purposes (Laeven and Majnoni, 2003; Leventis et al, 2011; Ozili, 2015; Curcio and Hasan, 2015; Ozili, 2017; Andries et al, 2017), while the component of loan loss provisions that bank managers do not have control over is termed ‘non-discretionary’ loan loss provisions which is driven by fundamental credit risk and economic factors that affect banks’ loan portfolio and the survival and stability of banks in any country (Bouvatier and Lepetit, 2012; Bikker and Metzmakers, 2005). In this study, we focus on non-discretionary loan loss provisions because it allows us to examine the credit risk and economic factors that influence bank provisioning decisions.

From a global perspective, bank supervisors in developing countries place emphasis on non-discretionary loan loss provisions because (i) it is an important micro prudential instrument for bank regulation while ‘general provision’¹ is a core macro prudential instrument (Bikker and Metzmakers, 2005; Pool et al, 2015), (ii) it is directly linked to the survival of banks that have a large loan portfolio because huge loan losses could have serious consequence for bank stability, and (iii) non-discretionary provisions can be directly observed from bank financial statements compared to discretionary provisions (BCBS, 2004).

In Africa, bank supervisors continue to raise serious concern about the under provisioning of banks relative to the rising non-performing loans in several African economies. For instance, the Central Bank of Kenya in 2015 require Kenyan banks to increase loan loss provisions by 2.4billion Kenya shillings. In 2010, the Central Bank of Nigeria issued a set of provisioning guidelines to ensure sound

¹ Basel II makes a distinction between specific provisions and general provisions (BCBS, 2004). Specific provision is set aside to cover actual loan losses that have materialised or that can be reasonably estimated while general provision is set aside to cover general credit risk in the business environment including loan losses that cannot be reasonably estimated (BCBS, 2004).

provisioning and disclosure practices among Nigerian banks (CBN, 2010)². In the 2014 annual bank supervision report (p.22), the bank regulator in Uganda stress that the key source of vulnerability to the Ugandan banking sector is credit risk which could be mitigated via sufficient loan loss provisioning³.

The growing concern of bank supervisors about insufficient bank provisioning begs the question of whether bank balance sheet characteristics can provide bank managers with a good indication of their true credit risk exposure for which they should keep adequate loan loss provisions that is commensurate with their credit risk exposure. Our curiosity therefore lead us to investigate the fundamental or non-discretionary factors that influence the level of bank provisions in order to gain some insight about the loan loss provisioning practices of banks in the region.

Therefore, our paper is precisely an investigation into the non-discretionary determinants of bank loan loss provisions and how the determinants are influenced by transient macroeconomic changes and investor protection differences in the African region. We employ bank-level non-discretionary provisions determinants commonly used in the literature (see, De Lis et al, 2001; Pain, 2003; Bouvatier and Lepetit, 2008; Ozili, 2017) and this approach is appropriate because the balance sheet characteristic of each bank reflect the unique conditions that each African bank face. We find that non-performing loans, loan-to-asset ratio and loan growth are important non-discretionary determinants of bank provisions in the African region. Further tests show that some determinants are strongly significant in environments with stronger investor protection, financial development and during periods of economic prosperity.

Our analysis in this paper is of interest to bank supervisors in Africa for the following reasons. First, the assessment of the factors that drive the level of non-discretionary bank provisions is an important aspect of micro-prudential surveillance in many African countries; therefore, an in-depth understanding of the non-discretionary determinants of bank provisions in the region will help bank regulators and supervisors in the region to identify key vulnerabilities of banks in relation to credit

²http://www.cenbank.org/out/2010/publications/bsd/prudential%20guidelines%2030%20june%202010%20final%20%20_3_.pdf

³ <https://www.bou.or.ug/bou/bou-downloads/asr/2014/Dec/Annual-Supervision-Report-2014-.pdf>

risk. Second, the findings in this paper can serve as a cross-check for bank supervisors in the region who wish to construct models that link bank loan loss provisions with the macro economy. More so, the analysis in this paper is also of interest to bank practitioners who are curious to identify balance sheet variables that influence the level of bank provisions in their bank. Finally, by focusing on the non-discretionary determinants of loan loss provisions, this study contributes to the literature that examine the discretionary provisions while controlling for non-discretionary provisions determinants.

The remainder of the paper is organised as follows. Section 2 provides a review of related literature Section 3 present the data. Section 4 discuss the methodology. Section 5 report the results. Section 6 concludes.

2. Literature Review

Loan loss provision is a significant accrual⁴ in the banking industry (Lobo, 2017). Beaver and Engel (1996) demonstrate that the decisions that determine the level of non-discretionary provisions are based on variables that provide information about probable loan loss. They suggest that reported loan loss provision is conditional on the value relevance of information regarding its non-discretionary components. They further argue that a positive relation between loan loss provisions and its non-discretionary determinants is expected if non-discretionary provision determinants convey value-relevant information that determine the level of reported loan loss provisions. Conversely, they argue that a negative relation between reported provisions and its non-discretionary determinants may be expected if non-discretionary provisions determinants do not convey value-relevant information regarding the level of reported loan loss provisions (Beaver and Engel, 1996).

Common non-discretionary determinants of bank loan loss provisions include loan growth (a proxy for bank lending or credit supply), non-performing loans (a proxy for realised credit risk), bank loan

⁴ Accrual is the difference between profit and cashflow (Dechow and Dichev, 2002), where bank profit consist of two components: cash item (which is cashflow) and non-cash item (which is accrual).

to asset composition, total loan outstanding, bank size, etc. We discuss the literature that examine these determinants in the next section.

2.1. Provisions and Bank Lending

The relationship between loan loss provisions and bank lending (or loan growth) has been explored in the literature in several developed country studies while there is little knowledge on how bank lending influence the loan loss provisioning practices of banks in Africa. For instance, Foos et al (2010) investigate whether loan growth affects the riskiness of banks in 16 countries during the 1997 to 2007 period and find that loan growth leads to an increase in loan loss provisions during the subsequent three years, and has a negative impact on risk-adjusted interest income. They conclude that loan growth is an important driver of the riskiness of banks. Bouvatier and Lepetit (2012) in a cross-country study investigate whether backward-looking provisioning amplifies growth in bank lending. They find that backward looking loan loss provisioning systems exacerbate lending fluctuations in emerging countries than in developed countries. Pool et al (2015) examine banks in 12 OECD countries and find that bank lending and loan loss provisions are drivers of business cycle fluctuations. They also observe that loan loss provisions decreases as bank lending increases. Mlachila and Sanya (2016) show that, after a crisis, a bank can reduce its risk-taking behaviour and subsequently engage in less bank lending leading to prolonged reduction in bank lending (financial intermediation).

Given that loan growth is a proxy that reflects increase or decrease in bank lending, the literature present two views on the relationship between loan loss provisions and bank lending (or loan growth). Cavallo and Majnoni (2002), Laeven and Majnoni (2003) and Bikker and Hu (2002) present the ‘cyclical’ view which argue that periods of economic prosperity leads to increase in bank lending, and banks are likely to underestimate credit risk during such periods by engaging in aggressive lending behaviour and lax loan screening standards. They argue that, when banks underestimate credit risk in periods of increased bank lending, they will keep fewer loan loss provisions. This view suggests a negative relationship between loan loss provisions and bank lending.

The second view is the counter-cyclical view (Borio et al, 2001; Lowe, 2002). Borio et al (2001) and Lowe (2002) argue that during periods of economic prosperity, banks that have forward-looking assessment of credit risk are more likely to anticipate credit risk that build-up during good economic times by keeping more provisions as a buffer against credit losses in anticipation of bad economic times. When economic downturns set in, banks can use the additional provisions buffer to cover for losses during bad economic periods. This view suggests a positive relationship between loan loss provisions and bank lending.

To date, empirical studies report mixed evidence for the relationship between loan loss provisions and bank lending. Bikker and Metzmakers (2005) report a significant and positive relation between bank provisions and loan growth for banks in OECD countries while the relation is positive but insignificant for European banks. Ozili (2017) find a positive relation between bank provisions and loan growth for Western European banks.

2.2. Bank Provisions and Loan to Asset Composition.

Loan-to-asset composition is the ratio of banks total loans to total assets, used to measure credit default risk of bank loan portfolio (Bouvatier and Lepetit, 2008). Banks with large amount of loan in their balance sheet will keep higher loan loss provisions to mitigate credit default risk and will keep fewer loan loss provisions if bank loans are well diversified across several assets. Bouvatier and Lepetit (2008) show that higher (lower) loan to asset composition implies higher (lower) default risk, and banks with high default risk on the overall loan portfolio will keep more provisions to compensate for the riskiness of the loan portfolio.

Empirical studies commonly include loan to asset ratio as a non-discretionary determinant of bank loan loss provisions. For example, Bouvatier and Lepetit (2008) investigate bank provisioning behaviour and find a positive relationship between bank provisions and loan to asset ratio. Bikker and Metzmakers (2005) examine bank provisioning in a wider cross-country context and find a positive relationship for banks in OECD countries but the relationship is not significant for European banks. Packer and Zhu (2012) investigate the loan loss provisioning practices of 240 banks in 12 Asian

economies during the 2000 to 2009 period and find evidence for countercyclical bank provisioning in the Asian region. They also document a positive relationship between bank provisions and loan to asset ratio for banks in South East Asia and a negative relationship for banks in China, India and Japan. Taken together, these studies suggest that the level of bank provisions is influenced by banks' loan to asset composition.

2.3. Bank Provisions and Economic Fluctuation

The behaviour of bank provisions during bad economic times is claimed to exacerbate an existing recession in a country. Laeven and Majnoni (2003) and Bikker and Metzmakers (2005) argue that bank provisioning behaviour is cyclical because it reinforces the current state of the economy. Banks keep relatively higher loan loss provisions during bad economic times because problem loans are relatively higher during such periods, and keep fewer provisions during good economic times because banks have fewer problem loans during such periods, implying that economic fluctuation is an important driver of the level of bank loan loss provisions.

Pain (2003) investigate the factors that explain the increase in the loan loss provisions of major UK banks and find that GDP growth, real interest rates and lagged aggregate lending growth are important predictors of the level of provisions of UK banks. Bikker and Metzmakers (2005) find that non-discretionary loan loss provisions are higher during bad economic times and lower during good economic times. Pool et al (2015) examine how credit risk affects bank lending and the business cycle for banks in 12 OECD countries and find that economic cycle fluctuations and bank lending are important drivers of loan loss provisions. Cummings and Durrani (2016) observe that Australian banks use discretionary provisions to mitigate the impact of fluctuations in lending activities in credit markets. Ozili (2015) find evidence to support the cyclical view showing a negative relationship between bank provisions and economic fluctuations among Nigerian banks. However, it is not clear whether the link between bank provisions and the economic fluctuation is procyclical or countercyclical in the African region.

Furthermore, several emerging country studies focus on the relationship between the macroeconomy and foreign direct investment, exchange rate volatility, bank deposits and money supply (e.g. Mahembe and Odhiambo, 2016; Sehrawat and Giri, 2016; Akhtar et al, 2017, etc), but do not address the link between the macroeconomy and loan loss provisions in Africa. Our study control for economic fluctuation to detect the association between bank provisions (or non-discretionary provisions) and economic fluctuation.

2.4. Bank Provisions and Bank Size

The provisioning decisions of large banks may differ significantly from smaller banks due to political cost and scope of activity reasons. Firm size is commonly used to control for the political cost associated with larger firms because the activities and/or actions of large firms are more likely to attract political/regulatory scrutiny compared to the activities of smaller firms. With regard to activity level, Anandarajan et al (2003) argue that large banks have higher levels of business activities compared to smaller banks and will keep more provisions to compensate for their increased level of business activities, implying a positive relationship between bank size and bank provisions.

Several studies that control for the impact of bank size on bank provisions document conflicting results, for instance, Bushman and William (2012) and Leventis et al (2011) report a negative relationship between bank size and loan loss provisions in their cross-country study. Anandarajan et al (2007) control for bank size in their study while investigating income smoothing, capital management and signalling among Australian banks. They find a positive but insignificant relation for bank size. Similarly, Quttainah et al (2013) control for bank size while investigating the use of loan loss provisions to manage earnings among Islamic banks and find a positive relationship between bank size and bank provisions.

2.5. Investor Protection

Institutional factors such as investor protection can provide additional monitoring on bank managers provisioning discretion to ensure that bank managers' provisioning decisions reflect the true credit risk of banks rather than opportunistic objectives (Fonseca and Gonzalez, 2008; Curcio and Hasan,

2015). Olszak et al (2016) examine the relationship between provisions and the business cycle and the source of such relationship among EU banks, and find that the provisions of listed banks are more procyclical. Also, they observe that stronger investor protection is associated with reduced procyclicality of bank provisions.

In this paper, we argue that banks in environments with strong investor protection have some incentive to report fewer provisions because reporting high provisions could significantly lower bank earnings and reduce value to shareholders. When there is active monitoring, strong investor protection should compel bank managers to find ways to exercise some control over the non-discretionary determinants of bank provisions to avoid reporting excessive loan loss provisions that would significantly lower earnings and reduce value to shareholders (and to minority shareholders), therefore, one would expect that bank provisions should not be too high in countries that have strong investor protection.

3. Data

The sample consist of banking institutions that report data for loan loss provisions during the 2004 to 2013 period from 19 African countries. Bank income statement and balance sheet data are collected from Bankscope database while data for real gross domestic product (Δ GDP) growth rate and investor protection are collected from World Economic Forum and Doing Business indicators archived in the World Bank database. Using the GDP growth variable, we measure a recessionary period as the year(s) when a country has a negative real GDP growth rate, reflecting periods when a country experience economic downturn while we measure economic boom as the year(s) when a country has above-the-median real GDP growth rate, reflecting periods when a country experience economic growth or economic prosperity. The description of data source is provided in Appendix A2.

To be included in the sample, the bank must be domiciled in an African country. Also, to minimise survivorship bias, we did not restrict the sample to banks that had full reporting data for the full period, hence, banks with reporting data for at least 4 consecutive years from 19 countries were

loan portfolio. Non-performing loans (NPL) control for ‘specific provisions’, that is, provisions that banks set aside for actual loan losses (Beaver and Engel, 1996); hence, we expect a positive sign for β_2 coefficient. $\ln\text{LOAN}$ variable controls for the impact of bank lending (or credit supply) on bank loan loss provisions, and we do not have a definite prediction for β_3 coefficient. We take the natural logarithm of LOAN to capture only the non-negative values of loan growth indicating actual bank lending or increase in credit supply. In further test, we use the non-logarithmic value of LOAN variable. Loan to asset ratio (LOTA) captures credit default risk associated with bank loan portfolio. Banks that have excessive loan relative to its asset will face higher credit default risk and will keep higher loan loss provisions to mitigate such credit default risk concern (Bouvatier and Lepetit, 2008); therefore, we expect a positive sign for β_4 coefficient. TA controls for the impact of bank size on bank provisioning behaviour and we predict a positive sign for β_5 coefficient because larger banks have increased level of business activities and should keep higher loan loss provisions to compensate for their increased level of business activities including increased lending activities (Anandarajan et al, 2003). $\ln\Delta\text{GDP}$ is measured as the natural logarithm of GDP growth rate (Bouvatier and Lepetit, 2008), and controls for the behaviour of bank provisioning during periods of economic prosperity. Consistent with the argument of Laeven and Majnoni (2003) and Beatty and Liao (2009), we expect banks to keep fewer provisions during good economic times because credit risk is lower during such periods; therefore, a negative relationship between LLP and $\ln\Delta\text{GDP}$ is expected.

We undertake further tests to determine whether loan loss provisions are influenced by low and high values of each non-discretionary determinant of bank provisions. We introduce ‘NPLD’ variable that equal one if NPL ratio is a double-digit number and zero otherwise, representing periods when banks have significant problem loans. ‘LG’ variable equal one if loan growth (LOAN) is positive and zero when loan growth is negative, representing periods when banks experience increase and decrease lending, respectively. ‘LT’ variable equal one if loan-to-asset ratio (LOTA) is at least 60% and zero otherwise, representing periods when banks face high credit default risk on their loan portfolio. ‘BG’ variable equal one if total asset is above-the-median natural logarithm of total asset and zero otherwise. ‘REC’ variable equal one if ΔGDP is negative and zero otherwise, representing periods of

economic downturns or recessions. ‘BOOM’ variable equal one if ΔGDP is above-the-median ΔGDP growth rate and zero otherwise, representing periods of economic growth or economic prosperity. Finally, the dummies are interacted with the associated main variable to test for any transient effect of the determinants on the level of bank provisions. The model is re-specified in Equation 2 as:

$$\begin{aligned}
 LLP_{it} = & \beta_0 + \beta_1 LLP_{it-1} + \beta_2 NPL_{it} + \beta_3 LOTA_{it} + \beta_4 LOAN_{it} + \beta_5 TA_{it} + \beta_6 \Delta GDP_{jt} \\
 & + \beta_7 NPL_{Dt} + \beta_8 NPL_{Dt} * NPL_{it} + \beta_9 LG_{t} + \beta_{10} LG_{t} * LOAN_{it} + \beta_{11} LT_{t} \\
 & + \beta_{12} LT_{t} * LOTA_{it} + \beta_{13} BG_{t} + \beta_{14} BG_{t} * TA_{it} + \beta_{15} RE_{ct} + \beta_{16} RE_{ct} \\
 & * \Delta GDP_{jt} + \beta_{17} BOOM_{t} + \beta_{18} BOOM_{t} * \Delta GDP_{jt} + e_{it} \dots \dots \dots \text{Equation 2}
 \end{aligned}$$

In the third round of tests, we test whether the level of investor protection has a significant impact on each non-discretionary determinant of bank provisions. Strong investor protection should compel bank managers to find ways to exercise some control over the non-discretionary determinants of bank provisions to avoid reporting excessive loan loss provisions that would significantly lower earnings and reduce value to shareholders (and to minority shareholders), therefore, we expect that bank provisions should not be too high in African countries that have strong investor protection institutions. The investor protection variable employed is the ‘strength of investor protection’ index (INVPRO). The ‘strength of investor protection’ index (INVPRO) measures the strength of minority shareholder protection against the misuse of corporate assets by directors for personal gain. The index is developed based on the methodology of La Porta and others (see. Djankov et al, 2008). INVPRO index ranges from 0 to 10 with higher values indicating stronger minority shareholders rights protection.

The model is re-specified in Equation 3 below:

$$\begin{aligned}
 LLP_{it} = & \beta_0 + \beta_1 LLP_{it-1} + \beta_2 NPL_{it} + \beta_3 LOTA_{it} + \beta_4 LOAN_{it} + \beta_5 TA_{it} + \beta_6 \Delta GDP_{jt} \\
 & + \beta_7 INVPRO_{jt} + \beta_8 INVPRO_{jt} * NPL_{it} + \beta_9 INVPRO_{jt} * LOAN_{it} \\
 & + \beta_{10} INVPRO_{jt} * LOTA_{it} + \beta_{11} INVPRO_{jt} * TA_{it} + \beta_{12} INVPRO_{jt} * \Delta GDP_{jt} \\
 & + e_{it} \dots \dots \dots \text{Equation 3}
 \end{aligned}$$

As the model considers a dynamic adjustment of LLP, the models are estimated with the fixed effect OLS and generalized method of moments (GMM) estimators. The GMM estimation is performed using first difference (Arellano and Bond, 1991) and orthogonal deviation (Arellano and Bover, 1995). The GMM estimations are robust to heteroscedasticity and autocorrelation. For the fixed effect OLS regression, we include the lagged dependent variable to correct for possible serial correlation between the explanatory variables and the error term. These two estimation techniques (OLS and GMM) allow us to test the robustness of the main findings reported in Table 2. Robust standard error correction is also applied to the coefficients of the t-statistics in the fixed effect regression to correct for possible unobservable heteroscedasticity issues. Also, the correlation between the variables in Appendix A1 are sufficiently low to be concerned about multicollinearity in our analyses. Finally, the presence of multiple binary variables require the use of separate regression models to test the interaction effects in the next section.

5. Empirical Result

5.1. Descriptive Statistics

Table 1a&b report the descriptive statistics. In table 1b, LLPs on average are 0.9% of total assets while LLPs are higher for banks in Nigeria, Togo, Tunisia and Angola, and lower for banks in Botswana, Namibia, Mauritius and Uganda, implying that there are substantial differences in the level of bank provisions across African countries. NPLs, on average, are 7.89% of gross loan and is double-digit higher for banks in Egypt (14.07%) and Tunisia (15.01%). The high NPLs suggest that banks in North Africa (Egypt and Tunisia) have lower credit quality possibly due to poor credit risk management practices. Comparatively, NPLs are lower for banks in Namibia and Uganda. Loan growth (LOAN) is about 19.2% but exhibit substantial differences across African countries. For instance, LOANs are much lower for banks in Egypt while other African countries experience a double-digit increase in loan growth over the sample period and are relatively higher for banks in Ghana and Angola. With respect to bank size, total asset (TA) on average is 13.45 and is higher for

banks in Nigeria, South Africa, Egypt, Morocco and Algeria, and lower for banks in Namibia and Uganda, implying that the average bank size in several African countries vary substantially. Δ GDP on average is about 5.7% and is lower for banks in South Africa and Algeria and higher for banks in Ethiopia, Angola and Nigeria, implying that some African countries experience greater economic stability than others during the period of analysis. Overall, the conclusion from the descriptive statistics suggests that there are wide bank-level variations across banks in the African countries examined.

	LLP	lnLOAN	NPL	TA	LOTA	ln Δ GDP
Mean	0.009	2.84	7.89	13.45	52.14	1.60
Median	0.005	2.97	1.64	13.22	52.07	1.64
S.D	0.019	1.04	0.61	1.91	20.31	0.61
Minimum	-0.305	-3.50	0.00	5.00	10.05	-1.46
Maximum	0.222	8.72	23.00	19.12	98.46	0.61
Observation	2438	1952		2575	2555	2965

*S.D - Standard Deviation. Descriptive statistics based on 302 sample banks from 19 countries. Data cover the period 2004 to 2013. LLP = loan loss provision to total asset ratio for firm i at year t. lnLOAN = natural logarithm of change in gross loan outstanding. LOTA = net loan to total asset ratio for firm i at time t. NPL = ratio of non-performing loan to gross loan for firm i at year t. TA = natural logarithm of total asset for firm i at year t. ln Δ GDP = natural logarithm of real gross domestic product growth rate.

Country	Mean LLP	Mean LOAN	Mean TA	Mean LOTA	Mean INVPRO	Mean Δ GDP	Mean NPL	# Banks
Algeria	0.003	19.38	14.17	40.95	5	3.14	5.75	16
Angola	0.008	33.35	13.85	30.76	5.3	10.79	5.73	14
Botswana	0.002	22.54	12.88	56.69	5.4	7.60	9.26	12
Cameroun	0.004	12.24	12.90	49.80	4.3	3.49	8.15	11
Egypt	0.006	9.45	14.91	39.20	3.6	4.52	14.07	16
Ethiopia	0.004	25.69	13.09	46.86	3.3	11.01	7.00	12
Ghana	0.003	31.04	13.12	43.38	6.3	7.43	10.20	15
Kenya	0.0003	22.59	12.47	52.59	5	5.24	10.18	24
Mauritius	0.002	12.39	13.50	53.01	7.7	3.98	4.18	15
Morocco	0.003	11.27	15.50	60.04	3.4	4.43	5.18	18
Namibia	0.002	14.50	13.74	74.17	5.3	5.28	2.99	10
Nigeria	0.010	20.07	15.56	39.25	5.7	8.78	4.92	16
Senegal	0.006	15.48	12.70	60.86	3	3.83	7.31	10
South Africa	0.004	16.95	14.89	62.17	8	3.28	7.75	29
Tanzania	0.007	26.44	12.21	50.06	4.9	6.67	4.06	16
Togo	0.008	23.64	12.41	54.68	3.7	3.53	10.91	7
Tunisia	0.008	12.66	13.26	30.18	4.8	4.05	15.10	26
Uganda	0.002	21.45	11.99	47.99	4.7	7.07	3.71	21
Zambia	0.006	28.97	11.79	37.60	5.3	7.76	9.14	14
Total								302
Mean	0.009	19.21	13.45	52.14	5.18	5.74	4.80	
Median	0.005	15.75	13.22	52.07	5.00	5.17	5.00	
S.D	0.019	23.74	1.91	20.31	1.46	3.91	8.00	
Maximum	0.222	98.57	19.12	98.46	8.00	33.73	1.00	
Minimum	-0.305	-81.60	5.00	20.21	2.70	-1.53	2.29	
Observations	2438	2319	2575	2555	2718	3020	2718	

*S.D - Standard Deviation. Descriptive statistics based on 302 sample banks from 19 countries. Data cover the period 2004 to 2013. LLP = loan loss provision. NPL = ratio of non-performing loans to gross loan. LOTA = net loan to total asset ratio. LOAN = change in gross loan outstanding. INVPRO = protection of minority shareholder right. Δ GDP = real gross domestic product growth rate. TA = natural logarithm of total asset.

5.2. Regression Result

The estimated coefficient of NPL is positive and significant at 1% level and implies that non-performing loan is a significant non-discretionary determinant of loan loss provisions among African banks and this result is robust to alternative econometric estimation. This result is consistent with the findings of Bouvatier and Lepetit (2008) and Ozili (2017) for European banks. LOTA coefficient is positive and significant in all estimation indicating that bank provisioning in Africa is significantly influenced by credit default risk on bank loan portfolio. This finding is consistent with the findings of Bikker and Metzmakers (2005) and Bouvatier and Lepetit (2008) and imply that African bank managers keep higher loan loss provisions when they have high loan to asset ratio in their loan portfolio. The coefficient of the lagged dependent variable is positively significant at 1% level in all estimations, implying that an increase (decrease) in bank provisions in the previous period is followed increase (decrease) in bank provisions in the subsequent period. This might be due to the risky lending environment in Africa as managers will have to incrementally increase loan loss provisions in each period in anticipation of unexpected losses that may arise which may not be detected by the traditional credit risk management tools of African banks. lnLOAN coefficient is negatively significant and is robust to alternative estimation, implying that African banks report fewer loan loss provisions during periods or increased bank lending (or increase loan supply), providing support to Cavallo and Majnoni (2002), Laeven and Majnoni (2003) and Bikker and Hu (2002) who argue that banks that do not anticipate credit risks in periods of increased bank lending will keep fewer loan loss provisions due to their underestimation of credit risk during good times. Bank size (TA) coefficient is negative and weakly significant in Column 3 indicating that bank size have a weak inverse effect on bank provisions. Bushman and William (2012) and Leventis et al (2011) also find a negative sign for the size variable. The insignificant sign for lnΔGDP indicates that the bank loan loss provision is not significantly cyclical with economic boom in the region.

Table 2: Analysis of Non-Discretionary Determinants of Provisions and the Economic Cycle				
		OLS	(Arellano-Bond)	(Arellano-Bover)
		(1)	(2)	(3)
c		-0.004 (-0.27)		
LLPt-1	+	0.271*** (3.44)	0.189*** (4.69)	0.192*** (4.90)
NPL	+	0.0004*** (4.41)	0.0006*** (4.70)	0.0004*** (3.49)
lnLOAN	+/-	-0.0005* (-1.80)	-0.003** (-2.58)	-0.004*** (-3.20)
LOTA	+	0.0003*** (5.67)	0.0007*** (3.63)	0.0005*** (2.70)
TA	+	-0.0004 (-0.39)	-0.004 (-1.51)	-0.007* (-1.90)
INΔGDP	-	-0.0003 (-0.67)	-0.0001 (-0.06)	0.001 (0.06)
Adjusted R ²		78.30	-	-
F-test		17.84	-	-
Durbin Watson		1.94	-	-
Observations		1196	953	953
J-statistic		-	33.13	21.10
P(J-statistic)		-	0.32	0.88
AR(1)		-	0.000	-
AR(2)		-	0.324	-

Regression 1 is based on the method of Bikker and Metzmakers (2005). Regression 2 and 3 are based on Bouvatier and Lepetit (2008). AR(1) and AR(2) are Arellano-Bond tests for first-order and second-order serial correlation. T-statistics are reported in parentheses with ***, **, and * indicating 1%, 5% and 10% significance level respectively. LLP = loan loss provision to total asset ratio for firm i at year t. LLPt-1 = lagged dependent variable. lnLOAN = natural logarithm of change in gross loan outstanding. LOTA = net loan to total asset ratio for firm i at time t. NPL = ratio of non-performing loan to gross loan for firm i at year t. SIZE = natural logarithm of total asset for firm i at year t. lnΔGDP = natural logarithm of real gross domestic product growth rate.

5.3. Sensitivity Analysis

Table 3 report the result for the relationship between bank provisions and low and substantial values of its non-discretionary determinants. NPLD coefficient is positively significant in Column 1 implying that higher (i.e., double-digit or abnormal) NPLs have a positive effect on the level of bank provisions. NPLD*NPL coefficient is negatively significant at 5% level, implying that bank provisions is a negative function of non-performing loans when African banks have double-digit (or high/abnormal) non-performing loans. One possible explanation for this could be that, although banks would normally increase loan loss provisions when they expect more NPLs, there is a non-performing loan threshold above which African banks will not increase provisions any further possibly to avoid eroding net interest margin and/or overall earnings. LG coefficient is positively significant in Column 2 indicating that increase in bank lending (or loan supply) has a significant positive effect on the level

of bank provisions. However, $LG*LOAN$ coefficient is insignificant. LT coefficient is negatively significant in Column 3 implying that higher loan-to-asset ratio has a negative effect on the level of bank provisions in Africa. $LT*LOTA$ coefficient is positively significant, implying that African banks keep higher provisions when they have large loan-to-asset ratio. This result suggests that $LOTA$ is a stronger determinant of bank provisions when African banks have large loan-to-asset ratio, and is robust to our earlier findings. BG and $BG*TA$ coefficients are insignificant to draw any meaningful inference in Column 4. Similarly, $BOOM*\Delta GDP$ and $REC*\Delta GDP$ report insignificant signs in Column 5 and 6, implying that transient states of the macro economy do not have a significant effect on bank provisions in the African region based on the banks and countries examined. One explanation for this might be that non-discretionary loan loss provisions are less sensitive to fluctuations in the economy compared to discretionary provisions.

Table 3: Non-Discretionary Determinants: Interaction Results						
	(1)	(2)	(3)	(4)	(5)	(6)
LLPt-1	0.063 (1.30)	0.023 (0.38)	0.112* (1.93)	0.129** (2.39)	0.089* (1.67)	0.072 (1.32)
NPL	0.001** (2.13)	0.00003 (0.14)	0.0002 (0.73)	0.0002 (1.14)	0.0001 (0.45)	0.0001 (0.28)
LOTA	0.0009*** (4.31)	0.001*** (4.27)	0.0008*** (2.73)	0.001*** (4.14)	0.0009*** (4.62)	0.001*** (5.18)
LOAN	-0.0002*** (-3.50)	-0.0006 (-1.58)	-0.0002*** (-3.30)	-0.0001** (-2.34)	-0.0001** (-2.32)	-0.0002*** (-2.67)
TA	-0.013*** (-3.30)	-0.017*** (-3.98)	-0.010** (-2.59)	-0.004 (-0.75)	-0.009** (-2.26)	-0.017*** (-2.67)
ΔGDP	-0.0001 (-0.11)	-0.00005 (0.06)	-0.0002 (-0.36)	-0.0001 (-0.19)	-0.0007 (-0.91)	-0.0003 (-0.41)
NPLD	0.007 (1.23)					
NPLD*NPL	-0.002** (-2.16)					
LG		0.012* (1.74)				
LG*LOAN		0.0003 (0.72)				
LT			-0.128*** (-3.33)			
LT*LOTA			0.002*** (3.42)			
BG				-0.085 (-0.63)		
BG*TA				0.005 (0.45)		
BOOM					0.004 (0.49)	
BOOM*ΔGDP					0.0001 (0.09)	
REC						-0.008 (-0.64)
REC*ΔGDP						0.007 (0.89)
J-Statistic	23.94	24.51	29.43	28.11	23.70	23.32
Prob (J-Statistic)	0.68	0.65	0.39	0.46	0.69	0.71
AR(1)	0.000	0.000	0.000	0.000	0.001	0.000
AR(2)	0.155	0.018	0.899	0.302	0.444	0.449

Regression is based on GMM first difference regression based on Arellano and Bond (1991). T-statistic are reported in parentheses with ***, **, and * indicating 1%, 5% and 10% significance level, respectively. LLPt-1 = one-year lagged loan loss provision to total asset ratio for firm i at year t-1. LOAN = change in gross loan outstanding. LOTA = net loan to total asset ratio for firm i at time t. NPL = ratio of non-performing loan to gross loan for firm i at year t. TA = natural logarithm of total asset for firm i at year t. ΔGDP = real gross domestic product growth rate at time t. NPLD = dummy variable that takes the value 1 when NPL ratio is a double-digit number and zero otherwise. LG = dummy variable that takes the value 1 when loan growth is positive and zero otherwise. LT = dummy variable that takes the value 1 when loan-to-asset ratio (LOTA) ratio is above 60% and zero otherwise. BG = dummy variable that takes the value 1 when bank total asset is above-the-median natural logarithm of total asset ratio and zero otherwise. REC = dummy variable that takes the value of 1 during periods of economic downturns, that is, periods with negative ΔGDP growth rate, and zero otherwise. BOOM = dummy variable that take the value of 1 for periods of economic prosperity, that is, periods with above-the-median ΔGDP growth rate, and zero otherwise.

Table 4 report the result for the impact of investor protection on the determinants of bank provisions. Of all the interaction terms, only INVPRO*LOAN coefficient is negatively significant indicating that higher bank lending is associated with fewer bank provisions in African countries with strong investor protection. This implies that the presence of strong investor protection does not mitigate banks' underestimation of loan loss provisions (or expected credit risk) during periods of increased lending. INVPRO coefficient reports a positive sign in all regression estimation, implying that strong investor protection has a positive effect on the level of loan loss provisions among African banks in the region, and this effect is significant in Column 3.

	(1)	(2)	(3)	(4)	(5)
LLPt-1	-0.029 (-0.39)	-0.027 (-0.41)	0.052 (0.62)	-0.023 (-0.33)	-0.022 (-0.33)
NPL	-0.00004 (-0.03)	0.0006*** (2.99)	0.0008*** (2.90)	0.0006*** (2.99)	0.0006*** (2.81)
LOTA	0.001*** (4.29)	0.001* (1.90)	0.0001*** (5.08)	0.0009*** (4.60)	0.0009*** (4.47)
LOAN	-0.0002* (-1.84)	-0.0002** (-2.03)	0.001*** (3.56)	-0.0002* (-1.94)	-0.0002* (-1.88)
TA	-0.029*** (-3.20)	-0.028*** (-3.08)	-0.022** (-2.33)	-0.028* (-1.74)	-0.028*** (-2.83)
ΔGDP	-0.0002 (-0.31)	-0.0002 (-0.25)	-0.001 (-1.36)	-0.0001 (-0.15)	0.0006 (0.23)
INVPRO	0.009 (1.04)	0.010 (0.98)	0.021*** (2.93)	0.008 (0.24)	0.007 (1.16)
INVPRO*NPL	0.0002 (0.64)				
INVPRO*LOTA		-0.00003 (-0.31)			
INVPRO*LOAN			-0.0002*** (-4.11)		
INVPRO*TA				-0.00005 (-0.02)	
INVPRO*ΔGDP					-0.0001 (-0.23)
J-statistic	19.77	18.60	20.81	18.64	18.12
Prob(J-statistic)	0.87	0.91	0.83	0.90	0.92
Regression is based on GMM first difference regression based on Arellano and Bond (1991). T-statistics are reported in parentheses with ***, **, and * indicating 1%, 5%, and 10% significance level, respectively. All bank-level variables remain as previously defined. INVPRO = minority shareholders right protection. Higher values indicate greater minority shareholders' right protection.					

In an additional test, we check whether the behaviour of each non-discretionary provisions determinant is influenced by transient economic conditions - economic boom and recession. We interact the determinants with the economic boom and recession variables. Table 5 report the results. Of all the interaction terms, BOOM*LOAN coefficient is positively significant, implying that higher

bank lending is positively associated with higher bank provisions during economic prosperity or boom.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
LLPt-1	0.089 (1.31)	0.025 (0.37)	0.021 (0.27)	-0.021 (-0.29)	0.050 (0.68)	0.018 (0.24)	0.020 (0.28)	0.036 (0.57)
NPL	0.0004** (1.98)	0.0006*** (2.79)	0.0005** (2.21)	0.0003 (1.41)	0.0003 (1.45)	0.0005** (2.51)	0.0004** (1.98)	0.0003* (1.66)
LOTA	0.0008*** (4.05)	0.0008*** (3.89)	0.0002*** (2.78)	0.0009*** (3.42)	0.0008*** (3.85)	0.0009*** (4.03)	0.0009*** (4.29)	0.0008*** (3.77)
LOAN	-0.0001 (-1.28)	-0.0001** (-1.98)	-0.0002** (-2.44)	-0.0002** (-2.27)	-0.0002* (-1.82)	-0.0002** (-2.30)	-0.0001** (-2.22)	-0.0002** (-1.99)
TA	-0.021* (-1.85)	-0.028*** (-3.33)	-0.034*** (-3.66)	-0.027** (-2.47)	-0.022* (-1.95)	-0.034*** (-3.13)	-0.0249*** (-3.17)	-0.022** (-2.04)
Δ GDP	-0.0002 (-0.22)	-0.0002 (-0.82)	0.00005 (0.06)	0.00002 (0.02)	0.0003 (0.33)	0.0003 (0.44)	-0.0002 (-0.34)	0.00009 (0.13)
REC	-0.012 (-1.15)			-0.014 (-1.18)	0.004 (0.46)			0.004 (0.34)
BOOM		0.007** (2.02)	-0.004 (-0.70)			0.004 (1.08)	0.013 (1.22)	
REC*NPL	0.0009 (1.50)							
BOOM*NPL		-0.0002 (-0.82)						
BOOM*LOAN			0.0003** (2.52)					
REC*LOAN				0.0003 (1.31)				
REC*TA					-0.00001 (-1.18)			
BOOM*TA						0.00003 (0.69)		
BOOM*LOTA							-0.0001 (-0.71)	
REC*LOTA								-0.0001 (-0.54)
J-Statistic	19.88	20.43	22.42	19.50	18.49	17.12	20.23	20.56
Prob (J-Statistic)	0.86	0.84	0.76	0.88	0.91	0.94	0.85	0.84

Regression is based on GMM first difference regression based on Arellano and Bond (1991). Regression is based on GMM first difference regression based on Arellano and Bond (1991). T-statistics are reported in parentheses with ***, **, and * indicating 1%, 5% and 10% significance level, respectively. All bank-level variables remain as previously defined. Δ GDP = change in real gross domestic product at time t. REC = dummy variable that takes the value of 1 for recessionary periods or economic downturns, that is, periods with negative Δ GDP growth rate, and zero otherwise. BOOM = dummy variable that take the value of 1 for periods of economic prosperity, that is, periods with above-the-median Δ GDP growth rate and zero otherwise.

5.4. Country-Specific Analysis

In order to analyse the differences in the non-discretionary determinants of bank provisions across countries and to pinpoint the bias of estimations that do not control for other unobservable country differences, we replicate the initial analysis separately for each African country in the sample. To do this, we re-estimate the main model and include the real gross domestic product growth rate variable to control for economic fluctuation in each African country and to detect whether bank provisions exhibit procyclical behaviour in each African country.

Table 6 report the results. As can be observed, a positive relationship between NPL and LLP is observed for 15 countries (Algeria, Angola, Botswana, Cameroun, Egypt, Mauritius, Morocco, Namibia, Nigeria, Senegal, South Africa, Tanzania, Togo, Tunisia and Zambia). Of these, the relationship between NPL and LLP is only significant for 8 African countries (Algeria, Angola, Egypt, Ghana, Morocco, Nigeria, Tanzania and Togo), implying that non-performing loan is a key driver of loan loss provisions for banks in the West African and North African region. The relationship between non-discretionary provisions (LLP) and loan growth (LOAN) is negatively significant for 4 African countries (Algeria, Botswana, Namibia and Tanzania) and positive but not significant for 10 African countries (Angola, Cameroun, Egypt, Mauritius, Nigeria, Senegal, South Africa, Tunisia, Uganda and Zambia). Also, the relationship between LLP and LOTA is positive for 13 countries (Algeria, Cameroun, Egypt, Ethiopia, Ghana, Kenya, Mauritius, Morocco, Namibia, Nigeria, Tanzania, Uganda, and Zambia) and is significant for banks in Algeria, Cameroun, Ethiopia and Nigeria. Furthermore, the link between LLP and Δ GDP is observed to be countercyclical in 3 African countries (Togo, Namibia and Algeria) and procyclical in Morocco while having a weak link for other African countries.

Overall, the results show that the non-discretionary determinants of bank provisions differ across African countries and these differences could be explained by the (i) several unobservable country-specific differences in the accounting for loan loss provisions in each country, (ii) bank regulator's provisioning guidelines for domestic banks and (iii) specific risk factors in the business environment that have a unique impact on the behaviour of loan loss provisions for banks across African countries. Also, government interference in bank lending which is common in African countries can also influence the behaviour of bank provisions in the region. Government interference in the form of guaranteeing bank loans to risky sectors will make banks keep fewer loan loss provisions for highly risky assets which could give rise to massive non-performing loans in the event of economic shocks. For instance, in South Africa, bank regulators in 2004 require major banks in South Africa to include eligible provisions to Tier II capital which include specific provisions, partial write-offs, country risk provisions and general provisions; and periodic adjustments to eligible provision would affect the

relationship between provisions and NPL, CAR and LOTA. In 2010, a PriceWaterCoopers (2010) report states that a significant reduction in bank loan loss provisions contributed to increased profitability of the biggest four banks in South Africa (PWC, 2010)⁵, indicating manipulation of provisions for earnings management. In Nigeria, bank regulators require banks to provide two provisions estimates: IFRS and prudential provisions estimates, and compare the two estimates. If prudential provisions estimates are greater than IFRS provisions estimates, the difference is transferred from the general reserve account to a non-distributable regulatory reserve account. If prudential provision estimates are less than IFRS provisions estimates, the difference is transferred from the regulatory reserve account to the general reserve account to the extent of the non-distributable reserve previously recognized (CBN, 2010), these specific requirements also affects the relationship between provisions and NPL, CAR and LOTA⁶.

In Kenya, the IMF warned that Kenyan banks kept too few provisions because there was government guarantee on bank loans to the construction industry. Government guarantee for risky bank lending to the construction industry gives rise to significant NPLs for Kenyan banks when losses materialise, and the effect of such government guarantee on loans would weaken the expected positive relationship between loan loss provisions and non-performing loan.⁷ For Mauritius, in 2014, bank regulators in Mauritius require external auditors to submit an opinion to each Mauritian bank on whether their loan loss provisions estimates are adequate.⁸ For inclusion in tier 2 capital, banks are required to include loan loss provisions (or reserves) for future losses in the determination of Tier 2 capital.⁹ In Uganda, bank supervisors require banks to set aside specific provisions regardless of whether a subjective or objective criteria was used in determining the classification. In addition to specific provisions, banks are required to maintain a general loan loss provision of at least 1% of their total outstanding loan

⁵ The big 4 banks are Absa, FirstRand, Nedbank and Standard Bank. PriceWatersCooper (PWC) report is available at: <https://www.pwc.co.za/en/assets/pdf/major-banks-analysis-march-2011.pdf>

⁶

http://www.cenbank.org/OUT/2010/PUBLICATIONS/BSR/PRUDENTIAL%20GUIDELINES%2030%20JUNE%202010%20FINAL%20%20_3_.PDF

⁷ <http://www.businessdailyafrica.com/IMF-says-Kenyan-banks-exposed-to-bad-loans-danger/-/539552/2613532/-/apcc8h/-/index.html>

⁸ https://www.bom.mu/sites/default/files/Guideline_BaselIII.pdf

⁹ https://www.bom.mu/sites/default/files/Guideline_BaselIII.pdf

facilities net of specific provisions and interest in suspense.¹⁰ In Namibia, bank regulators in Namibia require banks to determine provisions estimate using the IAS 39 and prudential rules measurement techniques, and additional specific provisioning should be raised to eliminate any shortfall between the two techniques.¹¹ In Algeria, public sector lending institutions take a conservative approach in provisioning, and tend to be cautious when writing-off NPLs to avoid being perceived as ‘mismanagement of bank loans’ under the Algerian Criminal Code; therefore, bank managers will be overly-cautious in writing off NPLs by increasing provisions¹².

Taken together, these issues confirm that the determinants of provisions for African banks are influenced by multiple factors other than credit risk factors alone, and these factors (which include managerial provisioning decisions, differences in regulatory guidelines on bank provisioning, differences in the accounting for bank loan loss provisions across countries in Africa, etc.) underline the peculiarity of the banking system in each African country, and should be taken into account when investigating bank provisioning practices in Africa. Apart from the seven (7) African countries discussed above, information for the bank loan loss provisioning practices for other African countries is not publicly available, remotely.

To sum up, the differences in the determinants of non-discretionary provisions across each country in Table 6 highlights the fact that the results obtained from the full sample (see Table 2) only reflect average determinants of non-discretionary provisions which vary among banks and across African countries. Moving forward, the cross-country result underline the importance of studying country-specific factors that directly or indirectly influence the level of bank loan loss provisions in any regional analysis.

¹⁰ https://www.bou.or.ug/bou/bou-downloads/acts/supervision_acts_regulations/FI_Regulations/FI_CreditClassificationRegulatns2005.pdf

¹¹ <https://www.bon.com.na/CMSTemplates/Bon/Files/bon.com.na/1d/1df704cc-a2e7-4764-bc10-6246f540e187.pdf>

¹² https://www.imf.org/~media/Websites/IMF/imported-full-text-pdf/external/pubs/ft/scr/2014/_cr14161.ashx

Country	β_0	LLPt-1	NPL	LOAN	LOTA	TA	Δ GDP	Adj R ²
Algeria	0.063*** (7.21)	0.045 (1.10)	0.0008*** (13.31)	-0.00001*** (-3.41)	0.0003*** (4.89)	-0.006*** (-11.25)	0.002*** (6.97)	98.24
Angola	-0.005 (-0.17)	-0.050 (-0.34)	0.0006*** (2.78)	0.00007 (1.53)	-0.00001 (-0.09)	0.0005 (0.23)	-0.0002 (-0.84)	48.42
Botswana	0.016 (1.06)	0.128 (0.95)	0.0002 (1.16)	-0.00004* (-1.68)	-0.00004 (-0.01)	-0.001 (-1.05)	0.00006 (0.67)	88.87
Cameroun	-0.297* (-1.75)	0.345 (1.25)	0.0007 (1.29)	0.00005 (0.47)	0.0008** (2.28)	0.021* (1.63)	-0.003 (-1.42)	80.16
Egypt	-0.096 (-1.43)	0.092 (0.54)	0.001*** (3.44)	0.00009 (1.52)	0.0003 (1.39)	0.004 (1.15)	0.00005 (0.01)	56.31
Ethiopia	0.029 (0.32)	-0.701* (-1.66)	-0.0005 (-0.63)	-0.0002 (-1.17)	0.0006** (2.22)	-0.002 (-0.39)	-0.0009 (-0.68)	46.37
Ghana	0.041** (2.05)	0.019 (0.15)	-0.0002** (-2.17)	-0.00005 (-1.26)	0.00006 (0.83)	-0.003** (-2.22)	0.0003 (1.15)	23.20
Kenya	0.009** (2.17)	-0.227* (-1.69)	-0.00002 (-1.25)	-0.00001 (-0.64)	0.00001 (0.07)	-0.0007* (-1.92)	0.00003 (0.06)	6.06
Mauritius	0.012* (1.91)	-0.157 (-1.12)	0.00007 (0.72)	0.00001 (0.35)	0.00004 (1.16)	-0.001** (-2.23)	0.0004 (1.49)	33.18
Morocco	-0.115** (-2.48)	0.170*** (3.25)	0.0006*** (2.90)	-0.00002 (-0.46)	0.00008 (0.65)	0.007** (2.55)	-0.0006** (-2.25)	85.70
Namibia	0.008* (1.94)	0.146 (0.93)	0.00002 (0.28)	-0.00002* (-1.86)	0.00001 (0.37)	-0.0006* (-1.74)	0.0002** (2.31)	33.79
Nigeria	0.180 (1.41)	-0.249** (-2.25)	0.002*** (3.84)	0.00001 (0.05)	0.0007* (1.74)	-0.012 (-1.63)	-0.002 (-1.42)	49.87
Senegal	-0.001 (-0.04)	0.473*** (2.59)	0.0004 (0.91)	0.00009 (0.98)	-0.0002 (-1.23)	0.001 (0.51)	0.00003 (0.04)	27.89
South Africa	0.040 (1.45)	0.351*** (2.70)	0.00004 (0.19)	0.00008 (1.52)	-0.0002 (-1.51)	-0.002 (-1.05)	-0.0002 (-0.65)	44.09
Tanzania	0.031 (1.12)	-0.213 (-1.38)	0.001*** (3.31)	-0.0001** (-2.39)	0.0001 (0.83)	-0.003 (-1.11)	0.0004 (0.54)	60.21
Togo	0.005 (0.11)	-0.346*** (-2.76)	0.001*** (3.33)	-0.0001 (-1.66)	-0.0002 (-0.77)	-0.0009 (-0.27)	0.004** (2.08)	64.72
Tunisia	0.032* (1.67)	0.260*** (4.03)	0.00007 (1.15)	0.00009 (0.90)	-0.00003 (-1.11)	-0.003*** (-2.76)	0.0002 (1.43)	52.89
Uganda	0.006 (0.46)	-0.098 (-0.37)	-0.00003 (-0.11)	0.00001 (0.58)	0.00009 (0.84)	-0.0008 (-0.67)	0.00007 (0.34)	1.20
Zambia	0.086** (2.49)	0.076 (0.23)	0.0002 (1.00)	0.00003 (0.45)	0.00006 (0.39)	-0.007*** (-2.68)	0.0002 (0.11)	3.24

Note: OLS regression with bank fixed effects and robust standard error correction is applied.

5.5. Further Robustness Checks

One, we address concerns that differences in the level of financial sector development may affect our result. Some African countries have a well-developed financial sector than other African countries and these differences may impact the non-discretionary determinants of bank provisions in the region. We divided the full sample into two country subsample: financially-developed African countries (which are Mauritius, South Africa, Nigeria and Kenya) and less financially-developed African countries (consisting of the remaining African countries). The result is reported in Table 7 and show that bank lending (lnLOAN) remain a key driver of non-discretionary provisions across all estimations in the two subsample while bank size is positively associated with non-discretionary provisions for banks in financially-developed African countries. The coefficient of the remaining variables report mixed signs.

Two, for the main result we remove the natural logarithm of GDP growth rate ($\ln\Delta\text{GDP}$) and loan growth ($\ln\text{LOAN}$) and replace it with the absolute values of both variables (ΔGDP and LOAN) and re-estimate Equation 1. The results remain the same with NPL, LOAN and LOTA coefficients remaining significant; hence, we excluded the analysis but retained the results in Table 2 because it is similar to the method of Bouvatier and Lepetit (2008, 2012). Finally, as an alternative proxy for economic prosperity, we use a dummy variable that equal one if GDP growth rate is a non-negative number rather than above-the-median GDP and the results remain the same.

	(A) More Financially Developed African Countries			(B) Less Financially Developed African countries		
	Fixed Effect OLS	GMM (Arellano- Bond)	GMM (Arellano- Bover)	Fixed Effect OLS	GMM (Arellano-Bond)	GMM (Arellano-Bover)
	(1)	(2)	(3)	(4)	(5)	(6)
C	0.032 (1.57)			0.036 (1.47)		
LLPt-1	0.259** (2.08)	-0.193*** (-3.53)	0.012 (0.22)	0.024 (0.03)	0.203*** (5.39)	0.219*** (4.79)
NPL	0.0005*** (3.54)	0.0005** (2.11)	-0.001*** (-5.63)	0.0005*** (3.38)	-0.0004*** (-3.02)	-0.0002* (-1.71)
$\ln\text{LOAN}$	0.016*** (4.89)	0.082*** (8.80)	0.106*** (18.38)	0.032*** (3.93)	0.048*** (4.05)	0.032** (2.12)
LOTA	0.00004*** (8.46)	0.0003 (0.56)	0.00001 (0.32)	-0.0006*** (-2.98)	-0.001** (-2.55)	-0.0007 (-1.33)
TA	-0.017*** (-4.67)	-0.119*** (-12.39)	-0.144*** (-19.10)	-0.030*** (-3.68)	-0.024*** (-2.96)	-0.018* (-1.66)
$\ln\Delta\text{GDP}$	0.0002 (0.97)	-0.0005 (-0.82)	-0.0004 (-0.78)	-0.0002 (-1.40)	0.0001 (0.25)	0.00003 (0.12)
Adjusted R ²	86.18	-	-	40.88		
F-test	35.11	-	-	4.48		
Durbin Watson	1.82	-	-	1.84		
Observations	515	434	953	903	737	737
J-statistic	-	25.27	29.58	-	32.00	34.44
P(J-statistic)	-	0.71	0.49	-	0.36	0.26

T-statistics are reported in parentheses with ***, **, and * indicating 1%, 5% and 10% significance level, respectively. LLP = loan loss provision to total asset ratio for firm i at year t. LLLPt-1 = lagged dependent variable. $\ln\text{LOAN}$ = natural logarithm of change in gross loan outstanding. LOTA = net loan to total asset ratio for firm i at time t. NPL = ratio of non-performing loan to gross loan for firm i at year t. SIZE = natural logarithm of total asset for firm i at year t. $\ln\Delta\text{GDP}$ = natural logarithm of real gross domestic product growth rate. The regression in (A) performed by pooling together all banks in financially developed African countries which include Mauritius, Kenya, South Africa and Nigeria, while the regression in (B) is done by pooling together all other banks except banks in Mauritius, Kenya, South Africa and Nigeria.

6. Conclusion

This study investigate the non-discretionary determinants of bank loan loss provisions in Africa. Using a sample of banks from 19 African countries, the findings indicate that non-performing loans, loan-to-asset ratio and loan growth are significant non-discretionary determinants of bank loan loss provisions in the African region. Additionally, the findings show that increase in loan loss provision is a positive function of non-performing loans up to a threshold beyond which loan loss provisions will no longer increase as non-performing loans increases. Also, bank loan-to-asset ratio is observed to be a more significant driver of bank loan loss provisions when banks have higher loan-to-asset ratios. More so, we observe that increase in bank lending leads to fewer loan loss provisions in African countries with strong investor protection while higher bank lending is associated with higher bank provisions during economic boom. Furthermore, the study reveals that country-specific differences matter in explaining the non-discretionary determinants of bank loan loss provisions. To sum up, apart from the relevance of using theoretical non-discretionary determinants of bank provisions, this paper highlights the relevance of minority shareholder rights protection, fluctuating economic conditions and national characteristics (both observable and unobservable non-discretionary factors) that may influence the level of bank loan loss provisions in the African region.

The policy implication of the study is that bank loan loss provision in Africa is not procyclical with fluctuating economic conditions, therefore, bank supervisors in African countries should encourage banks to adopt a forward-looking provisioning system in anticipation of bad times while ensuring that bank managers comply with existing institutional constraints aimed at protecting investors.

For the purpose of policy evaluation, if one goal of national bank supervisors in the African region is to ensure that bank loan loss provisioning is driven by its non-discretionary determinants (as opposed to its discretionary determinants), then the findings in this paper show that this goal has been achieved. We recommend that national bank supervisors in the African region should increase their surveillance of the loan loss provisioning practices of banks across African countries to ensure that each African bank has sufficient loan loss provisions to act as buffers to mitigate the mounting non-performing loan problems in the banking sector in several African countries. Also, there is the need to

improve the level of investor protection in the region which could provide additional monitoring and discipline on the way bank managers influence (or manipulate) loan loss provision estimates.

One limitation of the study is that we do not examine all the unique factors affecting loan loss provision for banks in each African country. Another limitation is that we do not examine the link between loan loss provisions and other macroeconomic factor such as inflation, exchange rate, etc.

Going forward, the implication of our study for future research is the need to provide additional insight on the link between bank loan loss provisions and other macroeconomic indicators. We focused on the link between loan loss provisions and changes in GDP as a proxy for macroeconomic fluctuation. Future research could analyse how loan loss provisions relate to other macroeconomic indicators in the African region such as unemployment, inflation, etc.

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Appendix

A1: Correlation Matrix												
	LLP	LOAN	LOTA	TA	Δ GDP	INVPRO	LG	LT	BIG	NPLD	BOOM	REC
LLP	1.000	0.041	0.060	-0.031	-0.079	0.194	-0.062	0.046	-0.068	0.307	-0.076	0.076
LOAN	0.041	1.000	0.019	-0.179	0.294	-0.001	0.494	-0.053	-0.147	-0.161	0.251	-0.092
LOTA	0.060	0.018	1.000	0.012	-0.208	0.062	0.225	0.799	0.012	-0.096	-0.134	0.055
TA	-0.031	-0.179	0.012	1.000	-0.199	0.238	-0.011	0.095	0.759	-0.157	-0.227	0.072
Δ GDP	-0.079	0.294	-0.208	-0.199	1.000	-0.214	0.080	-0.208	-0.113	-0.043	0.704	-0.341
INVPRO	0.195	-0.001	0.062	0.238	-0.214	1.000	-0.007	0.124	0.073	-0.081	-0.129	0.207
LG	-0.063	0.494	0.226	-0.011	0.080	-0.007	1.000	0.131	-0.014	-0.146	0.080	-0.085
LT	0.046	-0.053	0.799	0.095	-0.208	0.123	0.131	1.000	0.071	-0.049	-0.165	0.054
BIG	-0.068	-0.147	0.012	0.759	-0.113	0.073	-0.014	0.071	1.000	-0.142	-0.153	0.001
NPLD	0.307	-0.160	-0.095	-0.157	-0.043	-0.080	-0.146	-0.049	-0.142	1.000	-0.016	0.022
BOOM	-0.076	0.250	-0.134	-0.226	0.704	-0.129	0.080	-0.165	-0.154	-0.016	1.000	-0.155
REC	0.076	-0.092	0.056	0.073	-0.340	0.208	-0.086	0.054	0.001	0.021	-0.155	1.000

A2: Data Source	
Indicator	Source
Loan Loss Provision (LLP)	Bankscope Database
Net loan to total asset (LOTA)	Bankscope Database
Real Gross Domestic Product (Δ GDP)	World Economic Forum archived in World Bank database
Total asset (TA)	Bankscope Database
Loan growth (LOAN)	Bankscope Database
Non-performing loan (NPL)	Bankscope Database
Minority Shareholder Right Protection (INVPRO)	Doing Business Indicator in the World Bank database