Can Credit Reference Bureaus Mitigate Commercial Banks' Non-Performing Loans? Lesson from Tanzania

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Abstract

Creditors in Tanzania have been experiencing a problem of non-performing loans for a long time. Bank of Tanzania being the key regulator of financial sector confirmed the adoption of credit reference bureau in 2012 following the trust gained for these bureaus in addressing non-performing loans in different places around the world. The direction of this study is, therefore, to assess whether credit reference bureaus can mitigate commercial banks' non-performing loans for the case of Tanzania. The study used panel data with in-depth information from all commercial banks in Tanzania. The results indicate that credit information pulled from credit reference bureau for credit decision is a good predictor of non-performing loans among commercial banks with a negative relationship. This suggests that information shared from credit reference bureaus have a wider possibility of reducing non-performing loans among commercial banks in Tanzania. On gauging the direct effects of information usage by commercial banks in mitigating credit risks, the study found that information about customers onboarding, screening loan applications, credit risk hedging, and loan repayment follow-ups relate negatively and significantly to non-performing loans. This outcome indicates that credit reference bureau is reliable in managing credit risks among commercial banks. Finally, the results show that bank specific factors particularly capital adequacy ratio and returns on assets significantly account for pronounced non-performing loans in Tanzania. Thus, to reduce non-performing loans Bank of Tanzania has to increase control of commercial banks in provision of credit services. Also, commercial banks have to work harmoniously with credit reference bureaus in exchanging and using credit information to reduce moral hazard and adverse selection. In addition, commercial banks must regularly evaluate their credit performance in relation to bank specific factors such as capital adequacy ratio and returns on assets.

Key Words: Non-performing Loans; Credit Reference Bureaus; Commercial banks; Bank of Tanzania

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1.0 Introduction

The commercial banks' earnings and financial position depend more on the issuance of loans. However, bank loans have been the main source of credit risks. Financial institutions worldwide must impress the best credit risk management practices to avoid non-performing loans (NPL) (Bikker et al. 2005). The IMF report (2007) and World Bank report (2018) demonstrate that the non-performing loans varies considerably amongst countries, ranging from 0.2% for Australia to 26.5% for Egypt in 2002-2006. Non-performing loans in Tanzania averaged 7.89% from 2010 to 2018, with a maximum of 11.52% in 2017 while the world's average based in 129 countries during the same period is 6.78%, which is relatively lower than that of Tanzania. Non-performing loans is, therefore, one of the major causes of financial losses experienced by financial institutions in Tanzania

Lack of credit information sharing has created an environment for asymmetry of credit information, resulting in adverse selection and moral hazard problems. The financial institutions must identify mechanisms to collect and store information concerning borrowers who are not only credit-worthy but also with good credit histories. Ng'ang'a (2015) noted that uncertainty encountered by commercial banks in the lending process is mainly related to borrowers' characteristics. Thus, information sharing is expected to minimize the problem of information asymmetry between banks and borrowers, thereby reducing NPL. This necessitates having an appropriate risk management mitigation strategy such as Credit Reference Bureaus (CRB). It is widely agreed that the financial institutions should improve their capabilities of management of non-performing loans during lending process by using CRB' information-sharing mechanisms (Osoro et al. 2015).

The CRB was formed first in USA (1906) followed by Germany (1934), France (1946), Italy, Spain and Belgium (1960s). In Africa, west African countries, mainly the French colonies, were the earliest adopters of CRB system in 1962. In East Africa, Uganda was the first country to adopt CRB in 2008 (Ngunjiri, 2012; Alloyo, 2013). In Tanzania, CRB framework was initially established under the Bank of Tanzania (BOT) Act of 2006. This was progressed by publication of BOT's CRB regulations in 2010 and licensing CRBs operations in 2012. Two privately owned companies, Dun & Bradstreet Credit Bureau Tanzania Limited and CreditInfo Tanzania, were licensed, with CreditInfo selected to set up a Credit Reference Databank System (BOT, 2013). In Tanzania, CRB was designed to collect and provide credit data on the payment record of clients of all banks, financial institutions, savings and credit schemes and other entities in the lending business.

Despite the relevance of credit reference bureaus in controlling credit risks in the world, most of the empirical works analyzed the effects of macroeconomic factors and bank specific factors on non-performing loans (Goyal *et al*., 2023; Mutaba *et al*., 2017; Salas *et al*., 2024; and Klein, 2013). These studies did not specifically attempt the question of whether CRB mitigates commercial banks' NPL. Globally, rare studies traced the link between CRB information sharing and NPL (Guérineau *et al*., 2018; Loaba *et al*., 2019; Hoang *et al*., 2018; Fosu *et al*., 2020; Kusi *et al*., 2017). But most of these scholars did not explicitly examine usability of CRB shared information by the commercial banks in the lending process and its effects on NPL. This study, therefore, bridges this gap in literature by analyzing the relevance of CRB in mitigating non-performing loans in Tanzania.

The rest of this paper is organized as follows: section 2 is literature review; section 3 is methodology; section 4 presents findings; and section 5 gives concluding remarks and policy suggestions.

2.0 Literature Review

2.1 Theoretical Review

Credit reference bureaus are responsible for collection of personal financial data from financial institutions covering a wide range of information that are used by a potential lender in reaching credit decisions on whether one is a good or bad credit risk. CRBs' reports help to identify malpractices in the banking activities and minimize the problem of information asymmetry between banks and borrowers (Segihanga, 2022). Banks tend to load a risk premium to borrowers due to lack of customer information; in turn increasing costs of borrowing, as repayment of loans goes up, eventually translating to high level of default. Triki and Gajigo (2014) believe that information sharing bureaus can be essential tools to reduce information-related issues in the credit markets.

Pagano and Jappelli (1993) proposes that adverse selection would be reduced through credit information sharing among financial institutions. Information asymmetry creates a problem among lenders in distinguishing good from bad borrowers. Markets with information sharing among creditors improve bank profitability and lower default rates (Houston et al., 2010). Borrower's default more due to lack of adequate information to govern decisions during lending process; as a result, lenders encounter financial crises due to NPL. CRBs all over the world go with the motive to feed credit service providers decent credit information that guarantee avoidance of adverse selection.

The moral hazard theory is built on the stand that borrowers tend to default unless there are consequences for their future credit applications. This theory put forward two approaches to resolve the problem. The first is directed at the involvement of regulatory agencies that, in one way or another, can be used in setting operation standards. The second is the use of hostage mechanisms in supporting asymmetric information exchange, including the use of collaterals (Mishkin, 2004). Due to moral hazard, loan defaulters have been creating a danger of financial crisis among financial institutions. The commercial banks are, therefore, obliged to adopt CRB model as the essence of monitoring behaviors of clients to avoid loan defaulting. Jappelli and Pagano (1993) emphasis that information sharing institutions can lessen borrowers' moral hazard and boost borrowers' incentives to repay the loans because information sharing motivates debtors to behave.

Adverse selection and moral hazard negatively affect banking sector by reducing efficiency in provision of credit and causing NPL (Freixas & Rochet, 1997; Jappelli & Pagano, 2002; Stiglitz & Weiss, 1981). However, it is likely that with CRB being in place, financial services providers can similarly experience loan defaults. This should be checked on grounds of credit information sharing practicability in the economy as a function of many actors in the credit market. Hoang et al. (2022) argued that due to lower level of asymmetric information between lenders and borrowers in the presence of information sharing mechanisms such as CRB, NPLs are less likely to reflect moral hazards and adverse selection, but rather bad luck or systematic failure due to economic distress.

2.2 Empirical Review

Goyal et al. (2023) investigated what causes non-performing loans in developing and developed countries. The study found that loan defaults frequently happen at a lower rate during a rapid economic expansion, resulting in lower levels of non-performing loans. The study also shows that in both countries. NPLs are significantly reduced when institutional environment is improved. Mutaba et al. (2017) examined the link between cost efficiency and non-performing loans of community banks in Tanzania. This study applied the Tobit simultaneous regression to explore the effects of 'bad management' and 'bad luck' on the incidence of low cost efficiency and NPLs. The paper established that although both bad management and bad luck contribute to NPLs increase, bad luck was the dominant source of high NPLs and cost inefficiency in community banks in Tanzania.

Salas *et al*. (2024) examined determinants of commercial banks' NPL. The study used a sample of 1,631 entities from 111 countries grouped into eight central regions in the world: Africa, Eastern Europe, Middle East, North America, Western Europe, Far East and Central Asia, Oceania, South and Central America, with information corresponding to the period 2007–2021. The results demonstrate that NPL is significantly determined by a series of bank specific factors and macroeconomic factors in different directions. Similarly, Klein (2013) investigated determinants of NPL in Central, Eastern and South Eastern Europe (CESEE). The paper finds that NPLs can be attributed to both macroeconomic conditions and banks' specific factors, though the latter set of factors was found to have a relatively lower explanatory power. But these studies regressed macroeconomic and bank specific factors on NPL while ignoring the role of CRBs in controlling NPL.

Gilbert (2014) assessed factors affecting loan performance in CRDB PLC – Mwanza, Tanzania. The results show that repayment policy and credit terms have significance effect on loan performance. Mchopa (2002) for NMB PLC Tanzania indicates the causes of NPLs are weak loan monitoring base, limited information for credit decisions and weak management of institutions. Viswanadham (2015) analyzed the determinants of NPL for the case of NBC Bank – Dodoma, Tanzania. The study found that NPL is accelerated by high interest rate, loans supervision and gross domestic product. Mataba, (2012) assessed credit risk management for salaried loans to government employees for Postal Bank of Tanzania. The results show that banks in Tanzania have procedures for managing credit services but they are not fully implemented leading to increase in NPL and the main causes of NPLs among salaried workers are death of borrowers and labor turnover.

Fosu *et al*. (2019) analyzed the link between credit information sharing on loan defaults using dataset covering 879 unique banks from 87 developing countries. The study found that credit information sharing reduces loan default rate. Also, the relationship between credit information sharing and loan default rate is conditional on banking market concentration. Lastly, country governance quality does not have a strong moderating role on the effect of credit information sharing on loan default rate. Hoang et al. (2022) using aggregate dataset of 120 developed countries discover two issues. First, evidence of a negative and significant association between bad debt levels or NPL and credit information sharing. Second, information sharing is conducive to economic growth: information sharing decreases non-performing loans, which hampers economic growth.

Guerineau *et al*. (2018) analyzed the impact of credit information sharing on financial stability, drawing special attention to its interactions with credit booms. Using a sample of 159 countries divided into two sub-samples: 80 advanced economies and 79 less developed countries, the study found that credit information sharing reduces financial fragility hence NPL for both groups of countries. Also, information sharing mitigates the detrimental impact of a credit boom on financial fragility for advanced countries and depth of information sharing has a negative impact on credit boom. Houston et al. (2010) traced the relationship between information sharing and bank risk for a sample of 2,400 banks in 69 countries. The results demonstrate that the benefits of information sharing among creditors appear to be universally positive. Greater information sharing leads to high bank profitability, lower bank risk, a reduced likelihood of financial crisis, and high economic growth.

Kusi *et al*., (2017) found that credit information sharing whether through private bureaus or public registries reduces bank credit risk. The credit information shared through public credit registries was only negatively and significantly related to bank credit risk when all countries are observed as one unit but had no significant effect in low or high income countries separately. By contrast, credit information shared through private credit bureaus had a negative and significant effect on credit risk in low and high income countries as well as all countries together. Moreover, country specific studies by Segihanga (2022) for Rwanda, Dankwah (2013) for Ghana, and Alloyo (2013) for Kenya confirmed positive and significant effects of credit information sharing on bank loan performance. These studies also established that bank performance before CRBs adoption was low. However, bank performance increased slightly with commencement of CRBs in these countries.

But most of the previous studies focused on number and types of CRBs in gauging information sharing rather than credit reports. The credit reports pulled from CRBs is the best proxy for information sharing as they provide borrowers' information used by commercial banks for future credit decisions. Depth but not coverage of information provided impacts lending decisions (Guerineau et al., 2018). Also, most of the previous empirical works on this subject matter did not examine usage of credit information in lending process and its effects on non-performing loans. The efficacy of information sharing by CRBs is conditioned by information usage by commercial banks. Hoang et al. (2022) emphasizes that with CRBs being in place, loan defaults reflect issues related to credit information practicability in the economy as a function of many actors in credit market. In addition, most of these studies are comparative analysis; centered on the effects of information shared through private vs public institutions, effects of information sharing in developed vs developing countries, and bank loan performance before and after commencement of CRBs. This study fills these gaps in literature by testing the following key hypotheses in Tanzania:

H1: information shared by credit reference bureau is negatively linked to non-performing loans.

H2: information usage by commercial banks is negatively accompanying non-performing loans.

2.3 Conceptual Framework

The conceptual framework in Figure 1 demonstrates that credit reference bureaus share borrowers' information to commercial banks. The information sharing is directly linked to loan default rates or non-performing loans. But this relationship is controlled by bank specific factors such as capital adequacy ratio and returns on assets. This reason is based on premises that the problem of non-performing loans should not be perceived from one side of borrowers but also from counterpart side of lenders. Furthermore, it is shown that commercial banks use acquired information in lending process to make informed credit decisions. The lending process includes onboarding customers, screening loan applications, hedging credit risks, and loan repayment follow-ups. This mechanism is anticipated to mitigates non-performing loans given stable macroeconomic conditions.

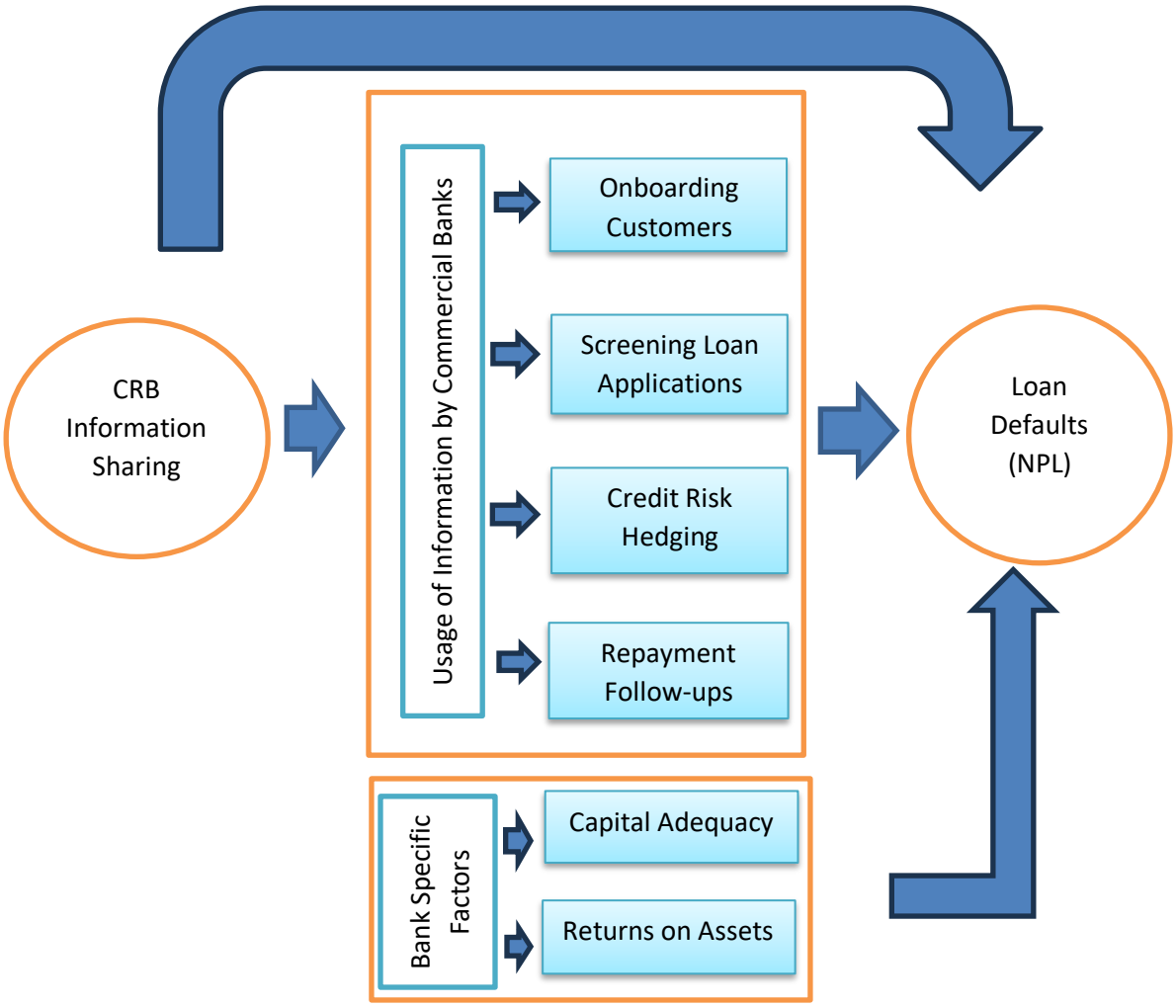

Figure1: The Role of CRBs in Mitigating Commercial Banks' Non-Performing Loans

3.0 Methodology

3.1 Data

This study used panel data covering all fifty-five (54) commercial banks in Tanzania mainland, headquartered in Dar es salaam. The commercial banks were the main focus of this study because of their large portion of the credit market in Tanzania compared to other banks and non-banks financial institutions. Moreover, the commercial banks issue large loans to many borrowers, and their defaulting adversely affects their financial performance. The study utilized quarterly panel data sourced from the Bank of Tanzania spanning from 2013 to 2018. The choice of this period under investigation is driven by availability of data, i.e. credit reference bureaus started operations in Tanzania by 2013. Data was collected through documentary review of credit reports pulled from CRB. Data for bank specific factors such as capital adequacy ratio and returns on assets were collected through documentary review of the financial institution credit reports submitted to the BOT.

3.2 Preliminary Test

Since analysis for panel data requires very clear direction of using either random or fixed effects model. The Hausman test was employed to determine the better model for this study, whether random or fixed. Whether to treat the individual effects as fixed or random is not an easy question to answer. According to Saunders *et al.* (2009), random and fixed effects models are stated as follows:

$$\text{Fixed effects: } Y_{it} = X_{it}\beta + \alpha_i + \mu_{it}$$

$$\text{Random effects: } Y_{it} = X_{it}\beta + \alpha_i + \mu_{it} + \varepsilon_{it}$$

Where X_{it} is variable vector; μ_{it} is interference terms between entities; and ε_{it} is interference terms within entities. With random effects, an interference term has no correlation with predictor variable included in the model, permitting the need for time-invariant variables to play the best purpose of control variables by permitting general inferences outside the sample that was opted in the model (Maddala, 2013). The argument pointed out by Maddala (2013) also shows that for fixed effects models to be used, the basis should be on the need to study the origin of the changes inside an entity. The alternative but appropriate interpretation is that the fixed effects approach is conditional upon the effect while the random effects approach is not conditional upon the individual effect, but 'integrates them out' (Verbeek, 2004). The Hausman test examine whether the disturbances (μ_{it}) have a correlation with the regressors, with the null hypothesis being no correlation between the two.

In addition, Fisher-type unit root test was performed to determine the existence of stationarity in panel data. Stationarity exists when a set of variables selected randomly for the joint distribution in a series will be the same irrespective of the source from which the series was obtained. In dealing with stationarity, the mean for the data with a stationarity element will necessarily be constant irrespective of the sample period being changed, while that of non-stationary data series will vary, which eventually can cause panel data to be asymptotically biased leading to spurious or nonsense regressions.

3.3 Model

The empirical model is developed from asymmetric information theoretical framework. This model as applied by previous scholars (Fosu et al. 2019; Hoang et al. 2022) shows that bank loan performance is contingent upon information shared by the credit reference bureaus. Also, it shows that bank loan default rate is linked with bank specific factors and macroeconomic conditions. Given a relatively stable macroeconomic environment over the study period, our model is specified as follows:

$$NPL = \alpha_0 + \alpha_1 PCR + \alpha_2 CAR + \alpha_3 ROA + U_1 \quad (1)$$

Where: NPL is non-performing loans; PCR refers to pulled credit reports from CRB; CAR represents capital adequacy ratio; ROA is the returns on assets; and U_1 unobserved random factors or error term.

Since information sharing by credit reference bureaus is one-thing and usage of information by commercial banks in lending is another-thing. Then, usage of information in lending process, i.e. customers onboarding, screening credit application, credit risks hedging and loan repayment follow-ups and its direct effects on non-performing loans was analyzed by estimating the following equation:

$$NPL = \beta_0 + \beta_1 COB + \beta_2 SCA + \beta_3 CRH + \beta_4 LRF + U_2 \quad (2)$$

Where: NPL is non-performing loans or loan default rates; COB: average proportion of information usage among commercial banks in customers onboarding; SCA: average proportion of information usage among commercial banks in screening credit applications; CRH: average proportion of information usage among commercial banks in credit risk hedging; LRF: average proportion of information usage among commercial banks in loan repayment follow-ups and U_2 is random factors. Note: (1) and (2) were estimated separately to avoid collinearity between sharing and usage.

3.4 Description of variables

Non-performing loan (NPL) is described as a percentage of loans issued by commercial banks to the clients without repayment (principal or interest or both) over an agreed period. It is usually expressed as % of total loans issued hence indicates loan default rates. Pulled credit reports (PCR) refers to the number of credit reports pulled by commercial banks from CRB for credit decisions. PCR was used as a better proxy for information sharing compared to number of CRBs used in previous studies. Usage of information by commercial banks in each step of lending was measured as proportion (%) of total shared information. Lending stages by commercial banks were specified as customers onboarding (COB), screening credit application (SCA), credit risks hedging (CRH) and loan repayment follow-ups (LRF). To account for the impact of bank specific factors on loan defaults two indicators were considered; capital adequacy ratio (CAR) and returns on asset (ROA). Capital adequacy ratio (CAR) is defined as a ratio of bank capital to total assets and returns on asset (ROA) is measure of bank profitability expressed as a ratio of bank returns or net income to total assets.

4.0 Results and Discussion

4.1 Hausman Test Results

Table 1 presents results of the Hausman test. Based on these results, the random effects model is favored over the fixed effects model. The Hausman results had a chi-square of 1.35 and a significance value of 0.5108, which is more than 0.05. This suggests that it the random model is better than the fixed one. Thus, random effects models were used to estimate effects of time-variant variables.

Table 1: Hausman Test Results

Variables	NPL			
	Fixed	**Random**	**Difference**	**Std. Error**
PCR	-0.0299	-0.0446	0.0146	0.0031
ROA	-0.0208	-0.0335	0.0126	0.0021
CAD	0.0991	0.0980	0.0011	0.0019
COB	-0.0288	-0.0397	0.0195	0.0027
SCA	-0.0197	-0.0214	0.0192	0.0056
LRF	-0.0244	-0.0322	0.0180	0.0048
CRH	-0.0166	-0.0177	0.0019	0.0026
Chi2 (4)	1.35			
Prob > Chi2	0.5108			

Note:

PCR: pulled credit reports; CAD: capital adequacy; ROA: return on assets; COB: information usage in customers onboarding; SCA: information usage in screening credit applications; CRH: information usage in credit risk hedging; and LRF: information usage in loan repayment follow-ups.

4.2 Multicollinearity Test Results

The study applied VIF to determine the presence and severity of multicollinearity. The results in Table 2 shows no evidence for the absence of multicollinearity in both regressions. This is substantiated by VIF and tolerance, which are less than 10 and greater than 0.1 respectively, for all variables. Multicollinearity is proven to be present if VIF is greater than 10 or tolerance is lower than 0.1

Table 2: Multicollinearity Test Results

Variable	1/VIF	VIF
PCR	1.8660	0.5359
ROA	1.8925	0.5284
CAD	1.0664	0.9377
COB	1.4322	0.6982
SCA	1.5817	0.6322
LRF	1.6281	0.6142
CRH	1.9357	0.5166

Note:

PCR: pulled credit reports; CAD: capital adequacy; ROA: return on assets; COB: information usage in customers onboarding; SCA: information usage in screening credit applications; CRH: information usage in credit risk hedging; and LRF: information usage in loan repayment follow-ups.

4.3 Cross-Sectional Dependence Test

A cross-sectional dependence test was done to determine whether to use first or second generation panel unit root tests. Results in Table 3 reject the null hypothesis of no cross-sectional dependence, i.e., there is cross-section dependence among regressors. This means there is a certain level of dependence among commercial banks, thus, the first-generation panel unit root tests fit this study.

Table 3: Cross-Sectional Dependence Test Results

Tests	Breusch-Pagan LM	Pesaran scaled LM	Pesaran CD
PCR	1201.38**	50.91**	15.74***
ROA	840.02**	31.65***	10.51**
CAD	713.49***	22.79**	8.48**
COB	527.85***	21.63***	4.76***
SCA	612.99***	27.71***	11.11**
LRF	364.26***	5.61**	3.45***
CRH	599.44**	17.02**	2.46**

Note: *** denote 1% significance level and ** denote 5% significance level

4.4 Unit Root Test Results

Having confirmed cross section dependence, cross-sectionally augmented IPS (CIPS) test developed by Pesaran (2007) was employed to examine the presence of unit root. The CIPS test results summarized in Table 4 demonstrates that, all variables were not stationary at levels. However, after first differencing, all variables became stationary as evidenced by their p-values in parenthesis.

Table 4: Cross-Sectionally Augmented IPS Test Results

Variables	Constant		Constant + Trend	
	Level	First Difference	Level	First Difference
NPL	-0.433	-1.0303	-13.044	-4.899
	(0.612)	(0.018)	(0.912)	(0.000)
PCR	4.184	3.426	6.402	4.123
	(0.928)	(0.023)	(0.645)	(0.000)
ROA	-6.447	-2.4033	-1.812	-2.791
	(1.296)	(0.025)	(0.338)	(0.013)
CAD	0.731	-4.221	0.614	-3.9021
	(0.241)	(0.002)	(0.443)	(0.001)
COB	7.711	6.4381	6.361	5.837
	(0.870)	(0.019)	(0.139)	(0.002)
SCA	5.425	8.881	7.168	2.3002
	(0.503)	(0.066)	(1.022)	(0.000)
LRF	5.144	1.332	3.118	1.021
	(0.777)	0.073	(0.128)	(0.091)
CRH	-3.004	-5.621	-2.982	-5.872
	(0.683)	(0.001)	(0.771)	(0.020)

Note: Values show Cross-Sectionally Augmented IPS (CIPS) statistics, which are average of CADF.

4.5 Effects of CRB Information Sharing on Commercial Banks' Non-Performing Loans.

The results in Table 5 indicates that number of credit reports pulled from CRB by commercial banks for credit decisions has a significant negative relationship with non-performing loans in Tanzania. The results show that one percentage point increase in credit reports shared by CRBs to commercial banks for credit decisions reduces non-performing loans by 1.71 percentage point. This outcome suggests that as banks access more credit information from CRBs for thorough analysis before extending credits to prospective borrowers the risks of loan defaulting are minimized. This study concurs (Freixas & Rochet, 1997; Jappelli & Pagano, 2002; Stiglitz & Weiss, 1981) that adverse selection and moral hazard resulting from information asymmetry negatively affect banking sector by reducing the efficiency in the provision of credit and causing non-performing loans

Moreover, the findings that credit reference bureaus shared information has a significant and negative impact on the non-performing loans is consistent with the findings of previous scholars (Houston et al. 2010); Guérineau and Léon (2019; Fosu et al. (2020; Hoang et al 2022). These studies concluded that information sharing reduces credit risk, default rates, and banking system fragility. They also imply that the growth of information sharing institutions consolidates banking systems. Unlike this study which used number of credit reports pulled from CRBs to measure information sharing. Most of the previous empirical works used number of information sharing institutions (public and private) as a proxy for information sharing and/or information sharing index. In addition, some previous studies used dummy variable to test whether information sharing exist or not.

Apart from CRB shared information, the study also found that bank specific factors matter for credit risks. Specifically, the results reveal that holding other factors unchanged, a percentage point increase in capital adequacy ratio will cause non-performing loans to increase by1.630 percentage point. The positive link between capital adequacy ratio and non-performing loans is in line with moral hazard hypothesis established in Keeton and Morris (1987). It simply means the greater the capital held by commercial banks, the more the credits disbursed to the public and the more the credit risks or NPL. This outcome also implies that commercial banks have been striving to have enough cushions and minimize the risk of banks becoming insolvent. Mchopa (2013) argues that commercial banks guarantee minimum capital adequacy ratios to make sure that banks have enough cash to absorb a reasonable amount of losses before they become insolvent and lose depositors' funds.

Moreover, the results indicate that holding other factors unchanged, a percentage point increase in returns on assets will decrease non-performing loans by 7.825 percentage points. These results imply that return on assets is a good measure of how commercial banks are profitable relative to total assets, and having a negative relationship with non-performing loans suggests that commercial banks are striving to turn up their financial position to chart out maximization of earnings from invested capital (assets) which in turn influence down the non-performing loans. This outcome supports bad management hypothesis, which argues that banks with high profitability have lower incentives to involve in risky activities, therefore decreasing bad debts (Berger and DeYoung, 1997). Also, this study is in line with Ng'ang'a (2015) that the higher the returns on assets among commercial banks the more the assets efficiency and the lower the NPLs

Table 5: Information Sharing and Non-Performing Loans

Variables	NPL			
	Coefficients	Std. error	t-values	P > |t|
PCR	-1.711	1.673	-6.401	0.000***
CAD	1.630	2.191	7.440	0.000***
ROA	-7.825	22.275	-3.513	0.001***
CON	17.561	1.302	13.486	0.000***
R^2	0.7391			

Note:
NPL: non-performing loans; PCR: pulled credit reports; CAD: capital adequacy ratio; ROA: returns on assets; CON: constant; R^2: coefficient of determination; & *** = 1% levels of significance.

4.6 The Effect of Information Usage by the Commercial Banks on Non-Performing Loans.
The results in Table 6 reveals a negative association between average proportion of information usage for onboarding customers and non-performing loans. It is evident that one percentage point increase in usage of CRB shared information for customers onboarding during credit processing significantly reduces non-performing loans among commercial banks by 1.125 percentage points. Getting familiar to a loan applicant is a pre-requisite of loan performance and lenders have no way to escape this since their operations cuter much in credit services for appreciation of their assets. It is argued that credit assessment by respective commercial banks is necessary to review borrower's creditworthiness prior to making a decision as to whether loan application is approved or not. This outcome is in line with Galindo (2001) that information exchange from multiple sources improves the signal's precision about credit seeker's characteristics, thereby reducing the default rate.

Also, the results reveals that there is a negative and significant influence of using CRB shared information for screening loan applications on non-performing loans encountered by commercial banks in Tanzania. Results in Table 4 demonstrates that holding other factors to unchanged, one percentage point increase in usage of information from CRBs by commercial banks for screening loan applications during lending process decreases the proportion of credit risks resulting in a decline in non-performing loans by 1.123 percentage points. This outcome supports Pagano (2000) that the problem of increasing defaulting rate among borrowers can be well addressed with positive information sharing for screening loan applicants during credit decision process as that information justify loanable customers. These results suggest that informed credit decisions are likely to pull down loan defaulting basing on the solid base of gauging who is creditworthy borrower.

A closer examination of the results discloses that commercial banks in Tanzania have been using credit information from CRB in monitoring loan processes, especially in hedging credit risks. This is evident by the negative and statistically significant coefficient of the credit risk hedging of about -1.091; indicating that increase in usage of credit information among commercial banks especially in hedging credit risks has resulted in significant decline in non-performing loans (NPL) in Tanzania. This outcome is consistent with previous empirical findings by Segihanga (2022) that collateral information sharing significantly improves banks' loans performance in Rwanda

This outcome implies that guaranteeing ideal compensation for loan loss require ideal collateral information shared from a wider range of credit markets to foster reasonable estimations. The collateral information guide banks in assessing the probability of borrower default and price loan accordingly. The collateral information sharing is expected to enables borrowers to build a track record (reputational collateral) that they can use to access credit. However, in practice, some borrowers intentionally present collaterals which have lower market value than the value of requested loan or collaterals which have been used for loan application in other financial institutions.

Moreover, the results show that, holding other factors unchanged, one percentage point increase in usage of information from CRBs to make loan repayment follow-ups decreases credit risks absorbed by commercial banks and eventually reduces non-performing loans by 1.133 percentage points. This outcome suggests that tracking a client to effect loan repayment is information driven; credit information on how well the applicant has honored past loan obligations is important because there is usually a definite relationship between past and future performance in loan repayment. The results also align with Alloyo (2013) that monitoring after payout is very important since as long as the borrower pays their instalments on time, everything is fine. However, if problems arise at some point, it may already be too late. It is, therefore, vital that banks use relevant information to monitor borrower's ongoing development to be able to react to changes in a timely manner.

The results show that total effects of information usage for onboarding customers, screening credit applications, credit risk hedging and loan repayment follow-ups on non-performing loans is 4.472, i.e. 1.125+1.123+1.133+1.091. That is to say, one percentage point rise in usage of CRB shared information by commercial banks in lending process can reduce credit risks, which in turns mitigates non-performing loans to the tune of 4.472 percentage points. This effect is greater than the direct effect of information sharing on non-performing loan presented in Table 4, which is 1.711; suggesting that not all shared information is used by commercial banks in credit decisions. Generally, the study confirms the hypotheses that credit information sharing by CRB is negatively linked to NPL and information usage by commercial banks negatively accompanies NPL.

Table 6: Information Usage and Non-Performing Loans

Variables	NPL			
	Coefficients	**Std error**	**t-values**	**P > |t|**
COB	-1.125	1.689	-0.666	0.000***
SCA	-1.123	1.704	-0.664	0.000***
LRF	-1.133	2.049	-0.553	0.000***
CRH	-1.091	0.705	-1.548	0.000***
CON	18.025	1.474	12.228	0.000***
R^2	0.8712			

Note:

NPL: non-performing loans; COB: information usage in customers onboarding; SCA: information usage in screening credit applications; LRF: information usage in loan repayment follow-ups; CRH: information usage in credit risk hedging; CON: constant, & *** = 1% level of significance.

5.0 Conclusion and Implications

5.1 Conclusion

The study analyzed whether credit reference bureaus can reduce non-performing loans experienced by commercial banks for the case of Tanzania. The study used panel data of 54 commercial banks in Tanzania. The results indicate that credit information pulled from credit reference bureaus for credit decisions was a good predictor of non-performing loans among commercial banks with a negative relationship. This suggests that information sharing can reduce non-performing loans among commercial banks. Also, the results indicate that non-performing loans is negatively and significantly related to usage of information by commercial banks in lending process. That means the more the shared credit information gets used by commercial banks for customers onboarding, screening loan applications, credit risk hedging, and loan repayment follow-ups, the more the credit risk is minimized. In addition, the results show that bank specific factors particularly capital adequacy and returns on assets significantly account for pronounced non-performing loans in Tanzania.

5.2 Policy implications

The credit reference bureaus operating in Tanzania should strengthen more their credit information sharing mechanisms and services among the commercial banks and other financial institutions. This should be accompanied with establishing and/or promoting information sharing capacity of CRB staffs and working harmonious with commercial banks and other financial services providers. The credit reference bureaus should also smoothen accessibility of credit information among commercial banks for timed and effective credit decisions and follow-ups. This should be in line with equipping all financial institutions the best practices in credit information sharing. Importantly, the credit reference bureaus should avail their institutional information for stakeholder consumption including corporate information, membership and their professional standards.

The commercial banks should create effective strategies for collecting borrower information to ensure that the information delivered to CRBs can be relayed to other banks for lending decisions. Their systems of borrowers' information analysis should avail as much details as possible on borrowers, though legal limitations in the industry should be observed. The commercial banks should also create a framework for information usage to mitigate cannibalism of good customers in the financial markets. In addition, the commercial banks should regularly evaluate their credit performance in relation to the bank specific factors such capital adequacy ratio and returns on assets. This is important for the sake of stable credit system and financial health of commercial banks.

The government through its monetary authorities such as the Bank of Tanzania should continue monitoring commercial banks in the provision of credit services to lower non-performing loans. The Bank of Tanzania (BOT) should ensure that all commercial banks perform lending function according to laid down guideline and regulations. Furthermore, the government through its fiscal organs such as Tanzania Revenue Authority (TRA) and ministry of finance should set conducive fiscal measures (tax and spending) in favor of business operations toward success. This is important to encourage borrowers who run their business capital expansion to afford repayment of loans. The fact is that lenders depend much on earnings realized from their investment to service loans.

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