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Credit Information Sharing and its Impact on Access to Bank Credit across Income Bracket Groupings

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ABSTRACT

This study provides a global evidence of how credit information sharing impacts access to bank credit across the income bracket groupings by the World Bank which captures all countries. Employing OLS robust standard errors regression model, the study sources data from World Development Indicators covering period's between 2000 and 2012. The study finds that access to bank credit varies significantly across the five income bracket groupings with high income brackets having easier access to bank credit compared to their low income brackets counterparts. The results further indicate that information sharing helps improves access to bank credit across all the five income bracket groupings. The results in addition reports that information sharing and gross domestic savings were significantly and positively related to access to bank credit while gross capital formation, inflation and non-performing loans were negatively and significantly related to access to bank credit. These findings are consistent with theoretical and earlier empirical findings.

Keywords: *Information sharing, credit referencing bureaus, information asymmetry, access to bank credit, income brackets*

1. INTRODUCTION

In recent times the continent of Africa(seen as a developing or emerging economy) has seen the emergence of credit information sharing through Credit Referencing Bureaus (CRBs) although credit information sharing have existed in some European and American countries for a very long time. Credit Referencing Bureaus are institutions (either private or public) that collect financial data, process the data, store it and at the request of lenders and other financial institutions, they (CRBs) share or provide the credit worthiness status or report for lending decision by the requesting lending institution. Empirical literature advocates several effects of information sharing on banks and an economy as a whole. For instance, Brown and Zehnder (2007) also find that information sharing through CRBs can help improve loan repayment. Barth et al. (2009) prove that CRBs are able to reduce bank corruption. Powell et al. (2004) also prove that CRBs are able to reduce default rates. Brown et al. (2009), Triki and Gajigo (2012), Djankov et al. (2007), Singh et al (2009), Love and Mylenko (2003) and Jappelli and Pagano (2002) have also found that information sharing through CRBs improves access to finance or credit. However, only two of these studies (Triki and Gajigo, 2012 and Singh et al., 2009) cited considered financial data from Africa to establish the effect of information sharing on access to finance or credit.

Nevertheless, this study departs from these studies in a number of ways. First, earlier studies focused on either country orsub-regionallevel data (Triki and Gajigo 2012; Singh et al., 2009; Barth et al., 2009; Brown and Zehnder 2007) and proved how information sharing affects access to credit in countries or sub-regional blocks. However, this study focuses on the five (5) income bracket as per World Bank classification and employs income bracket classification data from World Development Indicators database to establish the impact information sharing on access to finance or credit. Second, since the income bracket classification captures all countries across the globe, this study will provide a global picture of how information sharing impact of access to credit or finance across the world. We cite no study that provides a global view of how information sharing impact access to credit. Third, we able to test if access to credit or credit availability varies across the five different income bracket classifications. The motivation is that, we expect credit availability in high income countries (developed countries) to be better as compared to low income countries (developing countries) due to stronger credit regulations and institutions in high income countries (see Miller, 2003, Djankov et al., 2007; Singh et al., 2009). Hence, the study first test the significant different (if any) in access to bank credit among the five different income brackets. Second, the study establishes the impact of credit information sharing on access to bank credit across the five income brackets.

2. LITERATURE REVIEW

2.1 Theoretical Review: Information Asymmetry and Collateral Constraints

Literature suggests that access to finance or credit is obstructed through the collateral conditions due to theory of information asymmetry (Freimer and Gordon, 1965; Stiglitz and Weiss, 1981; Freixas and Rochet, 1997). That is, due to incomplete or transparent financial or credit data from both the lender and borrower sides, lenders or banks are forced to require collateral (physical asset) as a guarantee to secure unforeseen future eventualities in order to safeguard their lending position (Stiglitz and Weiss, 1981; Bester, 1985). By this collateral requirement, potential and credit worthy bank client who do not have access to collateral or assets (less privileged) are less likely or at worst denied access to finance or credit. That is, individual and corporate entities with high credit worthiness status are denied credit due to lack of

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collateral. However, studies have revealed that sharing credit information in the midst of collateral oriented credit market can help reduce the constraints to access to credit since the ability of an individual or entity to repay loans or credit is not solely based on their ability to provide collateral as a guarantee (Behr and Sonnekalb et al., 2012; Triki and Gajigo, 2012; Singh et al., 2009; Djankov et al., 2007; Love and Mylenko, 2003; Jappelli and Pagano, 2002). This suggests that, credit information sharing can help reduce or at best eradicate constraints to access to credit in a collateral oriented credit market.

2.2 Empirical Review

Information sharing in the credit market is a relatively new concept in most developing or emerging markets (Luoto et al., 2007). Numerous benefits are reported to be associated with information sharing in the credit market and one important benefit of information sharing highlighted in empirical studies is its effect on access to finance or credit (Behr and Sonnekalb, 2012; Singh et al., 2009; Triki and Gajigo, 2012; Jappelli and Pagano, 2002; Pagano and Jappelli, 1993). We therefore highlight some key empirical findings on studies that have examined the link between information sharing and access to credit or finance.

Pagano and Jappelli (1993) proved that information sharing among lenders allow loans to be advanced to good borrowers who would not have received loans or credit where banks or lenders did not share credit information on borrowers. This leads to increased aggregate lending in the credit market. Jappelli and Pagano (2002) also show that lenders that share credit related information increase the size of the credit market.

Brown, Jappelli and Pagano (2009) indicate that credit information sharing leads to increased and cheaper credit in transition countries in Eastern Europe. They show that credit related information sharing is associated with higher ratios of private credit to gross domestic product. In the United States, Berger and Frame (2006) demonstrated that information sharing increases quantity of small business loans and also extended credit to marginal borrowers.

Djankov et al. (2007) found that private credit is enhanced by the presence of both credit referencing bureaus (private or public) across 129 countries covered over 25 years in their sample. Singh et al. (2009) show that countries from sub-Saharan Africa that encourage credit information sharing report higher levels of credit to the private sector as a share of GDP.

Using firm-level data, Love and Mylenko (2003) found that while the presence of PCBs is associated with lower obstacle to access finance, there is no such relationship in the case of PCRs.Behr and Sonnekalb (2012) also found no evidence in support that information sharing through public credit registries affect access and cost to finance but found evidence to support the view that information sharing improved loan performance (repayment of loans) in banks in Albania.

Luoto et al. (2007) revealed that the use of information sharing tend to move or shift in the client portfolio toward better-performing clients, and the awareness treatment induced a moderate improvement in repayment performance.

3. METHODOLOGY

The study employs Anova and panel regression techniques in this study. First, the study used the Anova technique to test for difference in information sharing and access to bank credit to private sector among income brackets. The null hypothesis states that difference in mean values of bank credit to private sector (access to credit) for each income bracket are all the same and equal to zero while the alternate hypothesis states that the difference in mean values of bank credit to private sector are all not the same and not equal to zero. The null and alternate hypotheses of the Anova technique are mathematically expressed as:

$$\mathbf{H_o: \mu_1 = \mu_2 = \mu_3 = \mu_4 = \mu_5 = 0}$$

$$\mathbf{H_a: \mu_1 \neq \mu_2 \neq \mu_3 \neq \mu_4 \neq \mu_5 \neq 0}$$

The study further takes advantage of the qualities of a panel data as suggest by Brooks (2008) and Stock and Waston (2001) to investigate the impact of information sharing through CRBs on access to credit across the five income brackets from 2000 to 2012.The income bracket variables are obtained from World Development Indicators (WDI). The common form of a panel data model is expressed as

$$Y_{it} = \alpha_i + \gamma_t + \beta X_{it} + \varepsilon_{it} \quad (1)$$

Where: Subscript i signifies the cross sectional dimension (income bracket) i=1. . . *N* and t signifies the time series dimension (time), t=1…T; *Yit* is the output variable; α_i is scalar and constant term for all periods (t) and specific to an income bracket (*i*); γ_t is the time fixed effect; *β is a k*×1 vector of parameters to be estimated on the input variables or the factor loadings or parameter estimates for the explanatory variables; *Xit is a 1*× k vector of observations on the input variables comprising of input variables in the model which includes controlled variables and *Eit* which is iid is the error term.Our models are econometrically expressed as:

$$dcpsb_{it} = \beta_0 + \beta_1\ lnciis_{it} + \beta_2\ gcf_{it} + \beta_3\ gds_{it} + \beta_4\ cpi_{it} + \beta_5 npl_{it} + \varepsilon_{it} \ldots\ldots \quad (2)$$

4. VARIABLE DESCRIPTION AND SELECTION

4.1 Domestic Credit to Private Sector by Banks (DCPSB)

Domestic credit to private sector by banks (dcpsb) is the dependent variable in our access to credit

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models. This variable measures the availability of bank credit to private sector in a particular income bracket at a point in time. Domestic credit to private sector by banks measured as the ratio of domestic credit offered by banks to the private sector to gross domestic product. These variables are picked from World Development Indicators (WDI) database.

4.2 Credit Information Sharing Index (LNCII)

Information sharing variable which the variable of interest is pick from World Development Indicators database. It measures the rules affecting the span, accessibility and quality of credit information sharing through either private or public credit referencing bureaus. The index ranges from 0 to 6, with higher values indicating the availability of more credit information, from either a public registry or a private bureau, to facilitate lending decisions. The study logs the information sharing variable to attain normality. Taking queue from Brown et al. (2009), Singh et al (2009) and Djankov et al (2007), we expect a positive between access to credit and information sharing. This means that as information sharing improves in quality and quantity, lending decision will not be solely based on collateral requirement, hence increase in access to the less privileged who do not have access to collateral to secure credit.

4.3 Gross Capital Formation (GCF)

Gross Capital Formation has to do with the amount of additional funds invested in long term projects (such as equipments, plants, machinery and buildings).

Gross Capital Formation is computed as the ratio of gross capital formation to gross domestic product.

Following the neoclassical theory of economics, we expect a negative impact of gross capital formation on access to credit. That is, as firms invest in capital or long term projects, funds are rather spent than saved. Hence, capital (huge fund) is tired down reducing the amount of credit in the system.

4.4 Gross Domestic Saving (GDS)

Gross Domestic Savings measures the amount of money residence in an income bracket is able to save or keep out of their disposable income. Gross domestic savings is calculated as a ratio of gross domestic savings to gross domestic product. In line with the classical theory of economics, we expect a positive impact of gross domestic savings on access to credit. This imply that, as residence save more money, financial institutions are able to mobilize more funds which makes funds easily accessible to residence through loans and advances.

4.5 Non-Performing Loans (NPL)

The empirical studies of Bennnardo et al. (2010), Kallberg and Udell (2003) and Pagano and Jappelli (1993) suggest that credit advancement to indebted firms is reduced. Hence, as firms and individuals default on loan (indicating increase in nonperforming loans), bank reduce or stop loan advance to defaulting firms or individuals. From this, we anticipate a negative impact of nonperforming loans on access to credit. Non-performing loans is measured as a ratio of bank non-performing loans to gross loans and advances.

4.6 Consumer Price Index (CPI)

Consumer Price Index is employed in this study to proxy inflation in a given income bracket as a particular point in time. We anticipate a negative impact of consumer price index on access to credit. This relationship is expected because an increase in inflation will cause a reduction in the value (purchasing power) of available credit. Hence, inflation reduces the monetary value of funds available to financial institutions to lend to clients (see Jiménez and Saurian, 2005). The reduction in monetary value of funds makes it less attractive for borrowers to borrow.

Table 1: Summary of variables

Variables	Symbol	Source of Data	Expected Sign	Description	Measurement of Variables
Domestic Credit to Private Sector by Banks	dcpsb	World Development Indicators		Dependent Variable	Domestic Credit to Private Sector by Banks divided by Gross domestic product
Credit Information Sharing Index	lncii	World Development Indicators	+	Independent Variable	As measured by World Development Indictors
Gross Capital Formation	gcf	World Development Indicators	-	Independent Variable	Gross Capital Formation divided by Gross domestic product
Gross Domestic Saving	gds	World Development Indicators	+	Independent Variable	Gross Domestic Saving divided by Gross domestic product

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Consumer Price Index	cpi	World Development Indicators	-	Independent Variable	As measured by World Development Indictors
Non-Performing Loans	npl	World Development Indicators	-	Independent Variable	Non-Performing Loans divided by gross loans and advances

All computations on variables are done by World Development Indicators.

5. EMPIRICAL RESULTS

Table 2: Descriptive statistics

Variables	Obs	Mean	Std. Dev.	Min	Max	SWilk	VIF
dcpsb	65	0.5485	0.2602	0.1559	1.0136	0.0036***	-
lncii	70	0.6482	0.5972	-0.2136	1.4458	0.0000***	5.9800
gcf	68	0.2585	0.0413	0.1884	0.3273	0.0019***	4.4000
gds	68	0.2363	0.0777	0.0886	0.3443	0.0001***	2.4900
cpi	70	0.0497	0.0208	0.0120	0.1106	0.0026***	1.9600
npl	46	0.0519	0.0348	0.0130	0.1720	0.0000***	1.7100

Significance Level: (*)< 10%, (**)< 5%, (***)< 1%

Table 2 presents the descriptive statistics on the variables employed in the robust Ordinary Least Squares estimation technique used for this study. The descriptive statistics table covers periods between 2000 and 2012. The table presents the mean, standard deviation, minimum, maximum, normality (SWilk) and the acceptability (VIF) of each variable. From the minimum and maximum values of each variable, it is evident that none of the values is an outlier. Brook (2008) argues that outliers distort the precision of regression estimates; hence leading to inconsistent, inefficient and biased coefficient estimates. From this, the study eliminates the effect of outliers. From the Shaprio Wilk normality test (SWilk), all the variables are normality distributed under 1% significance level around their means implying that the variables are linear and hence a linear regression can be used to estimate these variables. Wooldridge (2008) states that it is imperative to test for normality in order to choose either normal or non-normal distribution estimation form for coefficient estimates to be BLUE. From the SWilk test, the study employs the ordinary least squares technique because the variables are normally distributed.

Table 3: Correlation matrix

	dcpsb	lncii	gcf	gds	cpi	npl
dcpsb	1.0000					
lncii	-0.1358*	1.0000				
gcf	-0.0865	0.4353*	1.0000			
gds	-0.2344*	0.5160***	0.7710***	1.0000		
cpi	0.3577***	-0.2560***	0.2930**	-0.1148	1.0000	
npl	-0.5750***	-0.6781***	-0.1720	-0.1078	0.1127	1.0000

Significance Level: (*)< 10%, (**)< 5%, (***)< 1%

Table 3 exhibits the Pearson's correlation which serves as a means for checking the collinearity of each variable compared with the other variables needed to achieve the set objectives. The study set a threshold of 0.7 (following Kennedy, 2008) for the Pearson's correlation to be considered as the existence of high collinearity between a variable and other variables and find evidence of multicollinearity between gross capital formation and gross domestic savings. However, the two variables are kept in the OLS model because, Variance Inflation Factor (VIF)in Table 2 suggest that both variables can be used since their VIF values do not exceed the threshold of 10 (Brook, 2009; Kennedy, 2008).

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5.1 Empirical Results: ANOVA Results

Table 4: Difference in access to bank credit to private sector across the income brackets

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	3.9524	4.0000	0.9881	155.9377	0.0000***	2.5252
Within Groups	0.3802	60.0000	0.0063			
Total	4.3326	64.0000				

Significance Level: (*)< 10%, (**)< 5%, (***)< 1%

Table 4 exhibits the Anova results of the difference in access to credit across the income bracket groups as per the World Bank classification. With a null hypothesis of no significant difference in access to bank credit to private sector across the five income bracket groupings, the Anova results repots an F-critical of 2.5252 and a p-value of 0.0000 indicating that the study rejects the null hypothesis of no significant difference in access to credit across the income bracket groupings and concludes that there is a significant difference (under 1%) in access to credit across the income bracket groupings. This study argues that the significant difference found can be alluded to the result earlier empirical studies that provide evidences that credit availability in high income countries (developed countries) is better as compared to low income countries (developing countries) due to strong credit regulations and institutions in high income countries (see Miller, 2003, Djankov et al., 2007; Singh et al., 2009).

5.2 Empirical Results: OLS Regression Model

Table 5: OLS regression: impact of information sharing across the income brackets

dcpsb	Coef.	Std. Err.	|t|	P> |t|
lncii	0.0716	0.0302	2.37	0.0230**
gcf	-5.0351	1.1038	-4.56	0.0000***
gds	3.2041	0.9251	3.46	0.0010***
cpi	-2.8842	0.9775	-2.95	0.0060***
npl	-2.9839	0.3906	-7.64	0.0000***
cons	1.3854	0.1175	11.79	0.0000***
Number of Obs:		42		
R-Squared		0.7752		
Prob>F		0.0000		

Significance Level: (*)< 10%, (**)< 5%, (***)< 1%

Table 5 presents the OLS regression results on the impact of information sharing on access to credit across the income bracket groupings as per the World Bank. Independent variables employed includes logged values of information sharing index, ratio of gross capital formation to gross domestic product, ratio of gross domestic savings to gross domestic product, inflation measured by consumer price index and ratio of bank non-performing loans to gross loans. The dependent variable is a ratio of domestic credit to private sector by banks to gross domestic product. Variables span from 2000 to 2012.

From the regression above the variable of interest information sharing (cii) has a significant (under 5%) and positive relationship with access to bank credit across the income brackets. This implies that a unit increase in information sharing will lead to 0.0716 unit increases in access to credit by banks to the private sector.

This finding is consistent with the empirical evidences of Brown et al. (2009), Singh et al (2009) and Djankov et al (2007) who found that information sharing reduces collateral constraints to access to credit; hence making credit easily available to corporate institutions and individuals.

Gross capital formation (gcf) was negatively related to access to credit and significant under 1%. That is a unit increase in gross capital formation results in 5.0351 units decrease in access to credit. With gross capital formation representing additional funds spend on items such as equipments, machinery and other infrastructures; it consists of the use of available credit, hence reducing the available funds accessible to the private sector. This finding is in line with the neoclassical theory of economic.

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Again, given that banks are able to mobilize domestic savings (gds) which increases access to credit following the classical theory of economics, our results report similar finding. That is gross domestic savings is significant (under 1%) and positively related to access to credit meaning that a unit increase in gross domestic savings results in 3.2041 units increase in access to bank credit to private sector. This finding supports the classical theory of economics.

Inflation measured as consumer price index has a negative and significant impact (less than 1% significance level). This indicates that a unit increase in inflation leads to 2.8842 units decrease in access to credit to private sector by banks. This result is consistent with empirical finding that argue that inflation reduces access to credit. For instance Jiménez and Saurian (2005) argues that inflation shrinks the purchasing power of available funds making it difficult for banks to honor all qualified credit applicants.

Non-performing loans from the regression has a negative and significant impact on access to credit (under 1% significance level). A unit increase in non-performing loans leads to 2.9839 units decrease in access to credit to private sector by banks. Earlier empirical findings (Bennnardo et al. 2010; Kallberg and Udell 2003; Pagano and Jappelli 1993) suggest that non-performing loans reduces access to credit as banks put up more stringent and robust conditions for accessing credit. This reduces the chance of accessing credit. This finding is in line with these earlier studies.

5.3 Robust Checks and Diagnostics

To ensure our OLS model produces the best linear, unbiased and efficient coefficients, the study checks for outliers, multicollinearity, normality of errors and variables, heteroskedasticity and autocorrelation. The study screened for outlier and found no outlier using the descriptive statistics. The Pearson's correlation and Variance Inflation Factor (VIF) were employed to check for multicollinearity.

To ensure normality of variables (which is a key assumptions in regression), the study used the Shaprio Wilk normality test which provided evidence of normality (under 1%) for all variables. It must be noted that the variable of interest credit information sharing index had to be logged to attain normality since it was an index that ranged between the absolute values 1 and 6. All other variables were in ratio form hence attaining normality.

However, residuals were normality distributed under 10% (see Appendix 1). Employing the Breusch-Pagan / Cook-Weisberg test for heteroskedasticity (see Appendix 2), the study found evidence of constant variance in the model indicating robust coefficients.

However, the autocorrelation assumption was violated using the Wooldridge test for autocorrelation (see Appendix 3). Hence, the study used the robust standard error option to correct for autocorrelation in Stata 13.From the OLS regression output in Table 5, all the variable together are jointly significant (as indicated by Prob> F = 0.0000) and are able to explain 77.52% of the total variation in domestic credit to private sector by banks across the five income bracket groupings by the World Bank. These are indications that the model is fit and can be used for generalization to a large extent.

6. CONCLUSIONS AND POLICY RECOMMENDATIONS

The study set out to investigate the impact of information sharing and its impact on access to bank credit across the income bracket groupings. This was motivated by the fact that earlier studies focused on country level and sub-regional level analysis. Hence, this study aimed at providing global evidence by taking advantage of the income bracket groupings by the World Bank which captures all countries. The study further examined if there was a significant different in access to bank credit to private sector across the income bracket groupings. The finding suggests that access to bank credit by private sector varies across the five (5) income bracket groupings. This difference is attributed to the strong and effective nature of financial regulations and institutions in high income (developed) countries. This implies that for low income countries to bridge the gap in access to credit by private sector, low income countries must take queue from the financial system of high income countries and tailor it to suit their economy.

Also, the study provides global evidence that information sharing improves access to bank credit to private sector across the five income bracket groupings by the World Bank. From this, it is recommended that countries (especially developing economies) that do not sharing credit information in their bank industry should do so since it can help improve access to bank credit to private sector. Again, economies or countries that already share credit information should improve the efficiency and effectiveness of credit information sharing so as to derive the ultimate best from information sharing. For the purpose of future research direction, researchers can look into the effect of information sharing on bank non-performing loans as it is a major problem in most countries especially developing countries. Studies that examine factors that enhance information sharing are also needed to ensure information sharing provides positive effects on the financial system of countries.

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APPENDIX

Appendix 1

Shapiro-Wilk W test for normal data					
Variable	Obs	W	V	z	Prob>z
----------+----------					
Residuals	29	0.93164	2.119	1.549	0.06066

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Appendix 2

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of dcpsb
chi2(1) = 0.07
Prob > chi2 = 0.7971

Appendix 3

Wooldridge test for autocorrelation
H0: no first order autocorrelation
F(1, 3) = 41.984
Prob > F = 0.0075