**Credit information sharing and bank loan pricing: Do concentration and governance matter?**

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**Abstract**

The development of credit information sharing schemes in developing countries has gained significant attention in recent times along with ongoing financial sector reforms. In this paper, we provide first-hand evidence of the effect of credit information sharing on credit intermediation cost in these countries, and consequently ascertain the extent to which the credit information sharing–credit intermediation cost nexus may be accentuated by banking market concentration and governance quality. Using a large dataset covering 272 banks from 27 African countries over the 2004-2012 period, we uncover four new findings. First, we find that credit information sharing does reduce credit intermediation cost. Second, we show that the relationship between credit intermediation cost and credit information sharing is conditional on banking market concentration. Third, our findings suggest that governance quality moderates the effect of credit information sharing on credit intermediation cost. Finally, we find that banking market concentration reduces credit intermediation cost, but the effect is moderated by credit information sharing. Overall, our findings suggest that credit information sharing may serve as a useful policy tool for achieving financial sector stability in developing countries.

**Keywords**

* Credit information sharing
* Developing countries
* Banking market concentration
* Governance

*JEL* Classification:

* G14
* G21
* G38

**1. Introduction**

Information asymmetry between lenders and borrowers is seen as a major obstacle to accessing finance (Stiglitz and Weiss, 1981), and this has significant implications for credit intermediation cost. Economic theory suggests that credit information sharing can facilitate lending decisions of banks mainly by reducing adverse selection problems (Pagano and Jappelli, 1993) and agency costs in the form of moral hazards by encouraging loan repayment (Padilla and Pagano, 2000) and limiting overborrowing in multiple lending relationships (Bennardo et al., 2015). Indeed, the existing empirical evidence largely suggests that credit information sharing improves bank lending (e.g., Jappelli and Pagano, 2002; Houston et al., 2010; Fosu, 2014) and reduces default rates (e.g., Jappelli and Pagano, 2002; Brown et al., 2009; Dierkes et al., 2013; Fosu et al., 2019).

However, evidence relating to whether credit information sharing ultimately reduces intermediation costs is virtually non-existent. We address this research gap with a specific focus on developing countries in Africa, where, until recently, access to credit information about borrowers was a rarity. With low coverage and depth of credit information sharing and weak contract enforcement (Sacerdoti, 2005; Honohan and Beck, 2007; Nataliya, 2007; Fosu, 2014), it is not surprising that the African region records extremely low credit penetration (Mylenko, 2007) and excessively high loan rates (Honohan and Beck, 2007). This extreme credit intermediation cost further creates adverse selection problems, as safer borrowers drop out of the market, leaving the riskier ones (Stiglitz and Weiss, 1981). Consequently, financial sector development remains significantly low in the African region, even in comparison with other developing countries (Allen et al., 2012). Therefore, any attempts, including research, to help policy makers shape policies that improve the African financial system are steps in the right direction.

Accordingly, we contribute to the broad literature on the African banking system. Using a sample of 272 banks from 27 African countries and a dynamic system generalised method of moments (GMM) estimation, we examine the extent to which credit information sharing reduces credit intermediation cost in African banking markets. Second, we investigate the extent to which the effect of credit information sharing is conditional on the level of banking market concentration. Third, we assess the extent to which credit information sharing moderates the effect of banking market concentration on credit intermediation cost. Fourth, we investigate the extent to which governance moderates the effect of credit information sharing on credit intermediation cost.

We make several new contributions to the existing literature, including opening up a new research space by providing the first evidence (to the best of our knowledge) on the relationship between credit information sharing and credit intermediation cost. In doing so, we shed light on the ultimate real effect of information sharing on credit intermediation. Further, by conditioning the effect of credit information sharing on banking market concentration, we shed light on the complex interactions between credit information sharing, banking market concentration and credit intermediation cost. In particular, we show that credit market concentration and credit information sharing are to some extent substitutes, as far as their effect on credit intermediation cost is concerned. Hence, we highlight the potential distortions and risk-shifting effects of the pro-competition banking sector reforms in the absence of effective credit information sharing schemes. This further has policy implications given the ongoing reforms in Africa’s financial sector aimed at promoting competition through credit information sharing (Marquez, 2002).

Also, by conditioning the effect of credit information sharing on governance quality, we assess the extent to which national governance quality could substitute for the role of credit information sharing in reducing credit intermediation cost. Finally, we provide the first comprehensive study of the determinants of bank intermediation cost in Africa – a region with significant institutional and contextual differences, especially compared with those of developed countries, but one that is severely under-researched.

The rest of the paper proceeds as follows: Section 2 provides some background information on African banking markets. Section 3 examines the relevant literature, including theoretical underpinnings and develops relevant hypotheses. In Section 4, we discuss the sample, empirical design and measurement of key variables. Regression results and robustness checks are presented in Section 5 and, finally, Section 6 concludes the study with a summary of our main findings and their policy/managerial implications.

**2. The African context**

Prior studies have persuasively established that credit availability to households and firms is strongly influenced by the economic, financial, and legal/governance environment in which households/firms operate (Rajan and Zingales, 1998; La Porta *et al*., 1997). Accordingly, several factors, including the enforcement of contracts, the quality of governance, and the level of financial market development affect the cost of capital faced by firms, and by extension, the intermediation costs of banks. Legal, governance, and cultural systems with ineffective contract enforcement and higher agency (moral hazard) problems make it more challenging for banks to operate and, thus, make it extremely difficult for firms to obtain long-term finance (La Porta *et al*., 1997). Rajan and Zingales (1998) contend that well developed financial markets and institutions help firms, including banks, to overcome moral hazards and adverse selection (information asymmetry) problems, thereby reducing banks’ intermediation costs, as well as the costs of raising external finance for firms. By contrast, these problems are exacerbated in countries with underdeveloped financial markets and weaker institutions, thereby, raising banks’ intermediation costs and costs of borrowing for firms in such economies.

Most developing countries, particularly those across the African continent, share some features that expose them to severe agency and information asymmetry problems (Agyei-Boapeah and Machokoto, 2018; Gyapong, Monen, and Hu, 2016). First, inadequate corporate information disclosures and the absence of well-functioning public credit information sharing systems in many African economies (Fosu, 2014), exacerbate the information asymmetry problems in financial markets and make it more difficult for banks to lend at reasonable intermediation costs. Second, the legal, governance, cultural and judicial systems in the region are plagued by obsolete laws and bureaucratic procedures, insufficient resources, and corruption (Biggs and Shah, 2006), that results in public perception of a legal and judicial system that is unworkable, too costly, and slow for resolving commercial disputes. Furthermore, the economies of most African countries are prone to shocks, such as periodic weather-related distress in agriculture, civil conflicts, frequent policy changes and infrastructure breakdowns, among others (see Agyei-Boapeah and Machokoto, 2018; Collier and Gunning, 1999). These shocks to the economic system tend to cause unanticipated changes in prices and transaction costs, resulting in unexpected changes in borrowers’ cash flows. In such shock-prone circumstances, bank lending becomes extremely challenging, leading to higher intermediation costs for most African banks.

Fortunately, recent years have witnessed some crucial reforms in several developing countries which inspire hope for African banks. The reforms include the development of credit information sharing schemes, financial sector reforms and improvements in political governance that are aimed at strengthening financial institutions by reducing credit default rates (see Marquez, 2002; Brown et al., 2009; Fosu et al., 2019). For instance, based on World Bank data covering 87 developing countries (and including 26 African countries), Fosu et al. (2019) suggest that the depth of credit information shared among lenders in developing countries surged by over 72% from 2004 to 2012 (i.e., depth of credit information index climbed from an average of 2.47 in 2004 to 4.26 in 2012). They further report that the improvements in the credit information sharing schemes have improved the loan portfolio quality in developing countries.

It is, however, not clear whether the better quality of loans on the balance sheet of African banks, resulting from improvements in information sharing schemes in many African countries, translates to lower intermediation costs for banks. We, therefore, take advantage of the recent improvements in data coverage for information sharing to examine the effect of credit information sharing on banks’ intermediation costs using a large dataset of 272 banks across 27 African countries over the 2004-2012 period.

**3. Related literature and hypotheses**

The 2007-08 global banking crisis has stimulated interest in the challenges posed by banks’ dual roles as liquidity providers (Diamond, 1984) and delegated monitors (Diamond and Dybvig, 1983), especially in opaque environments and weak governance contexts (Adegbite, 2015). At the centre of this endeavour is an attempt to understand the benefits derived from credit information sharing institutions. In particular, prior studies have attempted to relate information sharing to a number of issues and outcomes, including private credit (Grajzl and Laptieva, 2016); collateral value (Karapetyan and Stacescu, 2014); default risk (Dierkes et al. 2013); firm performance (Doblas-Madrid and Minetti, 2013); banking crisis (Büyükkarabacak and Valev, 2012); and credit market performance (Daniels and Ramirez, 2008; Brown et al. 2009; Fosu, 2014). These studies are unequivocal in their findings, arguing that credit information sharing facilitates lending decisions. However, almost entirely missing from these studies is a direct examination between information sharing and credit intermediation cost.

For example, the theoretical literature identifies several channels through which credit information sharing can affect lending decision. First, the adverse selection channel, as shown in Pagano and Jappelli (1993), suggests that credit information sharing facilitates banks’ lending decisions. Typically, banks face the risk of adverse selection when faced with the challenge of deciding whether to lend to a new pool of potential borrowers. Pagano and Jappelli (1993) show that credit information sharing amongst banks can help lending banks make an accurate assessment of the credit worthiness of the new potential borrowers. Ultimately, the pool of borrowers increases. Hence, one can expect intermediation cost to decrease as banks are able to lend safely and scale economies accrue.

The moral hazard theory suggests that credit information sharing reduces borrower default by both reducing borrower holdup problems and disciplining borrowers. Private information about borrowers acquired by banks permits them to extract rent by pricing their loans relatively high, and thereby often leads to borrower default. Credit information sharing helps to reduce the information rent, encourages borrower effort and reduces default risk (Padilla and Pagano, 1997). Borrower disciplinearises where there is adequate information sharing, which implies that defaulting borrowers will be blacklisted and face high costs when trying to access finance in the future. Hence, credit information sharing improves borrowers’ efforts to repay and reduces default risk (Klein, 1992; Vercammen, 1995; Padilla and Pagano, 2000). Furthermore, the overall indebtedness of an individual borrower from all lending sources is revealed through information sharing, thus mitigating potential over-borrowing from multiple lenders (Bennardo et al., 2015), which subsequently reduces loan default rates. Ultimately, credit information sharing should lead to a reduced credit intermediation cost.

The above theoretical predictions have received rich empirical support. For instance, in a cross-sectional study of 43 countries, Jappelli and Pagano (2002) find that credit information sharing increases bank lending to the private sector, measured as private credit to gross domestic product. Similarly, and using bank-level data, Fosu (2014) reports that information sharing increases bank lending. Further, Brown et al. (2009) and Love and Mylenko (2003) find that information sharing reduces credit constraints on firms. On borrower default, Jappelli and Pagano (2002) and Behr and Sonnekalb (2012) find that credit information sharing reduces borrower default. More recently, Bahadir and Valev (2019) report that credit information sharing disproportionately increases lending to households relative to businesses. Due to data unavailability, a bulk of the prior empirical literature excluded African countries, leaving policy makers in Africa with very little guidance on how credit information sharing schemes could impact the economy. The current study sets out to fill this gap by examining the impact of credit information sharing on the intermediation costs of African banks.

Overall, the foregoing discussion suggests that credit information sharing reduces adverse selection costs and moral hazard problems, and thus facilitates bank lending decisions. Realisation of these benefits of credit information sharing should lead to reduced credit intermediation cost. We, therefore, formulate our first hypothesis as follows:

*H1: Credit information sharing reduces credit intermediation cost.*

Another strand of the literature also suggests that the role of information sharing on bank lending decisions is moderated by banking market concentration. For example, Petersen and Rajan (1995) report that concentration in banking markets leads to a long-term lending relationship, which can facilitate the acquisition of soft credit information about borrowers. Further, Marquez (2002) and Hauswald and Marquez (2006) suggest that banking sector concentration increases the pool of borrowers per bank in the banking market. Moreover, Cetorelli and Peretto (2000) show that concentrated banking markets are characterised by more efficient screening compared to less concentrated banking markets. The foregoing arguments suggest that credit information sharing is less beneficial in facilitating lending decisions in concentrated markets. This review leads to our second hypothesis as follows:

*H2: The effect of credit information sharing on credit intermediation cost is conditional on banking market concentration.*

It is noteworthy that the extant literature is inconclusive on the effect of banking market concentration on credit intermediation cost. For instance, a strand of the literature suggests that concentrated banking markets are inefficient, as having only a few larger banks stifles competition (Berger and Hannan, 1998) and makes the banks assume a “too big to fail” status (Acharya et al., 2013). On the other hand, banking market concentration could emerge from a situation in which the presence of more efficient banks drives less efficient ones out of the market, suggesting that less concentrated banking markets are efficient (Demstz, 1973). Nonetheless, it is insightful to note that credit information sharing has a role to play in the concentration-efficiency nexus. On the one hand, by facilitating the acquisition of credit information (e.g., Petersen and Rajan 1995; Cetorelli and Peretto, 2000), the effect of concentration on credit intermediation cost can be moderated by credit information sharing. These arguments lead to our third hypothesis as follows:

*H3: Credit information sharing moderates the effect of banking market concentration on credit intermediation cost.*

We take the view that the nature of the institutional environment is likely to impact on the relationship between information sharing and credit intermediation cost. For instance, Brown et al. (2009) and Fosu (2014) note that information sharing is an important determinant of credit market performance, especially in countries where governance quality, rule of law, control of corruption and regulatory quality are weak. Furthermore, Djankov et al. (2007) show that, whilst credit information sharing mitigates bank risk-taking, the effect decreases with the quality of creditor rights protection. The foregoing suggests that information sharing plays a substitution role to institutional quality as it mitigates the effects of weak protection afforded to creditors. In the light of the above discussion, we formulate our fourth hypothesis as follows:

*H4: The effect of credit information sharing on credit intermediation cost is moderated by governance quality.*

The foregoing suggests that information sharing generally improves lending decisions. We, thus, argue that credit information sharing should also help reduce credit intermediation cost. Further, it posits that the effect of credit information sharing on intermediation cost is moderated by the extent of banking market concentration and the quality of governance. We extend the existing literature by exploring these hypotheses further. With African countries characterised by low banking depth and breadth (Fosu, 2014; Tahir, et al., 2016), credit information sharing remains one of the substantial issues that impact on lending decisions. However, on the whole, research on information sharing in this context is scant to date. In response, we depart from the existing literature by providing new evidence on the link between information sharing and banks’ intermediation cost, specifically highlighting the interaction effects of banking market concentration and institutional quality.

**4. Data and empirical methodology**

**4.1. Data description**

Bank-level data for this study was obtained from Bankscope database, which contains information on banks around the world. The sample period for this study is from 2004 – 2012.[[3]](#footnote-3) In line with existing literature (e.g. Fosu, 2013; Beck et al, 2013), a number of exclusion criteria were applied. These include the exclusion of countries with fewer than 10 bank observations. Also, banks with less than three consecutive years of observations were excluded. Finally, bank-year observations with missing data on key variables were also dropped. A total of 272 banks from 27 countries in Africa were employed in our analysis. Information sharing variables and other macroeconomic variables used were obtained from the World Bank Doing Business and World Bank World Development Indicators, respectively. Governance variables were obtained from Worldwide Governance indicators. Details of sample construction procedures and justification for filters, as well as the sample distribution across the 27 countries are provided in Appendixes 1 and 2.

**4.2. Measurements of variables**

The measures used in this study were chosen in line with the previously discussed empirical and theoretical literature. This is important to enable us compare our results with prior research. We draw on the extant literature (e.g. Demirgüç-Kunt et al., 2003; Valverde and Fernández, 2007; De Haan and Poghosyan, 2012) and include a number of bank-specific and macroeconomic variables in our analysis. To minimize estimation challenges associated with outliers, we follow standard procedures in the literature to winzorise all continuous variables at the top and bottom 1%. All variables have been fully defined under Table 1, as well as in Table A1 in the appendices, and are discussed below.

**4.2.1. Credit information sharing and intermediation cost**

Consistent with the emerging empirical literature on the role of information sharing on credit markets (e.g. Fosu, 2014; Nana, 2014), we adopt the depth of credit information sharing index as our main measure of information sharing. This index “measures rules and practices affecting the coverage, scope and accessibility of credit information available through either a public credit registry or a private credit bureau” (World Bank Doing Business, 2016). Over our sample period, the index ranges from 0 to 6, where higher values indicate the availability of more credit information to help in lending decisions. Zero index means that the credit registry or private credit bureau is non-operational, or its coverage falls below 1% of the adult population. In order to provide a robustness check, two other measures of credit information sharing are adopted. These are credit registry coverage and credit bureau coverage. Credit registry coverage measures the number of individuals and firms listed by a public credit registry concerning the information on their borrowing history for the past five years, expressed as a percentage of the adult population. Similarly, credit bureau coverage measures the number of individuals and firms listed in a private credit bureau concerning the information on their borrowing history for the past five years, expressed as a percentage of the adult population**.**

Following other scholarly works (e.g., Valverde and Fernández, 2007; Aydemir and Guloglu 2016), our study utilises the difference between loan rate and deposits rate, otherwise referred to as spread, as a measure of credit intermediation cost.

**4.2.2. Concentration**

In the light of extant literature (e.g., Beck et al., 2006; Fosu, 2014; Dietrich, 2016), we measure banking market concentration by using the three-bank concentration ratio defined as the share of assets of the largest three banks as a percentage of the entire banking assets. The choice of this measure as against other alternative measures (e.g., the Herfindahl–Hirschman Index and five-bank concentration) is due to the fact that the sample size changes over the sample period and this could lead to a measurement error if we utilised more than the top three banks (see Beck et al., 2006).

**4.2.3. Other bank-specific factors**

The econometric models we specify in our study also account for other bank-specific variables. These include size, liquidity of bank assets, loan loss provisions, lending specialisation, deposit mix, bank equity, fee income and inefficiency. Bank size is defined as the logarithm of the total bank assets. Size may be an important determinant of credit intermediation cost where there are increasing returns to scale in banking (Demirgüç-Kunt et al., 2003). Also, liquidity is computed as the percentage of liquid assets to total assets of the bank and this accounts for differences in bank assets. Empirical literature (e.g., Demirgüç-Kunt et al., 2003) argues that banks that have a high level of liquid assets in the form of cash and government securities may receive lower interest income than their counterparts that charge a higher liquidity premium. Loan loss provisions is measured as the percentage of loan loss provisions to total loans and this accounts for borrowers’ default risk (Lepetit et al., 2008). Lending specialisation is also defined as the percentage of total loans to total assets. An increase in the lending specialisation may lead to an increase in efficiency, hence, a lower intermediation cost (e.g. Petersen and Rajan 1995; Valverde and Fernández, 2007). Deposit mix is also defined as the percentage of total deposits to total liabilities. This accounts for the level of reliance on deposit funding. Bank equity is measured as the ratio of book value of equity to total assets. This accounts for the effects of leverage on risk level and the required risk premium (Lepetit et al., 2008). Fee income is the ratio of net fees and commissions to total assets. This accounts for differences in the pricing of the product mix offered by banks (Demirgüç-Kunt et al., 2003). Finally, we measure inefficiency as the ratio of overheads to total assets (Demirgüç-Kunt et al., 2003).

**4.2.4. Macroeconomic and governance variables**

In line with other empirical studies (e.g., Valverde and Fernández, 2007; Demirgüç-Kunt et al., 2003), we control for a number of country-specific traits. This is to ensure that the relationship between credit information sharing and intermediation cost is not driven by macroeconomic variations. These variables include inflation measured as the annual percentage change in consumer price index. This accounts for possible uncertainty in the credit market (Fosu, 2014). We also include growth in gross domestic product (GDP Growth), which is measured as the annual percentage change in real GDP. The inclusion of this variable is to account for changes in credit demand within a country, as well as the possible variations in adverse selection and moral hazards in business cycles (Altunbas et al., 2009; Andrianova et al., 2015). In addition to the variables described above, we also include a number of governance indicators. These include rule of law, control of corruption and regulatory quality. The rule of law measures “perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence” (Kaufmann et al., 2011, p. 223). The control of corruption index measures “perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as ‘capture’ of the state by elites and private interests” (Kaufmann et al., 2011, p. 223). Finally, the regulatory quality index captures “perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development” (Kaufmann et al., 2011, p. 223).

**4.3 Estimation method**

We formulate empirical models in this section to test out our main argument. In order to do this, and consistent with the extant literature (e.g., Cole et al., 2016), we adopt a panel data approach, which permits bank- and country-level variables to vary over time. In order to cater for the likelihood that credit intermediation cost may not have been observed under long-run equilibrium for any given year, we adopt a dynamic estimation approach to accommodate the possibility of partial adjustment towards equilibrium. Our baseline model is therefore presented as:

$ $  (1)

Where represents the bank  in country. is our measure of credit intermediation cost;  is the information sharing index, which is alternately the depth of credit information sharing, credit registry coverage and private credit bureau coverage.  is the banking market concentration ratio; is bank-specific variables; is macroeconomic and governance variables (that is, GDP growth rate and inflation) and governance indicator, which is alternately rule of law, regulatory quality and control of corruption; and is an error term composed of bank fixed effect () and an independently and identically distributed component with zero mean and constant variance ().

Eq. (1) permits us to test our first hypothesis. In order to test the next two hypotheses, we modify Eq. (1) by including interaction terms of credit information sharing variables with banking market concentration. We then obtain Eq. (2) as follows:

 (2)

We derive the marginal effect of credit information sharing by differentiating Eq. (2) with respect to the banking market concentration as follows:

 (3)

Similarly, we derive the marginal effect of banking market concentration by differentiating Eq. (2) with respect to the information sharing variable as follows:

 (4)

We modify (2) and (3) in a similar fashion to provide further extensions and examples, including the moderating roles of governance quality on the marginal effect of credit information sharing.

The estimation of Eqs. (1) and (2) poses an endogeneity problem as follows. First, the bank fixed-effects may be correlated with the other explanatory variables. This problem can be addressed by first differencing the equations to wipe out the bank fixed-effects. Second, the lagged dependent variables are, by construction, correlated with the differenced error terms. This problem can be addressed by using the difference generalised method of moments (GMM) estimator proposed by Arellano and Bond (1991), where the lagged levels of the endogenous variables are used as instruments for the differenced equation in Eqs. (1) and (2).[[4]](#footnote-4) Absence of serial correlation in the original error term,, and weak exogeneity of the explanatory variables will permit the following moment conditions:

 for (5)

 for (6)

It is noteworthy that the lagged levels of the explanatory variables could be inefficient instruments for their first differences due to reasons such as persistence or measurement errors (Blundell and Bond, 1998; Alonso-Borrego and Arellano, 1999). Therefore, to improve efficiency, the levels equation can be combined with the differenced equation as a system of equations (Arellano & Bover, 1995; Blundell & Bond, 1998). Accordingly, the lagged first-differenced variables can serve as instruments for the corresponding variables in levels. This leads to the following additional moment conditions[[5]](#footnote-5):

 for (7)

 for (8)

First-order serial correlation in the first-differenced equation is expected by construction. However, second-order serial correlation in the differenced equation would suggest possible first-order serial correlation in the levels equation (Roodman, 2009) and undermine the moment condition. We, therefore, report the Arellano-Bond tests for first-order and second-order serial correlations in the differenced residuals. Next, we compute the Hansen test of overidentifying restrictions to test for the validity of the over-identification restrictions. Finally, we correct the standard errors for finite sample bias by using the two-step covariance matrix proposed by Windmeijer (2005).

**5. Results and discussion**

This section presents the descriptive statistics and estimation results of the paper. We first present the descriptive statistics and correlation matrix for the variables of the study. We then move to the results for our baseline models, where bank intermediation cost is explained by credit information sharing (Table 3). Next, we follow this up by conditioning the effect of credit information sharing individually on banking market concentration (Tables 4 and 5) and governance (Tables 6 and 7). We further subject out results to a range of robustness tests (Tables 8 -10).

First, all of our estimation restricts the maximum lag-dependent variable to 1, as we seek to reduce the number of moment conditions. The lagged dependent variables do enter all regressions with statistically significant coefficients, justifying the use of a dynamic model approach in our estimation. The Hansen test *p*-values are all above 1, suggesting that the over-identification restrictions are valid. Finally, we cannot reject the absence of second-order serial correlation in our models, hence suggesting that our use of a dynamic model is appropriate.

**5.1. Descriptive statistics and correlations**

In Table 1, we present the summary statistics of the variables used in this study. The information is confined to 1,487 observations.

**[Table 1 about here]**

A few findings are worth noting. The average value of spread is 8.25. The minimum and the maximum values of this variable are -1.6 and 27.44 respectively. This suggests a high degree of heterogeneity across banks. Our average spread of 8.25% compares to 6.00% reported in Valverde and Fernández (2007) for Germany, Netherlands and Sweden. This implies a higher banking intermediation costs for African banks relative to European banks. The mean value of depth of credit information sharing index (which is our main measure of credit information sharing) is 1.28. This compares to 3.54 in Fosu et al. (2019), whose data coverage extend to developing countries across the globe. This suggests that development of information sharing schemes in Africa is still at the nascent stage compared to developing countries on other continents. The mean values of our alternative measure of credit information sharing (i.e., credit registry coverage and credit bureau coverage) are 3.02 and 8.21 respectively. These again compare to statistics of 9.37 and 29.00 in Fosu et al. (2019). Moving beyond this, the correlation among the variables (as presented in Table 2) reveals that credit information sharing (as measured by depth of information sharing index) is negatively associated with bank intermediation cost. Additionally, the other two measures of information sharing (i.e., credit registry coverage and credit bureau coverage) are both negatively related to bank intermediation cost. Two of the governance measures (i.e., control of corruption and regulatory quality) are strongly correlated with each other. However, this poses no concerns about multicollinearity as these variables do not enter the regression at the same time. Further, there is no issue of multicollinearity with any of the causal variables employed.

Overall, the descriptive statistics and the correlation matrix suggest that statistical problems, such as lack of variations and multicollinearity, are unlikely to plague our analysis.

 **[Table 2 about here]**

**5.2 Credit information sharing and credit intermediation costs**

Our baseline results, presented in Table 3, suggest that credit information sharing reduces credit intermediation costs. In Models 1-3, we use the depth of credit information sharing as our main measure of the information sharing. We then control alternately for governance indicators of rule of law, regulatory quality and control of corruption. The depth of credit information sharing enters each of the regressions with a negative sign and a statistical significance at the 1% level. The results suggest that a one unit increase in the depth of credit information index is associated with a between 0.31 and 0.37% percentage point reduction in credit intermediation cost. In fact, the effect of credit information sharing is also not economically significant. The average spread is 8.25% and the standard deviation of the depth of credit information sharing is 2.18. Hence, in economic terms, a one standard deviation increase in the depth of credit information sharing will reduce credit intermediation cost by up to 9.77% [100 X (2.18 X 0.37)/8.25].

**[Table 3 about here]**

We confirm our findings on the negative relationship between information sharing and credit intermediation costs in the following six models of Table 3 using alternative measures of information sharing, namely, credit registry coverage (Models 4-6) and credit bureau coverage (Models 7-9). The coefficient of the credit bureau coverage is negative and statistically significant, but the coefficient on the credit bureau coverage is statistically insignificant. The findings in Models 4-6 suggest that a one standard deviation (8.37) increase in credit registry coverage is associated with a between 0.15 and 0.18 percentage point reduction in credit intermediation costs, which amounts up to 2.13% reduction in the credit intermediation cost of the average bank.

Overall, these findings provide support for Hypothesis 1 and thus are broadly consistent with previous literature which suggests that credit information sharing improves bank lending (Jappelli, and Pagano, 2002; Brown et al., 2009; Fosu, 2014). Our findings provide some support for the theoretical position that information sharing mechanisms could reduce information asymmetry, agency and moral hazards problems in financial markets, and subsequently lower borrowing cost to boost investment.

The coefficients on banking market concentration offer an important insight; they are negative and largely statistically significant in all models, suggesting that banking market concentration reduces credit intermediation cost. The effect of concentration on credit intermediation cost is also economically significant. For instance, based on Model 8, a one standard deviation increase in concentration reduces bank intermediation cost by as much as 2.89%. These results are broadly consistent with the literature which suggests that banking market concentration fosters relationship building, hence the acquisition of soft credit information (e.g., Fosu, 2014; Petersen and Rajan, 1995).

We draw further insight into what drives bank intermediation cost from the coefficients on the other control variables. Liquidity enters all models with a positive and statistically significant sign. This suggests that highly liquid banks have higher credit intermediation cost, reflecting higher charges for liquidity premium (e.g., Angbazo, 1997; Valverde and Fernández, 2007). The coefficient on provisions has a positive sign and is largely statistically significant. This suggests that banks with higher default risk have higher credit intermediation cost. The coefficient on Deposits is negative and largely significant, suggesting that banks that depend on stable deposit funding have lower credit intermediation. The coefficient on Fees is negative and statistically significant across all models. This suggests that banks with diversified income sources have lower credit intermediation costs (Demirgüç-Kunt et al., 2003). Inefficiency has a statistically significant positive coefficient across models. This suggests that banks that are inefficient have higher credit intermediation cost. The results further suggest that GDP growth and inflation increase bank intermediation cost. The governance indicators of rule of law, regulatory quality and control of corruption all have a positive impact on credit intermediation cost. However, the coefficients on these variables are statistically insignificant in the models using credit registry coverage and private bureau coverage as the measure of credit information sharing. This effect could be attributed to the fact that improved governance quality enables banks to extend credit to poor-quality borrowers, albeit at a high rate (Demirgüç-Kunt et al., 2003).

**5.3 Credit information sharing, concentration and credit intermediation cost**

The results presented in the preceding section conditioned bank intermediation costs on the level of credit information sharing. However, to the extent that banking market concentration reduces the dispersion of credit information (Marquez 2002; Fosu, 2014), increases the degree of credit market screening (Cetorelli and Peretto, 2000) and increases the acquisition of soft credit information through increased relationship banking (Petersen and Rajan, 1995), we now proceed to condition on banking market concentration the relationship between credit information sharing and credit intermediation cost. We present the findings in Table 4.

**[Table 4 about here]**

In Models 1-3 of Table 4, we confirm the negative relationship between credit information sharing and credit intermediation cost, but we also find evidence for the moderating role of banking market concentration. The coefficients on the depth of credit information sharing remain negative and statistically significant. Interestingly, the coefficients on the interaction terms between credit information sharing and banking market concentration are also positive and statistically significant, suggesting that the reduction in credit intermediation cost arising from credit information sharing is lower in concentrated banking markets.

**[Table 5 about here]**

We evaluate the statistical and economic significance of this finding by presenting in Table 5 the marginal effect of the depth of information sharing evaluated at the relevant levels of banking market concentration. For instance, based on Model 1 of Table 4, the marginal effect analysis in Table 5 shows that, at the 25th percentile of concentration, the marginal effect of credit information sharing on credit intermediation cost is -0.405. This effect reduces to -0.219 at the 75th percentile of banking market concentration. Similar results are obtained based on Models 2-3 of Table 4: the marginal effect ranges between -0.382 and -0.441 at the 25th percentile of concentration but -0.238 and -0.293 at the 75th percentile. These changes in the marginal effect of the depth of credit information sharing are statistically and economically significant. For instance, in economic terms, the reduction in credit intermediation cost per one standard deviation increase in the depth of credit information sharing for the average bank could be up to 4.91% lower at the 75th percentile of banking market concentration compared to the 25th percentile. These findings provide support for Hypothesis 2.

In Models 4-6 of Table 4, we confirm the moderating effect of banking market concentration on the relationship between credit information sharing and credit intermediation cost. The coefficients on the credit registry coverage remain negative and statistically significant at the 1% level, whilst the coefficients on the interaction term between this variable and banking market concentration are positive and statistically significant at the 1% level. The finding suggests that, although an increase in credit registry coverage is associated with a reduction in credit intermediation cost, the reduction in credit intermediation cost decreases with banking market concentration. For instance, whilst the marginal effect of credit registry coverage is between -0.02 to -0.03 at the 25th percentile of banking market concentration, it turns out to be 0.01 at the 75th percentile[[6]](#footnote-6). This change in the marginal effect is significant, statistically and economically. In economic terms, this represents a 2.87-3.49% reduction in the economic significance of credit registry coverage.

In Models 7-9, we present the results based on credit bureau coverage. Although the coefficient on the credit bureau is consistently negative, it remains statistically insignificant, confirming the earlier results suggesting that the private bureau coverage does not significantly impact on credit intermediation cost.

The coefficients on concentration in Table 4 remain negative, as in Table 3, confirming that banking market concentration reduces credit intermediation cost. However, we interpret this finding with a fair amount of caution since the interaction terms between concentration and the credit information sharing variables are positive, albeit statistically insignificant for the models using private bureau coverage as the main measure of credit information sharing. In fact, the results suggest that, although banking market concentration reduces credit intermediation cost, the reduction in credit intermediation cost is limited by credit information sharing. This finding provides support for Hypothesis 3.

Thus, overall, our findings suggest that there exists some level of substitutability between credit information sharing and banking market concentration, which is consistent with the literature that suggests that banking market concentration aids the acquisition of soft credit information via long-term relationship (e.g., Fosu, 2014).

**5.4 Credit information sharing, governance and credit intermediation cost**

In this section, we further investigate the relationship between credit information sharing and credit intermediation cost, paying particular attention to the moderating role of governance quality - rule of law, regulatory quality and control of corruption - underpinning the extent of creditor protection in banking markets. We present the findings in Table 6.

**[Table 6 about here]**

The results in Table 6 suggest that country-level governance quality moderates the effect of credit information sharing on credit intermediation cost, to a large extent. In Models 1-3 of Table 6, the coefficients on the depth of credit information sharing remain negative and significant at the 1% level. However, the interaction terms between the depth of credit information sharing and the governance variables have positive and statistically significant coefficients. Table 7 presents the marginal effect analysis to support the interpretation of the interaction effects.

**[Table 7 about here]**

The marginal effects analysis in Table 7 shows that, based on Model 1 of Table 6, the marginal effect of the depth of credit information sharing is -0.439 at the 25th percentile of rule of law but -0.272 at the 75th percentile. The marginal effects are statistically significant at the 1% level and also economically significant. For instance, a country at the 25th percentile of rule of law can experience a reduction in credit intermediation cost by 11.60% of the mean credit intermediation cost per one standard deviation change in the depth of credit information sharing. For a country at the 75th percentile of rule of law, however, the reduction in credit intermediation cost per one standard deviation change in the depth of credit information sharing would be only 7.19%. This represents a 4.41 percentage point reduction across the spectrum. We find similar evidence in Models 2 and 3; for instance, the difference between the reduction in credit intermediation cost arising from a one standard deviation increase in the depth of credit information sharing at the 25th and 75th percentiles of control of corruption is 4.78 percentage points.

We do not find a similar moderating effect of governance quality on the effect of credit registry coverage, as the interaction terms between the governance quality variables and the credit registry coverage enter the regression with insignificant coefficients (Models 4-6). However, we do find supporting evidence in Models 7-9, where the interaction terms between private bureau and governance quality of rule of law, regulatory quality and control of corruption enter with positive and statistically significant coefficients.

In conclusion, our evidence largely suggests that any reduction in credit intermediation cost arising from information sharing mechanism is moderated by governance quality. This thus provides support for Hypothesis 3.

**5.5 Credit information sharing, concentration, governance and credit intermediation cost**

In this section, we control jointly for the interaction effects of concentration and governance quality on the relationship between credit information sharing and credit intermediation cost. We present the results in Table 8.

**[Table 8 about here]**

The results in Table 8 show that the coefficients on the credit information sharing variables remain negative across all models except in Model 8. The coefficients remain statistically significant at the 1% level across Models 1-6, but are statistically insignificant in Models 7-9. These results confirm the findings presented in the preceding sections, suggesting that the depth of credit information sharing and increased credit registry coverage reduce credit intermediation cost, thus providing support for Hypothesis 1.

In Model 1 of Table 8, the coefficient on the interaction term between concentration and depth of credit information sharing also remains positive and statistically significant. However, whilst the coefficient on the interaction term between rule of law and depth of credit information sharing also remains positive, it is statistically insignificant. Overall, these findings confirm the moderating role of concentration in the relation between credit information sharing and credit intermediation cost, and that this role overshadows that of rule of law. In Model 2, however, the moderating role of regulatory quality appears statistically significant whilst the moderating role of concentration does not. Finally, the interaction terms involving concentration and control of corruption are both statistically insignificant in Model 3, although they remain positive. Whilst a relatively higher degree of correlation amongst the interaction terms leads to loss of efficiency, the marginal effects of the respective variables are statistically significant. We provide the marginal effect analysis in Table 9.

The marginal effect analysis in Table 9 confirms that, for any given level of the governance indicators of rule of law, regulatory quality and control of corruption, the effect of credit information sharing decreases with the level of concentration. Similarly, the governance indicators moderate the effect of credit information sharing on credit intermediation cost at any given level of concentration. However, the magnitude of the moderating role of concentration (that is, the change from the 25th percentile to the 75th percentile) is statistically significant only when the moderating role of governance being controlled for is that of rule of law. Interestingly, in these specifications, the magnitude of the moderating role of rule of law on the effect of depth of credit information sharing is insignificant, whilst that of regulatory quality is significant.

In Models 7-9 of Table 8, we confirm the moderating role of banking market concentration in the relationship between credit registry coverage and credit intermediation cost; however, the moderating role of the governance indicators are not statistically significant. Further, the coefficients on the interaction between private credit bureau and governance indicators are positive and statistically significant. With negative and statistically significant coefficients on the governance indicators of rule of law and regulatory quality, the evidence suggests that credit bureau coverage moderates the impact of governance quality on credit intermediation cost.

 **[Table 9 about here]**

The findings suggest that the overall quality of regulation is of paramount importance for the efficiency of banks’ credit intermediation role in developing countries. However, the findings suggest that rule of law cannot be an effective substitute for effective credit information sharing in developing countries.

**5.6 Credit information sharing and credit intermediation cost – Endogeneity**

In this section, we address the potential of endogeneity problems to plague our findings. Such problems may arise from possible reverse causality between credit information sharing and credit intermediation cost. For instance, it is likely that a move towards facilitating lending decisions may lead to a decision to establish credit information-sharing schemes. This may not be a problem in our setup since we instigate credit intermediation cost at the bank level in relation to credit information sharing mechanism at the country level. This notwithstanding, we test for the robustness of our models by endogenising our main information sharing measure, the depth of credit information sharing.

We follow Büyükkarabacak (2012) and Houston et al. (2010) and choose as instruments urbanisation, population size and geographical latitude. As argued in Büyükkarabacak (2012), larger population size and urbanisation impede the dissemination of information in a country. Moreover, it is argued that geography defines overall institutional development, and consequently financial development (Acemoglu et al., 2005; Beck, et al., 2009). Meanwhile, these factors should not directly affect bank credit intermediation cost, especially after controlling for the overall lending volume. These arguments suggest that these factors could serve as valid external instruments for information sharing. We present the results for the endogenous credit information sharing in Table 10. The Hansen test *p*-values remain consistently higher than 0.1, justifying the validity of the instruments.

**[Table 10 about here]**

The results in Table 10 confirm the negative effect of credit information sharing on bank credit intermediation cost. The coefficient on the depth of credit information enters all the models with a negative sign and is statistically significant. Additionally, the interaction terms between credit information sharing and concentration (Model 2), on the one hand, and credit information sharing and governance indicator of rule of law (Model 3), on the other hand, remain positive and significant. Finally, the two interaction terms remain positive and statistically significant when we control for them jointly (Model 4).

Overall, these findings corroborate the earlier findings suggesting that credit information sharing reduces bank credit intermediation cost but less so in a more concentrated banking market and banking markets with relatively good governance.

**6. Conclusion**

The findings of prior studies suggest that credit information sharing can have a number of positive effects, including reducing default rates, enhancing access to private credit, and improving credit performance (Jappelli, and Pagano, 2002; Brown et al. 2009; Fosu, 2014). However, the extent to which credit information sharing influences credit intermediation cost has rarely been examined. Consequently, in this paper, we seek to offer fresh perspectives to the growing literature on credit information sharing by empirically examining the relationship between credit information sharing and bank intermediation cost in developing countries, with a specific focus on banks in Africa. In particular, and motivated by the growing attention being paid both to banking competition and to credit information mechanisms in developing countries, we provide first-hand evidence using a sample of 272 banks from 27 countries in Africa over a 9-year period (i.e., 2004-2012). Notably, evidence presented here indicates that credit information sharing leads to a reduction of banks’ intermediation costs. However, the extent to which credit intermediation reduces in response to credit information sharing is moderated by banking market concentration and, to a large extent, governance quality. By way of extension, we also find that banking market concentration reduces credit intermediation costs, but the effect decreases with credit information sharing. These findings are novel and our empirical findings remain robust to alternative econometric methods.

A major implication of our study is that greater information sharing leads to a lower intermediation cost for borrowers in developing countries, where institutional voids make adverse selections and moral hazards severe problems for banks. Therefore, the promotion of credit information sharing schemes across the African continent seems to be a step in the right direction since it has the potential to improve the balance sheets of banks, boost lending and even make the financial system more stable. However, in order to reap greater benefits from information sharing, policy makers in countries with highly concentrated banking markets may need to take steps to increase competition, and perhaps reduce the risk of inefficient lending. Another implication of our study is that information sharing through the public credit registries seems to achieve greater desirable outcomes than those shared through the private credit bureaus. Therefore, policy makers in Africa seeking to drive down banking intermediation costs should focus more the public credit registries.

Although our study focuses on African countries, which share some similar institutional characteristics with other developing economies, thus providing a basis for the generalisability of the results to other developing economies, nonetheless, some institutional differences between developing countries, on the one hand, and emerging economies, on the other hand, suggest a natural extension of our study to other emerging economies. In the light of this, future studies could aim to provide further insights by extending this study to other emerging economies.

Moreover, although our study employs a large dataset comprising bank-level data from BankScope and country-level data from the World Bank, our findings may be limited by the errors and omissions of these data sources. For instance, Bhattacharya (2003) and Fosu et al. (2019) point out that the BankScope database suffers from selectivity bias, and particularly in its coverage of banks in developing countries in that it almost completely omits rural and foreign banks. Given the focus of our analysis on African countries, it is likely that our results apply more to domestic and commercial banks in urban centres, and generalisation to other banks should be carried out with caution. Future studies can, therefore, extend our analysis specifically to rural and foreign banks to see how information sharing influences the intermediation costs of such banks. Finally, as with archival studies of this nature, our measures for credit information sharing, intermediation costs, banking market concentration and governance quality, amongst others, may or may not reflect practice. Future research can offer additional insights by conducting in-depth interviews and surveys with bankers and regulatory bodies regarding these issues.

**Appendix 1**

**[Figure A1 about here]**

**Appendix 2**

**[Table A2 about here]**

**Appendix 3**

**[Table A3 about here]**

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**Table 1:** **Descriptive statistics**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | . |  |  |  |  |  |  |  |
|  | Mean | Standard Deviation | Minimum | Maximum | 25th percentile | 50th percentile | 75th percentile | Observations |
| Spread | 8.25 | 4.66 | -1.63 | 27.44 | 5.30 | 7.41 | 10.48 | 1538.00 |
| Depth | 1.28 | 2.18 | 0.00 | 6.00 | 0.00 | 0.00 | 3.00 | 1538.00 |
| Registry | 3.02 | 8.37 | 0.00 | 56.30 | 0.00 | 0.00 | 2.50 | 1538.00 |
| Bureau | 8.21 | 18.20 | 0.00 | 64.80 | 0.00 | 0.00 | 4.10 | 1538.00 |
| Size | 12.99 | 1.68 | 9.87 | 18.19 | 11.79 | 12.80 | 14.03 | 1538.00 |
| Liquidity | 28.43 | 16.76 | 3.92 | 81.11 | 15.70 | 24.28 | 38.17 | 1538.00 |
| Provisions | 1.81 | 3.71 | -40.20 | 49.89 | 0.37 | 1.01 | 2.18 | 1454.00 |
| Lending | 52.95 | 17.49 | 10.25 | 96.26 | 41.23 | 53.68 | 63.95 | 1538.00 |
| Deposits | 89.91 | 13.73 | 11.34 | 99.33 | 89.50 | 93.99 | 96.34 | 1537.00 |
| Equity | 12.80 | 8.28 | 2.13 | 55.83 | 7.89 | 10.73 | 14.89 | 1538.00 |
| Fees | 21.56 | 17.34 | 0.00 | 109.70 | 11.07 | 18.08 | 26.97 | 1498.00 |
| Inefficiency | 5.39 | 3.52 | 0.59 | 20.58 | 2.93 | 4.69 | 6.94 | 1538.00 |
| Concentration | 0.62 | 0.16 | 0.35 | 1.00 | 0.51 | 0.60 | 0.74 | 1538.00 |
| GDP Growth | 5.26 | 3.01 | -7.84 | 33.74 | 3.41 | 5.45 | 7.04 | 1494.00 |
| Inflation | 8.00 | 5.21 | -3.10 | 26.24 | 3.89 | 7.13 | 11.27 | 1494.00 |
| Law | -0.38 | 0.52 | -1.50 | 1.01 | -0.70 | -0.40 | -0.06 | 1494.00 |
| Regulation | -0.23 | 0.44 | -1.32 | 0.98 | -0.46 | -0.28 | -0.04 | 1494.00 |
| Corruption | -0.42 | 0.54 | -1.42 | 1.14 | -0.83 | -0.51 | -0.09 | 1494.00 |

Spread is the difference between loan rate and deposits rate; Depth is the depth of credit information, an index that captures the depth of credit information; Registry is credit registry coverage, measured as the number of individuals and firms listed by a public credit registry concerning the information on their borrowing history for the past five years, expressed as a percentage of the adult population. Bureau is credit bureau coverage and measures the number of individuals and firms listed in a private credit bureau concerning the information on their borrowing history for the past five years, expressed as a percentage of the adult population; Size is the logarithm of the total bank assets; Liquidity is the liquid assets of the bank divided by the total; Provisions is loan loss provisions, measured as the ratio of loan loss provisions to total loans; Lending is lending specialisation and is measured as total loans as a ratio of total assets; Deposit is the percentage of total deposits to total liabilities; Equity is the ratio of book value of equity to total assets; Fee income is the ratio of net fees and commissions to total assets; Inefficiency is the ratio of overheads to total assets. GDP growth is the annual percentage change in real GDP; Inﬂation is the annual percentage change in the consumer price index; Concentration is the three-bank concentration ratio, measured as the share of assets of the largest three banks as a percentage of total banking assets; Rule of law, Regulatory quality and Control of corruption are indicators capturing the quality of governance deﬁned in details in subsection 4.2.

**Table 2:** Pearson **correlations matrix**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 1 Spread | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 Depth | -0.32a | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 Registry | -0.26a | 0.24a | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 Bureau | -0.15a | 0.70a | -0.15a | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 5 Size | -0.24a | 0.39a | 0.13a | 0.24a | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 6 Liquidity | 0.07 | -0.10a | -0.05 | -0.17a | -0.12a | 1.00 |  |  |  |  |  |  |  |  |  |  |  |  |
| 7 Provisions | 0.17a | -0.12a | -0.07 | -0.10a | -0.04 | 0.05 | 1.00 |  |  |  |  |  |  |  |  |  |  |  |
| 8 Lending | -0.19a | 0.22a | 0.14a | 0.29a | 0.09a | -0.65a | -0.03 | 1.00 |  |  |  |  |  |  |  |  |  |  |
| 9 Deposits | -0.03 | -0.07a | 0.05 | -0.13a | -0.03 | 0.14a | -0.04 | -0.27a | 1.00 |  |  |  |  |  |  |  |  |  |
| 10 Equity | 0.08a | -0.08a | -0.10a | -0.01 | -0.33a | 0.01 | 0.05 | -0.03 | -0.27a | 1.00 |  |  |  |  |  |  |  |  |
| 11 Fees | 0.04 | -0.15a | -0.11a | -0.09a | -0.10a | 0.20a | 0.02 | -0.12a | 0.02 | 0.03 | 1.00 |  |  |  |  |  |  |  |
| 12 Inefficiency | 0.51a | -0.30a | -0.25a | -0.14a | -0.47a | -0.09a | 0.17a | -0.02 | -0.02 | 0.18a | 0.31a | 1.00 |  |  |  |  |  |  |
| 13 Concentration | -0.09a | 0.12a | -0.15a | 0.33a | -0.01 | 0.10a | 0.01 | 0.02 | -0.07 | -0.08a | 0.07a | -0.00 | 1.00 |  |  |  |  |  |
| 14 GDP Growth | 0.26a | -0.24a | -0.14a | -0.19a | -0.17a | 0.08a | 0.04 | -0.16a | 0.01 | 0.05 | -0.02 | 0.24a | -0.17a | 1.00 |  |  |  |  |
| 15 Inflation | 0.28a | -0.09a | -0.22a | -0.06 | -0.03 | 0.06 | 0.01 | -0.19a | -0.00 | 0.17a | -0.13a | 0.16a | -0.30a | 0.12a | 1.00 |  |  |  |
| 16 Law | -0.16a | 0.56a | 0.40a | 0.46a | 0.10a | -0.05 | -0.05 | 0.18a | -0.10a | -0.08a | -0.22a | -0.22a | 0.01 | 0.02 | -0.11a | 1.00 |  |  |
| 17 Regulation | -0.11a | 0.57a | 0.33a | 0.57a | 0.09a | -0.20a | -0.08a | 0.28a | -0.10a | -0.01 | -0.25a | -0.14a | -0.11a | -0.01 | -0.01 | 0.83a | 1.00 |  |
| 18 Corruption | -0.09a | 0.53a | 0.26a | 0.57a | 0.06 | -0.06 | -0.05 | 0.21a | -0.16a | -0.05 | -0.16a | -0.14a | 0.13a | 0.03 | -0.17a | 0.88a | 0.78a | 1.00 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

Note: Variable are as described in Table 1. a indicates significance at 1% or better.

**Table 3: Regression results of information sharing and credit intermediation cost**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Spread | 0.198\*\*\* | 0.219\*\*\* | 0.217\*\*\* | 0.229\*\*\* | 0.230\*\*\* | 0.240\*\*\* | 0.211\*\*\* | 0.224\*\*\* | 0.229\*\*\* |
|  | (0.071) | (0.070) | (0.070) | (0.074) | (0.074) | (0.071) | (0.074) | (0.073) | (0.073) |
| Depth | -0.310\*\*\* | -0.329\*\*\* | -0.370\*\*\* |  |  |  |  |  |  |
|  | (0.069) | (0.066) | (0.070) |  |  |  |  |  |  |
| Registry |  |  |  | -0.018\* | -0.019\* | -0.021\*\* |  |  |  |
|  |  |  |  | (0.011) | (0.010) | (0.010) |  |  |  |
| Bureau |  |  |  |  |  |  | 0.006 | 0.008 | -0.000 |
|  |  |  |  |  |  |  | (0.008) | (0.007) | (0.008) |
| Size | 0.245\*\*\* | 0.270\*\*\* | 0.287\*\*\* | 0.120 | 0.120 | 0.144 | 0.116 | 0.130 | 0.150\* |
|  | (0.091) | (0.090) | (0.089) | (0.087) | (0.088) | (0.087) | (0.091) | (0.090) | (0.090) |
| Liquidity | 0.020\*\* | 0.022\*\* | 0.019\*\* | 0.020\*\* | 0.020\*\* | 0.018\*\* | 0.018\*\* | 0.018\* | 0.018\* |
|  | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) |
| Provisions | 0.057 | 0.065 | 0.066 | 0.078\* | 0.079\* | 0.074\* | 0.072\* | 0.074\* | 0.075\* |
|  | (0.038) | (0.041) | (0.041) | (0.041) | (0.041) | (0.041) | (0.040) | (0.041) | (0.041) |
| Lending | -0.041\*\*\* | -0.040\*\*\* | -0.041\*\*\* | -0.042\*\*\* | -0.042\*\*\* | -0.042\*\*\* | -0.045\*\*\* | -0.044\*\*\* | -0.044\*\*\* |
|  | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) |
| Deposits | -0.021 | -0.028\*\* | -0.024\* | -0.027\*\* | -0.027\*\* | -0.024\* | -0.024\* | -0.026\*\* | -0.026\*\* |
|  | (0.014) | (0.013) | (0.014) | (0.012) | (0.012) | (0.012) | (0.013) | (0.012) | (0.012) |
| Equity | 0.003 | -0.003 | 0.001 | -0.007 | -0.007 | -0.003 | -0.005 | -0.004 | -0.003 |
|  | (0.022) | (0.022) | (0.022) | (0.021) | (0.021) | (0.021) | (0.021) | (0.021) | (0.021) |
| Fees | -0.040\*\*\* | -0.042\*\*\* | -0.042\*\*\* | -0.036\*\*\* | -0.036\*\*\* | -0.039\*\*\* | -0.039\*\*\* | -0.041\*\*\* | -0.039\*\*\* |
|  | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) |
| Inefficiency | 0.728\*\*\* | 0.722\*\*\* | 0.724\*\*\* | 0.695\*\*\* | 0.696\*\*\* | 0.708\*\*\* | 0.721\*\*\* | 0.724\*\*\* | 0.727\*\*\* |
|  | (0.089) | (0.092) | (0.093) | (0.089) | (0.089) | (0.090) | (0.088) | (0.091) | (0.090) |
| GDP Growth | 0.062\* | 0.062\* | 0.045 | 0.078\*\* | 0.076\*\* | 0.081\*\* | 0.101\*\*\* | 0.102\*\*\* | 0.090\*\* |
|  | (0.037) | (0.036) | (0.036) | (0.037) | (0.036) | (0.036) | (0.037) | (0.036) | (0.036) |
| Inflation | 0.103\*\*\* | 0.090\*\*\* | 0.101\*\*\* | 0.100\*\*\* | 0.100\*\*\* | 0.092\*\*\* | 0.100\*\*\* | 0.095\*\*\* | 0.100\*\*\* |
|  | (0.023) | (0.023) | (0.023) | (0.023) | (0.023) | (0.023) | (0.023) | (0.023) | (0.023) |
| Concentration | -0.706 | -0.393 | -0.938 | -1.403\*\* | -1.411\*\* | -1.440\*\* | -1.432\*\* | -1.521\*\* | -1.176 |
|  | (0.695) | (0.737) | (0.698) | (0.698) | (0.704) | (0.712) | (0.704) | (0.735) | (0.720) |
| Law | 0.540\* |  |  | -0.059 |  |  | -0.300 |  |  |
|  | (0.281) |  |  | (0.271) |  |  | (0.236) |  |  |
| Regulation |  | 0.847\*\* |  |  | 0.036 |  |  | -0.315 |  |
|  |  | (0.343) |  |  | (0.328) |  |  | (0.284) |  |
| Corruption |  |  | 1.058\*\*\* |  |  | 0.260 |  |  | 0.194 |
|  |  |  | (0.277) |  |  | (0.249) |  |  | (0.261) |
| Constant | 3.817\* | 3.875\* | 3.914\* | 5.868\*\*\* | 5.898\*\*\* | 4.898\*\* | 5.554\*\*\* | 5.531\*\*\* | 5.183\*\* |
|  | (1.996) | (2.028) | (2.025) | (1.939) | (1.940) | (1.969) | (2.036) | (2.058) | (2.100) |
| No. of observations | 1156 | 1156 | 1156 | 1156 | 1156 | 1156 | 1156 | 1156 | 1156 |
| Hansen test p-value | 0.591 | 0.305 | 0.291 | 0.960 | 0.964 | 0.569 | 0.616 | 0.572 | 0.543 |
| AR(1) test p-value | 0.000 | 0.000 | 0.000 | 0.001 | 0.001 | 0.000 | 0.001 | 0.000 | 0.000 |
| AR(2) test p-value | 0.915 | 0.888 | 0.897 | 0.865 | 0.862 | 0.857 | 0.914 | 0.892 | 0.887 |

This table shows the dynamic system GMM estimation results for the effect of credit information on bank credit intermediation cost. Time ﬁxed-effects are included in all estimations. All variables are as described in Table 1. Robust Windmeijer (2005) ﬁnite-sample corrected standard errors are in parentheses.

\* Indicates signiﬁcance at 10%

\*\* Indicates signiﬁcance at 5%

\*\*\* Indicates signiﬁcance at 1%

**Table 4: Regression results of information sharing and credit intermediation cost: Interactions with concentration**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Spread | 0.209\*\*\* | 0.213\*\*\* | 0.211\*\*\* | 0.240\*\*\* | 0.241\*\*\* | 0.245\*\*\* | 0.225\*\*\* | 0.224\*\*\* | 0.230\*\*\* |
|  | (0.070) | (0.070) | (0.070) | (0.070) | (0.070) | (0.070) | (0.073) | (0.073) | (0.073) |
| Depth | -0.811\*\*\* | -0.697\*\*\* | -0.762\*\*\* |  |  |  |  |  |  |
|  | (0.239) | (0.237) | (0.236) |  |  |  |  |  |  |
| Registry  |  |  |  | -0.082\*\*\* | -0.085\*\*\* | -0.101\*\*\* |  |  |  |
|  |  |  |  | (0.027) | (0.027) | (0.026) |  |  |  |
| Bureau  |  |  |  |  |  |  | -0.011 | -0.020 | -0.015 |
|  |  |  |  |  |  |  | (0.033) | (0.035) | (0.032) |
| Size | 0.245\*\*\* | 0.246\*\*\* | 0.268\*\*\* | 0.149\* | 0.149\* | 0.149\* | 0.127 | 0.123 | 0.148 |
|  | (0.091) | (0.091) | (0.090) | (0.086) | (0.086) | (0.087) | (0.092) | (0.092) | (0.091) |
| Liquidity | 0.021\*\* | 0.022\*\* | 0.020\*\* | 0.019\*\* | 0.019\*\* | 0.019\*\* | 0.018\*\* | 0.017\* | 0.017\* |
|  | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) |
| Provisions | 0.067 | 0.067 | 0.069\* | 0.072\* | 0.073\* | 0.074\* | 0.076\* | 0.075\* | 0.075\* |
|  | (0.041) | (0.041) | (0.041) | (0.040) | (0.041) | (0.041) | (0.041) | (0.041) | (0.041) |
| Lending | -0.041\*\*\* | -0.041\*\*\* | -0.042\*\*\* | -0.040\*\*\* | -0.040\*\*\* | -0.041\*\*\* | -0.044\*\*\* | -0.044\*\*\* | -0.044\*\*\* |
|  | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) |
| Deposits | -0.027\*\* | -0.028\*\* | -0.024\* | -0.025\*\* | -0.025\*\* | -0.024\* | -0.027\*\* | -0.026\*\* | -0.026\*\* |
|  | (0.013) | (0.013) | (0.014) | (0.012) | (0.012) | (0.012) | (0.012) | (0.012) | (0.012) |
| Equity | -0.002 | -0.005 | -0.001 | -0.004 | -0.004 | -0.003 | -0.005 | -0.004 | -0.003 |
|  | (0.022) | (0.022) | (0.022) | (0.021) | (0.021) | (0.021) | (0.021) | (0.021) | (0.021) |
| Fees | -0.043\*\*\* | -0.043\*\*\* | -0.042\*\*\* | -0.040\*\*\* | -0.040\*\*\* | -0.038\*\*\* | -0.041\*\*\* | -0.041\*\*\* | -0.039\*\*\* |
|  | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) |
| Inefficiency | 0.725\*\*\* | 0.718\*\*\* | 0.721\*\*\* | 0.704\*\*\* | 0.703\*\*\* | 0.702\*\*\* | 0.718\*\*\* | 0.721\*\*\* | 0.726\*\*\* |
|  | (0.093) | (0.092) | (0.093) | (0.090) | (0.090) | (0.090) | (0.091) | (0.091) | (0.090) |
| GDP Growth | 0.062\* | 0.064\* | 0.045 | 0.082\*\* | 0.081\*\* | 0.071\*\* | 0.102\*\*\* | 0.101\*\*\* | 0.090\*\* |
|  | (0.036) | (0.036) | (0.036) | (0.036) | (0.035) | (0.035) | (0.036) | (0.036) | (0.036) |
| Inflation  | 0.084\*\*\* | 0.083\*\*\* | 0.093\*\*\* | 0.089\*\*\* | 0.089\*\*\* | 0.091\*\*\* | 0.094\*\*\* | 0.095\*\*\* | 0.099\*\*\* |
|  | (0.023) | (0.023) | (0.023) | (0.023) | (0.023) | (0.023) | (0.023) | (0.023) | (0.023) |
| Concentration | -1.817\*\* | -1.372 | -1.824\*\* | -1.675\*\* | -1.684\*\* | -1.935\*\*\* | -1.527\*\* | -1.776\*\* | -1.276\* |
|  | (0.778) | (0.838) | (0.784) | (0.725) | (0.722) | (0.730) | (0.766) | (0.825) | (0.769) |
| Law | 0.542\* |  |  | -0.003 |  |  | -0.307 |  |  |
|  | (0.276) |  |  | (0.265) |  |  | (0.239) |  |  |
| Regulation |  | 0.610\* |  |  | 0.062 |  |  | -0.390 |  |
|  |  | (0.346) |  |  | (0.323) |  |  | (0.313) |  |
|  |  |  |  |  |  |  |  |  |  |
| Corruption |  |  | 0.971\*\*\* |  |  | 0.340 |  |  | 0.188 |
|  |  |  | (0.282) |  |  | (0.252) |  |  | (0.266) |
| Conc X Depth | 0.796\*\* | 0.617\* | 0.630\* |  |  |  |  |  |  |
|  | (0.359) | (0.369) | (0.363) |  |  |  |  |  |  |
| Conc X Registry |  |  |  | 0.121\*\*\* | 0.125\*\*\* | 0.147\*\*\* |  |  |  |
|  |  |  |  | (0.037) | (0.037) | (0.036) |  |  |  |
| Conc X Bureau |  |  |  |  |  |  | 0.025 | 0.039 | 0.020 |
|  |  |  |  |  |  |  | (0.046) | (0.049) | (0.045) |
| Constant | 5.092\*\* | 4.850\*\* | 4.860\*\* | 4.977\*\* | 4.991\*\* | 5.159\*\*\* | 5.624\*\*\* | 5.784\*\*\* | 5.304\*\* |
|  | (2.118) | (2.136) | (2.123) | (1.946) | (1.949) | (1.963) | (2.156) | (2.170) | (2.149) |
| No. of observations | 1156 | 1156 | 1156 | 1156 | 1156 | 1156 | 1156 | 1156 | 1156 |
| Hansen test p-value | 0.353 | 0.320 | 0.294 | 0.562 | 0.563 | 0.560 | 0.557 | 0.566 | 0.539 |
| AR(1) test p-value | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| AR(2) test p-value | 0.944 | 0.930 | 0.936 | 0.859 | 0.856 | 0.848 | 0.892 | 0.896 | 0.889 |

This table shows the dynamic system GMM estimation results for the effect of credit information on bank credit intermediation cost. Time fixed-effects are included in all estimations. All variables are as described in Table 1. Robust Windmeijer (2005) ﬁnite-sample corrected standard errors are in parentheses.

\* Indicates signiﬁcance at 10%

\*\* Indicates signiﬁcance at 5%

\*\*\* Indicates signiﬁcance at 1%

**Table 5: Regression results of depth of credit information sharing and credit intermediation cost at specified levels of concentration**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Concentration at: | 25th percentile | 50th percentile | 75th percentile | Change | Based on |
| Governance indicator: |  |  |  |  |  |
| Rule of Law  | -0.405\*\*\*(0.083) | -0.337\*\*\*(0.071) | -0.219\*\*\*(0.079) | -0.186\*\*(0.084) | Table 4, Column 1 |
| Regulatory quality  | -0.382\*\*\*(0.077) | -0.329\*\*\*(0.067) | -0.237\*\*\*(0.081) | -0.144\*(0.086) | Table 4, Column 2 |
| Control of corruption  | -0.406\*\*\*(0.081) | -0.387\*\*\*(0.071) | -0.293\*\*\*(0.083) | -0.147\*(0.085) | Table 4, Column 3 |

**Table 6: Regression results of information sharing and credit intermediation cost: Interaction with governance**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Spread | 0.201\*\* | 0.203\*\* | 0.207\*\* | 0.236\*\*\* | 0.238\*\*\* | 0.205\*\*\* | 0.211\*\*\* | 0.226\*\*\* | 0.216\*\*\* |
|  | (0.082) | (0.082) | (0.082) | (0.073) | (0.072) | (0.075) | (0.075) | (0.076) | (0.075) |
| Depth | -0.256\*\*\* | -0.296\*\*\* | -0.284\*\*\* |  |  |  |  |  |  |
|  | (0.079) | (0.078) | (0.084) |  |  |  |  |  |  |
| Registry |  |  |  | -0.015 | -0.016 | -0.025\* |  |  |  |
|  |  |  |  | (0.016) | (0.015) | (0.013) |  |  |  |
| Credit Bureau |  |  |  |  |  |  | -0.006 | -0.008 | -0.012 |
|  |  |  |  |  |  |  | (0.010) | (0.009) | (0.010) |
| Size | 0.248\*\*\* | 0.243\*\* | 0.265\*\*\* | 0.143 | 0.144\* | 0.151 | 0.153\* | 0.112 | 0.160\* |
|  | (0.094) | (0.094) | (0.092) | (0.087) | (0.087) | (0.094) | (0.089) | (0.091) | (0.088) |
| Liquidity | 0.021\*\* | 0.021\*\* | 0.021\*\* | 0.019\*\* | 0.019\*\* | 0.018\*\* | 0.017\* | 0.017\* | 0.018\* |
|  | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) |
| Provisions | 0.054 | 0.055 | 0.053 | 0.072\* | 0.072\* | 0.055 | 0.069\* | 0.081\* | 0.071\* |
|  | (0.038) | (0.038) | (0.037) | (0.041) | (0.041) | (0.039) | (0.040) | (0.042) | (0.040) |
| Lending | -0.051\*\*\* | -0.052\*\*\* | -0.052\*\*\* | -0.041\*\*\* | -0.041\*\*\* | -0.052\*\*\* | -0.044\*\*\* | -0.045\*\*\* | -0.044\*\*\* |
|  | (0.011) | (0.011) | (0.011) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) |
| Deposits | -0.025\* | -0.026\*\* | -0.022 | -0.025\*\* | -0.025\*\* | -0.025\*\* | -0.022 | -0.027\*\* | -0.021 |
|  | (0.014) | (0.013) | (0.014) | (0.012) | (0.012) | (0.012) | (0.014) | (0.013) | (0.014) |
| Equity | 0.007 | 0.006 | 0.007 | -0.004 | -0.004 | 0.007 | -0.004 | -0.006 | -0.002 |
|  | (0.023) | (0.023) | (0.023) | (0.021) | (0.021) | (0.022) | (0.022) | (0.021) | (0.021) |
| Fees | -0.042\*\*\* | -0.042\*\*\* | -0.042\*\*\* | -0.040\*\*\* | -0.040\*\*\* | -0.042\*\*\* | -0.039\*\*\* | -0.038\*\*\* | -0.037\*\*\* |
|  | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.010) | (0.011) | (0.012) | (0.011) |
| Inefficiency | 0.732\*\*\* | 0.722\*\*\* | 0.718\*\*\* | 0.708\*\*\* | 0.708\*\*\* | 0.730\*\*\* | 0.722\*\*\* | 0.702\*\*\* | 0.727\*\*\* |
|  | (0.094) | (0.094) | (0.094) | (0.090) | (0.090) | (0.091) | (0.090) | (0.090) | (0.089) |
| GDP Growth | 0.045 | 0.044 | 0.031 | 0.091\*\* | 0.089\*\* | 0.069\*\* | 0.098\*\*\* | 0.082\*\* | 0.083\*\* |
|  | (0.033) | (0.034) | (0.033) | (0.037) | (0.036) | (0.034) | (0.037) | (0.036) | (0.037) |
| Inflation | 0.096\*\*\* | 0.094\*\*\* | 0.098\*\*\* | 0.091\*\*\* | 0.091\*\*\* | 0.082\*\*\* | 0.099\*\*\* | 0.103\*\*\* | 0.103\*\*\* |
|  | (0.022) | (0.022) | (0.022) | (0.023) | (0.023) | (0.022) | (0.024) | (0.023) | (0.023) |
| Concentration | -0.589 | -0.726 | -1.031 | -1.290\* | -1.312\* | -1.180 | -1.669\*\* | -2.077\*\*\* | -1.425\*\* |
|  | (0.723) | (0.767) | (0.722) | (0.713) | (0.713) | (0.739) | (0.717) | (0.745) | (0.707) |
| Law | 0.205 |  |  | -0.073 |  |  | -0.507\*\* |  |  |
|  | (0.318) |  |  | (0.289) |  |  | (0.236) |  |  |
| Regulation |  | 0.361 |  |  | -0.019 |  |  | -0.524 |  |
|  |  | (0.473) |  |  | (0.351) |  |  | (0.318) |  |
| Corruption |  |  | 0.525 |  |  | 0.272 |  |  | -0.046 |
|  |  |  | (0.322) |  |  | (0.276) |  |  | (0.255) |
| Law X Depth | 0.261\*\* |  |  |  |  |  |  |  |  |
|  | (0.126) |  |  |  |  |  |  |  |  |
| Regulation X Depth |  | 0.281\*\* |  |  |  |  |  |  |  |
|  |  | (0.136) |  |  |  |  |  |  |  |
| Corruption X Depth |  |  | 0.245\*\* |  |  |  |  |  |  |
|  |  |  | (0.105) |  |  |  |  |  |  |
| Law X Registry |  |  |  | -0.003 |  |  |  |  |  |
|  |  |  |  | (0.018) |  |  |  |  |  |
| Regulation X Registry  |  |  |  |  | -0.002 |  |  |  |  |
|  |  |  |  |  | (0.017) |  |  |  |  |
| Corruption X Registry |  |  |  |  |  | -0.001 |  |  |  |
|  |  |  |  |  |  | (0.023) |  |  |  |
| Law X Bureau |  |  |  |  |  |  | 0.057\*\* |  |  |
|  |  |  |  |  |  |  | (0.028) |  |  |
| Regulation X Bureau |  |  |  |  |  |  |  | 0.050\*\* |  |
|  |  |  |  |  |  |  |  | (0.023) |  |
| Corruption X Bureau |  |  |  |  |  |  |  |  | 0.034\*\* |
|  |  |  |  |  |  |  |  |  | (0.017) |
| Constant | 4.109\*\* | 4.379\*\* | 3.986\* | 5.159\*\*\* | 5.167\*\*\* | 5.590\*\*\* | 5.016\*\* | 6.382\*\*\* | 4.817\*\* |
|  | (2.049) | (2.063) | (2.048) | (1.928) | (1.926) | (2.046) | (2.045) | (2.158) | (2.088) |
| No. of observations | 1156 | 1156 | 1156 | 1156 | 1156 | 1156 | 1156 | 1156 | 1156 |
| Hansen test p-value | 0.676 | 0.671 | 0.538 | 0.422 | 0.424 | 0.523 | 0.423 | 0.939 | 0.623 |
| AR(1) test p-value | 0.001 | 0.001 | 0.001 | 0.000 | 0.000 | 0.001 | 0.001 | 0.001 | 0.001 |
| AR(2) test p-value | 0.906 | 0.888 | 0.911 | 0.868 | 0.865 | 0.934 | 0.940 | 0.882 | 0.911 |

This table shows the dynamic system GMM estimation results for the effect of credit information on bank credit intermediation cost. Time ﬁxed-effects are included in all estimations. All variables are as described in Table 1. Robust Windmeijer (2005) ﬁnite-sample corrected standard errors are in parentheses.

\* Indicates signiﬁcance at 10%

\*\* Indicates signiﬁcance at 5%

\*\*\* Indicates signiﬁcance at 1%

**Table 7: Regression results of depth of credit information sharing and credit intermediation cost at specified levels of governance**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Governance At: | 25th percentile | 50th percentile | 75th percentile | Change | Based on |
| Governance indicator: |  |  |  |  |  |
| Rule of Law  | -0.439\*\*\*(0.098) | -0.361\*\*\*(0.079) | -0.272\*\*\*(0.077) | -0.167\*\*(0.081) | Table 6, Column 1 |
| Regulatory quality  | -0.426\*\*\*(0.078) | -0.375\*\*\*(0.072) | -0.308\*\*\*(0.081) | -0.118\*\*(0.076) | Table 6, Column 2 |
| Control of corruption  | -0.487\*\*\*(0.094) | -0.409\*\*\*(0.080) | -0.306\*\*\*(0.080) | -0.181\*\*(0.077) | Table 6, Column 3 |

**Table 8: Regression results of information sharing and credit intermediation cost: Interactions with concentration and governance**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Spread | 0.206\*\*\* | 0.247\*\*\* | 0.246\*\*\* | 0.226\*\*\* | 0.240\*\*\* | 0.248\*\*\* | 0.211\*\*\* | 0.221\*\*\* | 0.217\*\*\* |
|  | (0.070) | (0.066) | (0.067) | (0.072) | (0.072) | (0.072) | (0.075) | (0.074) | (0.075) |
| Depth  | -0.764\*\*\* | -0.578\*\* | -0.630\*\* |  |  |  |  |  |  |
|  | (0.242) | (0.242) | (0.268) |  |  |  |  |  |  |
| Registry |  |  |  | -0.131\*\* | -0.127\*\* | -0.126\*\*\* |  |  |  |
|  |  |  |  | (0.052) | (0.052) | (0.042) |  |  |  |
| Bureau |  |  |  |  |  |  | -0.051 | 0.002 | -0.025 |
|  |  |  |  |  |  |  | (0.033) | (0.037) | (0.032) |
| Size | 0.242\*\*\* | 0.226\*\* | 0.261\*\*\* | 0.137 | 0.153\* | 0.152\* | 0.150\* | 0.126 | 0.158\* |
|  | (0.091) | (0.092) | (0.089) | (0.087) | (0.087) | (0.087) | (0.089) | (0.092) | (0.089) |
| Liquidity | 0.021\*\* | 0.021\*\* | 0.022\*\* | 0.021\*\* | 0.021\*\* | 0.020\*\* | 0.017\* | 0.016\* | 0.017\* |
|  | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) | (0.009) |
| Provisions | 0.070\* | 0.072\* | 0.072\* | 0.070\* | 0.072\* | 0.074\* | 0.070\* | 0.071\* | 0.071\* |
|  | (0.041) | (0.038) | (0.038) | (0.039) | (0.041) | (0.041) | (0.040) | (0.040) | (0.040) |
| Lending | -0.043\*\*\* | -0.042\*\*\* | -0.041\*\*\* | -0.041\*\*\* | -0.039\*\*\* | -0.041\*\*\* | -0.045\*\*\* | -0.045\*\*\* | -0.045\*\*\* |
|  | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) | (0.010) |
| Deposits | -0.027\*\* | -0.025\*\* | -0.021 | -0.023\* | -0.025\*\* | -0.024\* | -0.022 | -0.022\* | -0.021 |
|  | (0.013) | (0.013) | (0.014) | (0.012) | (0.012) | (0.012) | (0.014) | (0.013) | (0.014) |
| Equity | -0.004 | -0.004 | -0.001 | -0.005 | -0.005 | -0.004 | -0.004 | -0.002 | -0.002 |
|  | (0.022) | (0.023) | (0.023) | (0.022) | (0.022) | (0.021) | (0.021) | (0.021) | (0.021) |
| Fees | -0.043\*\*\* | -0.043\*\*\* | -0.041\*\*\* | -0.038\*\*\* | -0.039\*\*\* | -0.038\*\*\* | -0.040\*\*\* | -0.040\*\*\* | -0.037\*\*\* |
|  | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) | (0.011) |
| Inefficiency | 0.729\*\*\* | 0.690\*\*\* | 0.689\*\*\* | 0.706\*\*\* | 0.702\*\*\* | 0.700\*\*\* | 0.719\*\*\* | 0.717\*\*\* | 0.726\*\*\* |
|  | (0.094) | (0.094) | (0.094) | (0.088) | (0.090) | (0.090) | (0.089) | (0.088) | (0.088) |
| GDP Growth | 0.067\* | 0.057 | 0.036 | 0.076\*\* | 0.078\*\* | 0.068\* | 0.095\*\*\* | 0.092\*\* | 0.083\*\* |
|  | (0.036) | (0.036) | (0.035) | (0.036) | (0.036) | (0.036) | (0.036) | (0.036) | (0.037) |
| Inflation | 0.084\*\*\* | 0.086\*\*\* | 0.095\*\*\* | 0.092\*\*\* | 0.087\*\*\* | 0.089\*\*\* | 0.098\*\*\* | 0.099\*\*\* | 0.103\*\*\* |
|  | (0.023) | (0.023) | (0.023) | (0.023) | (0.023) | (0.023) | (0.024) | (0.023) | (0.024) |
| Concentration | -1.873\*\* | -1.678\* | -1.723\*\* | -1.868\*\*\* | -1.827\*\* | -1.984\*\*\* | -1.991\*\*\* | -1.968\*\* | -1.514\*\* |
|  | (0.778) | (0.876) | (0.799) | (0.717) | (0.735) | (0.729) | (0.761) | (0.812) | (0.751) |
| Law | 0.294 |  |  | -0.066 |  |  | -0.543\*\* |  |  |
|  | (0.315) |  |  | (0.289) |  |  | (0.234) |  |  |
| Regulation |  | 0.089 |  |  | -0.020 |  |  | -0.563\* |  |
|  |  | (0.495) |  |  | (0.349) |  |  | (0.318) |  |
| Corruption |  |  | 0.761\*\* |  |  | 0.306 |  |  | -0.053 |
|  |  |  | (0.330) |  |  | (0.269) |  |  | (0.255) |
| Concentration X Depth | 0.773\*\* | 0.483 | 0.475 |  |  |  |  |  |  |
|  | (0.359) | (0.372) | (0.387) |  |  |  |  |  |  |
| Concentration X Registry |  |  |  | 0.185\*\*\* | 0.181\*\* | 0.185\*\*\* |  |  |  |
|  |  |  |  | (0.071) | (0.071) | (0.061) |  |  |  |
| Concentration X Bureau |  |  |  |  |  |  | 0.059 | -0.017 | 0.018 |
|  |  |  |  |  |  |  | (0.044) | (0.054) | (0.045) |
| Law X Depth | 0.174 |  |  |  |  |  |  |  |  |
|  | (0.120) |  |  |  |  |  |  |  |  |
| Regulation X Depth |  | 0.244\* |  |  |  |  |  |  |  |
|  |  | (0.137) |  |  |  |  |  |  |  |
| Corruption X Depth |  |  | 0.129 |  |  |  |  |  |  |
|  |  |  | (0.114) |  |  |  |  |  |  |
| Law X Registry |  |  |  | 0.026 |  |  |  |  |  |
|  |  |  |  | (0.021) |  |  |  |  |  |
| Regulation X Registry |  |  |  |  | 0.023 |  |  |  |  |
|  |  |  |  |  | (0.021) |  |  |  |  |
| Corruption X Registry |  |  |  |  |  | 0.022 |  |  |  |
|  |  |  |  |  |  | (0.023) |  |  |  |
| Law X Bureau |  |  |  |  |  |  | 0.063\*\* |  |  |
|  |  |  |  |  |  |  | (0.028) |  |  |
| Regulation X Bureau |  |  |  |  |  |  |  | 0.053\*\* |  |
|  |  |  |  |  |  |  |  | (0.024) |  |
| Corruption X Bureau |  |  |  |  |  |  |  |  | 0.034\*\* |
|  |  |  |  |  |  |  |  |  | (0.017) |
|  |  |  |  |  |  |  |  |  |  |
| Constant | 5.124\*\* | 4.769\*\* | 4.324\*\* | 5.162\*\*\* | 5.331\*\*\* | 5.125\*\*\* | 5.369\*\* | 5.614\*\*\* | 4.931\*\* |
|  | (2.130) | (2.122) | (2.070) | (1.902) | (1.936) | (1.953) | (2.155) | (2.120) | (2.140) |
| No. of observations | 1156 | 1156 | 1156 | 1156 | 1156 | 1156 | 1156 | 1156 | 1156 |
| Hansen test p-value | 0.327 | 0.384 | 0.360 | 0.650 | 0.430 | 0.408 | 0.633 | 0.616 | 0.623 |
| AR(1) test p-value | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 | 0.001 | 0.001 | 0.001 |
| AR(2) test p-value | 0.943 | 0.842 | 0.867 | 0.877 | 0.853 | 0.839 | 0.950 | 0.900 | 0.913 |

This table shows the dynamic system GMM estimation results for the effect of credit information on bank credit intermediation cost. Time ﬁxed-effects are included in all estimations. All variables are as described in Table 1. Robust Windmeijer (2005) ﬁnite-sample corrected standard errors are in parentheses.

\* Indicates signiﬁcance at 10%

\*\* Indicates signiﬁcance at 5%

\*\*\* Indicates signiﬁcance at 1%

**Table 9: Regression results of depth of credit information sharing and credit intermediation cost at specified levels of concentration and governance**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ConcentrationAt: | 25th percentile | 50th percentile | 75th percentile | Change | Based on |
| Rule of Law at: |  |  |  |  |  |
| 25th percentile:  | -0.492\*\*\*(0.097) | -0.426\*\*\*(0.089) | -0.312\*\*\*(0.082) | -0.181\*\*(0.084) | Table 8, Column 1 |
| 50th percentile:  | -0.440\*\*\*(0.084) | -0.374\*\*\*(0.073) | -0.259\*\*\*(0.082) | -0.181\*\*(0.084) | Table8, Column 1 |
| 75th percentile:  | -0.381\*\*\*(0.086) | -0.314\*\*\*(0.074) | -0.200\*\*\*(0.081) | -0.181\*\*(0.084) | Table 8, Column 1 |
| Change:   | -0.111(0.077) | -0. 111(0.077) | -0. 111(0.077) |  | Table 8Column 1 |
| Regulatory quality at: |  |  |  |  |  |
| 25th percentile:  | -0.444\*\*\*(0.076) | -0.403\*\*\*(0.066) | -0.331\*\*\*(0.083) | -0.113(0.086) | Table 8, Column 2 |
| 50th percentile:  | -0.400\*\*\*(0.073) | -0.359\*\*\*(0.062) | -0.287\*\*\*(0.079) | -0.113(0.086) | Table 8, Column 2 |
| 75th percentile:   | -0.342\*\*\*(0.082) | -0.300\*\*\*(0.072) | -0.229\*\*\*(0.085) | -0.113(0.086) | Table 8, Column 2 |
| Change:   | -0.102\*(0.057) | -0. 102\*(0.072) | -0. 102\*(0.085) |  | Table 8, Column 2 |
|  |  |  |  |  |  |
| Control of corruption at: |  |  |  |  |  |
| 25th percentile:  | -0.495\*\*\*(0.085) | -0.454\*\*\*(0.083) | -0.384\*\*\*(0.107) | -0.111(0.091) | Table 8, Column 3 |
| 50th percentile:  | -0.454\*\*\*(0.078) | -0.413\*\*\*(0.070) | -0.343\*\*\*(0.088) | -0.111(0.091) | Table 8, Column 3 |
| 75th percentile:   | -0.399\*\*\*(0.093) | -0.359\*\*\*(0.079) | -0.288\*\*\*(0.085) | -0.111(0.091) | Table 8, Column 3 |
| Change:   | -0.096(0.084) | -0. 096(0.084) | -0. 096(0.084) |  | Table8, Column 3 |
|  |  |  |  |  |  |

**Table 10: Effects of information sharing on credit intermediation: Controlling for endogeneity**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) |
| L.spread2 | 0.210\*\*\* | 0.228\*\* | 0.162\*\* | 0.231\*\* |
|  | (0.075) | (0.093) | (0.074) | (0.095) |
| Depth | -0.617\*\*\* | -1.032\*\*\* | -0.277\* | -1.541\*\* |
|  | (0.182) | (0.342) | (0.155) | (0.628) |
| Size | 0.350\*\*\* | 0.269\*\*\* | 0.267\*\*\* | 0.244\*\* |
|  | (0.098) | (0.092) | (0.098) | (0.094) |
| Liquidity | 0.024\*\* | 0.028\*\*\* | 0.021\*\* | 0.027\*\*\* |
|  | (0.009) | (0.009) | (0.009) | (0.009) |
| Provisions | 0.059 | 0.077\* | 0.061\* | 0.086\*\* |
|  | (0.036) | (0.040) | (0.036) | (0.042) |
| Lending | -0.037\*\*\* | -0.040\*\*\* | -0.051\*\*\* | -0.046\*\*\* |
|  | (0.010) | (0.011) | (0.011) | (0.012) |
| Deposits | -0.016 | -0.025\*\* | -0.025\*\* | -0.016 |
|  | (0.016) | (0.012) | (0.013) | (0.013) |
| Equity | 0.013 | -0.003 | 0.013 | -0.000 |
|  | (0.024) | (0.025) | (0.023) | (0.025) |
| Fees | -0.043\*\*\* | -0.026\*\*\* | -0.044\*\*\* | -0.031\*\*\* |
|  | (0.010) | (0.009) | (0.011) | (0.009) |
| Inefficiency | 0.713\*\*\* | 0.646\*\*\* | 0.746\*\*\* | 0.639\*\*\* |
|  | (0.092) | (0.099) | (0.095) | (0.098) |
| GDP Growth | 0.019 | 0.001 | 0.067\* | 0.008 |
|  | (0.041) | (0.043) | (0.035) | (0.036) |
| Inflation | 0.102\*\*\* | 0.106\*\*\* | 0.099\*\*\* | 0.090\*\*\* |
|  | (0.023) | (0.023) | (0.023) | (0.024) |
| Law | 1.272\*\* | 1.118\*\* | -0.012 | 0.292 |
|  | (0.515) | (0.481) | (0.525) | (0.711) |
| Concentration | -0.158 | -1.401\* | -0.407 | -2.532\*\* |
|  | (0.743) | (0.728) | (0.774) | (1.185) |
| Concentration X Depth |  | 0.758\* |  | 1.652\*\* |
|  |  | (0.413) |  | (0.777) |
| Law X Depth |  |  | 0.471\*\* | 0.666\* |
|  |  |  | (0.237) | (0.362) |
| Constant | 2.041 | 4.624\*\* | 3.695\* | 4.866\*\* |
|  | (2.099) | (1.997) | (2.081) | (2.122) |
| No. of observations | 1156 | 1156 | 1156 | 1156 |
| Hansen test p-value | 0.309 | 0.177 | 0.517 | 0.150 |
| AR(1) test p-value | 0.000 | 0.003 | 0.001 | 0.004 |
| AR(2) test p-value | 0.866 | 0.848 | 0.974 | 0.864 |

This table shows the dynamic system GMM estimation results for the effect of credit information on bank credit intermediation cost. Time ﬁxed-effects are included in all estimations. All variables are as described in Table 1. Robust Windmeijer (2005) ﬁnite-sample corrected standard errors are in parentheses.

\* Indicates signiﬁcance at 10%

\*\* Indicates signiﬁcance at 5%

\*\*\* Indicates signiﬁcance at 1%

|  |  |  |  |
| --- | --- | --- | --- |
| **Table A1: Sample construction** |   |   |   |
| Description | Countries | Banks | Justification |
| Full initial sample  | 33 | 463 | To permit analysis |
| Less: Missing observations | 1 | 89 | To permit regression analysis |
| Less: Banks with less than 3 consecutive years of observation | 2 | 97 | To permit GMM estimation (after differencing) |
| Less: Countries less than 10 bank-year observations | 3 | 5 | To permit robust estimation |
| Final sample | 27 | 272 | For analysis |

|  |  |
| --- | --- |
|   **Table A2: List of countries and cross-sectional sample distribution** |   |
| Country  | No. of banks | Country  | No. of banks |
| Algeria | 69 | Mozambique | 50 |
| Angola | 49 | Namibia | 42 |
| Benin | 37 | Niger | 20 |
| Botswana | 47 | Nigeria | 27 |
| Burkina Faso | 51 | Rwanda | 27 |
| Cameroon | 11 | Senegal | 51 |
| Cote D'Ivoire | 54 | Sierra Leone | 18 |
| Democratic Republic of Congo | 44 | South Africa | 103 |
| Egypt | 115 | Togo | 16 |
| Gabon | 14 | Tunisia | 65 |
| Ghana | 111 | Uganda | 74 |
| Kenya | 140 | United Republic of Tanzania | 149 |
| Mali | 46 | Zambia | 54 |
| Mauritius | 54 | Total  | 1538 |
| This table shows the cross-sectional distribution of the sample.    |
|   **Table A3: Description of variables** |
| Variable | Symbol | Description |
| Credit intermediation cost | Spread | The difference between loan rate and deposits rate. Bankscope and authors’ calculation. |
| Information sharing: depth of credit information sharing index  | Depth | An index measuring "rules and practices affecting the coverage, scope and accessibility of credit information available through either a public credit registry or a private credit bureau” (World Bank Doing Business, 2016). Source: Bank Doing Business.  |
| Information sharing: credit registry coverage  | Registry | Credit registry coverage measures the number of individuals and firms listed by a public credit registry concerning the information on their borrowing history for the past five years, expressed as a percentage of the adult population. Source: Bank Doing Business.  |
| Information sharing: Credit bureau coverage | Bureau | The number of individuals and firms listed in a private credit bureau concerning the information on their borrowing history for the past five years, expressed as a percentage of the adult population. Source: Bank Doing Business. |
| Bank size | Size | The logarithm of the total bank assets. Source: Bankscope and authors’ calculation. Bankscope and authors’ calculation. |
| Liquidity | Liquidity | Percentage of liquid assets to total assets of the bank and this accounts for differences in bank assets. Source: Bankscope and authors’ calculation. |
| Loan loss provisions  | Provisions | The percentage of loan loss provisions to total loans. Source: Bankscope and authors’ calculation. |
| Lending specialisation  | Lending | The percentage of total loans to total assets. Source: Bankscope and authors’ calculation. |
| Deposit mix | Deposits | Percentage of total deposits to total liabilities. Source: Bankscope and authors’ calculation. |
| Bank equity | Equity | The ratio of book value of equity to total assets. Source: Bankscope and authors’ calculation.  |
| Fee income | Fees | The ratio of net fees and commissions to total assets. Source: Bankscope and authors’ calculation pe.  |
| inefficiency | Inefficiency | The ratio of overheads to total assets. Source: Bankscope and authors’ calculation.  |
| Three-bank concentration | Concentration | The ratio defined as the share of assets of the largest three banks as a percentage of the entire banking assets. Source: Bankscope and authors’ calculation. |
| Growth in gross domestic product | GDP Growth | The annual percentage change in real GDP. Source: World Bank World Development Indicators. |
| Inflation | Inflation | The annual percentage change in consumer price index. Source: World Bank World Development Indicators. |
| Rule of law | Law | An index measuring the “perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence” (Kaufmann et al., 2011, p. 223). Source: Worldwide Governance indicators.  |
| Control of corruption | Regulation | An index measuring the “perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as ‘capture’ of the state by elites and private interests” (Kaufmann et al., 2011, p. 223). Source: Worldwide Governance indicators. |
| Regulatory quality index  | Corruption | An index measuring perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development” (Kaufmann et al., 2011, p. 223). Source: Worldwide Governance indicators. |
| This table presents the mnemonics of each variable and its respective description. |

1. 1Accounting & Finance Department, College of Business & Economics (CBE), United Arab Emirates University, Al Ain, United Arab Emirates. [↑](#footnote-ref-1)
2. 2Leicester Castle Business School, De Montfort University, Leicester, UK.

3Centre for Research in Accounting, Accountability & Governance, Department of Accounting, Southampton Business School, University of Southampton, Southampton, UK. [↑](#footnote-ref-2)
3. Our sample period starts from 2004 because the World Bank Doing Business (WBDB) database on credit information sharing starts from 2004. There was a methodological change in the construction of the credit information sharing index in 2012. The index, therefore, now ranged from 0 to 8 instead of 0 to 6. To avoid the potential confounding effects of this methodological change, as well as to be consistent with prior studies (e.g., Kalyvas and Mamatzakis, 2017), we decided to employ 2012 as our cut-off period. [↑](#footnote-ref-3)
4. We also deal with normality and linearity issues by using GMM, which invokes the central limit theorem for the asymptotic normality of coefficients (even in cases, where the residuals are not normal) and, therefore, does not require a pre-estimation test of normality. We also use robust (Windmeijer finite-sample corrected) standard errors to deal with anomalies, which lead to autocorrelation and heteroskedasticity in the standard errors. [↑](#footnote-ref-4)
5. Note that the most recent lagged differences are used in order to avoid redundant moment conditions (see Arellano & Bover, 1995). [↑](#footnote-ref-5)
6. We do not present a separate marginal effect analysis table on credit registry coverage for brevity. [↑](#footnote-ref-6)