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Working Paper

The Effect of Reducing Information Asymmetry on Loan Price and Quantity in the African Banking Industry

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The Effect of Reducing Information Asymmetry on Loan Price and Quantity in the African Banking Industry

Forthcoming in: Research in International Business and Finance

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The Effect of Reducing Information Asymmetry on Loan Price and Quantity in the African Banking Industry

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Abstract

The purpose of this study is to assess how information sharing offices affect loan price and quantity in the African banking industry. The empirical evidence is based on a panel of 162 banks in 42 countries for the period 2001-2011. From the Generalised Method of Moments, public credit registries decrease loan price. With instrumental Quantile Regressions, two main findings are established. Public credit registries consistently decrease the price of loans whereas private credit bureaus consistently have the opposite effect. Public credit registries increase loan quantity in bottom quintiles (or banks associated with lower loan quantities) while private credit bureaus increase loan quantity in top quintiles (or banks associated with higher loan quantities).

JEL Classification: G20, G29, O16, O55
Keywords: Information Asymmetry; Financial Access; Africa

1. Introduction

Access to finance remains a fundamental problem in African development because less than 20% of households on the continent have access to financial services in the formal banking sector (IFAD, 2011; Asongu et al., 2016a). Consistent with the narrative, some of the documented factors restricting financial access include: limited communication infrastructure, low population densities and poor transport facilities. Even in regions that are characterised with substantial formal financial services, small corporations and some households may still be confronted with issues of lending requirements like collateral and

strict documentation. Furthermore, when the fundamental lending requirements are fulfilled, substantial minimum saving requirements and high cost (e.g. transaction fees) could still limit access to finance.

A number of solutions have been documented on mechanisms by which such constraints to financial access can be addressed. These solutions that are associated with surplus liquidity are measures that can be employed to limit the involuntary and voluntary keeping of excess cash by financial institutions (see Saxegaard, 2006; Asongu, 2014, p.70). On the one hand, measures that can be used to curb voluntary keeping of surplus cash include: (i) aiding financial institutions to trace their positions at the level of central banks in order to prevent them from holding cash reserves above statutory requirements; (ii) strengthening institutions that facilitate lending between banks and (iii) boosting infrastructure and transportation so that banks in remote zones are not constrained to hold excess liquidity because of logistic reasons. On the other hand, the involuntary holding of cash by banks can be restricted by inter alia: (i) increasing the lending capacity of banks in situation of regulated interest rate; (ii) creating a favourable atmosphere that enables commercial banks to use bond markets as investment avenues for their surplus liquidity; (iii) boosting investment possibilities for regional banks through regional stock market promotion and (iv) decreasing contractions in lending by banks via measures that reduce information asymmetry and encourage interbank competition. The present inquiry is situated within the framework of the last point on information asymmetry.

Information sharing offices were introduced across Africa during the past decade in order to mitigate information asymmetry between lenders and borrowers in the banking industry. Unfortunately, a recent stream of literature on information asymmetry in the African banking industry is motivated by the fear that information sharing offices are not meeting their anticipated effects of increasing financial assess (Triki & Gajigo, 2014). As a case in point, Asongu et al. (2016b) have established that the impacts of information sharing offices have negatively affected a plethora of financial development indicators. Furthermore, as we shall observe in the literature review section below, very limited scholarly attention has been devoted to examine the impact of information sharing offices on financial access in the continent.

Noticeably from the literature we shall engage in the section that follows, studies have fundamentally focused on developed nations, which in comparative terms have less concerns in financial access. In essence, whereas a great bulk of the literature has been positioned on

the emerging economies of Asia and Latin America on the one hand and the Organisation for Economic Cooperation and Development countries on the one hand, Africa which has severe issues of financial access has not received the scholarly attention it deserves (Asongu et al., 2016b). To put this point into perspective, Galindo and Miller (2001) have not involved any African country, while Love and Mylenko (2003) have used four countries. Whereas Barth et al. (2009) have focused on nine countries, Triki and Gajigo (2014), which is closest to the present inquiry have investigated 42 African countries for the period 2006-2009 using Probit models. This inquiry steers clear of Triki and Gajigo (2014) both from data and methodological standpoints. On the one hand, the periodicity is for the period 2001-2011. On the other hand, Generalised Method of Moments (GMM) and Instrumental Variable Quantile Regressions (IV QR) are employed.

The latter estimation technique is relevant because Triki and Gajigo (2014) have modelled the nexus between financial access and information sharing at the conditional mean of financial access. However, it is important to assess the linkages throughout the conditional distributions of financial access in order to emphasise banks that are characterised with high, intermediate and low levels of financial access. From a policy perspective, such distinctions are relevant because blanket policies are unlikely to succeed unless they are contingent on initial levels of financial access and tailored differently across banks characterised with varying levels of financial access.

Furthermore, Triki and Gajigo (2014) have recognised their failure to account for endogeneity. In this study, the specifications are tailored to have some bite on endogeneity, notably, by: (i) controlling simultaneity and time invariant omitted variables with the GMM technique and (ii) accounting for the unobserved heterogeneity and simultaneity with the IVQR approach.

In a nutshell, the purpose of this inquiry is to address the highlighted research gaps by assessing whether the introduction of information sharing offices has decreased the price of loans and increased the quantity of loans[1]. The inquiry is of policy relevance because results could inform policy markers on instruments that can be used to enhance financial access in order to enable small businesses as well as poor households maximise their earnings and savings for more employment and productivity that culminate in higher economic growth[2].

[1] The term financial access is used interchangeably with 'loan price' and/or 'loan quantity' throughout this study.
[2] The relationship between finance and growth has been substantially documented in the literature (Owosu & Odhiambo, 2014; Nyasha & Odhiambo, 2015a, 2015b).

The rest of the paper is organised in the following manner. Section 2 discusses the background, theoretical underpinnings and empirical literature. Section 3 covers the data and methodology whereas the empirical results are presented and discussed in Section 4. Section 5 concludes with implications and future research directions.

2. Background, theoretical underpinnings and empirical literature

2.1 Background

Credit reference agencies or information sharing offices are establishments that are designed to gather information on the debts of individual and commercial borrowers from multiple sources, namely, from: direct examination and public sources (usually for corporations), credit card companies and banks (usually for individuals) and retail lenders (Tchamyou & Asongu, 2017). After the data collection process and cross-checking for a detailed report, the information is then consolidated. Such information from some credit histories can entail both negative and positive signals: (i) negative information which consists for the most part of default data and (ii) positive information which encompasses histories on repayment behaviour as well as closed and open credits.

Before the year 2008, data on information sharing offices were mostly established in a few countries, notably: for the emerging markets of Asia and Latin America and the Organisation for Economic Cooperation and Development countries (see Mylenko, 2008). The global financial crisis, coupled with the burgeoning information and communication technology has prompted the establishment of information sharing centres across Africa. It is important to note that with the exception of South Africa, only a handful of counties in Sub-Saharan Africa had credit reference bureaus before 2008. Moreover, the roles of such credit agencies were for the most part limited to the supervision of the banking sector in the few countries, *inter alia*: Rwanda, Nigeria and Mozambique. Unfortunately, lending rates remained high for a number of factors: lack of relevant incentives and technology and the incapacity of the credit agencies to disclose accurate and timely information on borrowers' history. On the growing demand from supervisors to consolidate practices of risk management as well as requirements from other financial institutions, many countries (e.g. Zambia, Uganda, Tanzania, Nigeria and Ghana) responded before 2008 by instituting private credit bureaus.

2.2 Theoretical highlights

There are two main perspectives in the literature on the theoretical linkage between information sharing offices and financial access (see Claus & Grimes, 2003). The first view articulates liquidity provisions by banks whereas the second perspective is oriented towards the capacity of banks to improve on the risk features of assets. Both perspectives however are grounded on the fundamental mission of financial intermediation which is to improve allocation efficiency by converting mobilised resources into credit. The theoretical underpinnings on which the mission of financial intermediation is emphasised build on the literature of imperfect market information. In essence, the main task of financial intermediaries is to decrease information and transaction costs resulting from information asymmetry between borrowers and lenders in the banking industry. Therefore, it is for the purpose of reducing such information asymmetry that information sharing offices were introduced in Africa over the past decade.

In the light of the above, the nexus between information sharing offices and financial access is apparent from two perspectives, namely: the mitigation of moral hazard on the part of borrowers and reduction of adverse selection from the side of lenders. On the one hand, information sharing offices enable banks to have a comprehensive picture of borrowers' credit histories. Enhanced knowledge on borrowers' information avoids additional interest rates that would otherwise have been imposed by banks to compensate for adverse selection. On the other hand, borrowers have the luxury of moral hazard once they have been granted loans because they can conceal activities to which the loan was granted with the agenda of limiting or avoiding compliance with their financial obligations towards banks. It is therefore the responsibility of information sharing offices to discipline borrowers on the risks of defaulting on their debts, especially on the short-sightedness of defaulting because they want to resort to the informal financial sector as a viable alternative to the formal financial sector. By acting as a market disciplining device, information sharing offices can mitigate the moral hazard of borrowers. In a nutshell: (i) ex-ante of lending, information sharing offices decrease adverse selection while (ii) ex-post of lending, these offices mitigate moral hazard. Within the former framework, loan price and loan quantity are expected to increase.

2.3 Empirical literature

Much of the literature on the linkage between information asymmetry and financial development has focused on: (i) the influence more information or data has on creditors'

rights and (ii) the consequences of increasing information sharing among creditors. For the most part, the former perspective has been oriented towards how consolidated creditors' rights affect risk-taking by financial institutions and bankruptcy (Cleassens & Klapper, 2005; Houston et al., 2010; Djankov et al., 2011; Acharya et al., 2011). The latter perspective is focused on how information sharing offices: increase credit availability (Triki & Gajigo, 2014; Brown et al., 2009; Djankov et al., 2007); reduce rates of default (Jappelli & Pagano, 2002); mitigate the cost of credit (Brown et al., 2009); affect antitrust intervention (Coccorese, 2012); influence syndicated bank loans (Tanjung et al., 2010; Ivashina, 2009) and impact lending that is related to corruption (Barth et al., 2009).

Galindo and Miller (2001) have investigated how mitigating information asymmetry affects financial access to establish that developed nations that have credit registries are more associated with lower degrees of restrictions in access to finance when compared to less developed countries with credit bureaus. Love and Mylenko (2000) have used a combination of public credit registries and private credit bureaus with firm-related data from the World Bank Business Environment Survey to examine whether increased information sharing decrease constraints in financial access, as perceived by managers. The results demonstrate that private credit bureaus are associated with higher levels of financial access while public credit registries do not have any substantial effect on mitigating financial access constraints.

Barth et al. (2009) have examined the effect of: (i) information asymmetry and (ii) lender and borrower competition on corruption-related lending via information sharing offices by employing data from the World Bank Business Environment Survey. Two main results are established. On the one hand, corrupt-oriented lending is mitigated by banking competition and increasing information sharing positively affects the mitigating tendency. On the other hand, corrupt-oriented lending is influenced by the ownership structure of firms, the legal environment and competition among firms.

Asongu et al. (2016b) have assessed information sharing thresholds at which reducing information asymmetry enhances financial development to establish that information sharing offices negatively affect financial access for the most part. The results show that information sharing offices negatively influence financial depth with the magnitude from public credit registries comparatively higher relative to private credit bureaus. Private credit bureaus have a higher incidence on banking system efficiency while the impact of public credit registries is insignificant. Information sharing offices have negative impacts on financial activity with the incidence from private credit bureaus comparatively lower.

Triki and Gajigo (2014) which is closest to this inquiry have assessed two main concerns, notably: the effect of information sharing offices on financial access by businesses and the impact of public credit registries' design on financial access constraints. Two principal results are established. First, there is considerable heterogeneity in access to finance and how information sharing offices are designed with public credit registries. Second, financial access is comparatively more pronounced in nations that are characterised with more private credit bureaus compared to nations with public credit registries or no information sharing offices.

3. Data and Methodology

3.1 Data

The study examines a panel of 162 banks in 42 countries with data from Bankscope and the World Bank Development Indicators for the period 2001-2011. The number of countries, banks and periodicity is due to data availability constraints. Accordingly, data on information sharing offices is only available from 2001. Consistent with Coccorese and Pellecchia (2010), dependent variables for '*loan price*' and '*loan quantity*' are respectively the '*price charged on loans*' and '*logarithms of loans*'.

In accordance with Triki and Gajigo (2014), information sharing offices are measured with public credit registries and private credit bureaus. The present inquiry controls for market-level characteristics (*GDP per capita growth*, *inflation* and *population density*), bank-oriented features (*Deposits/Assets* and *Bank branches*) and the unobserved heterogeneity in bank: ownership (foreign versus (vs) domestic), size (large vs. small) and '*compliance with Sharia finance*' (Islamic vs. non-Islamic).

With regards to bank-oriented features, the following expected signs are anticipated. First, the 'deposit to asset ratio' is expected to increase the price and quantity of loans. Accordingly, given that deposits are the main sources of finance for banks, a higher proportion of deposits among liquid liabilities could augment the quantity of loans (and interest margins) given that good organisation is required for management and mobilisation. Second, from intuition, the number of bank branches should positively (negatively) affect the quantity (price) of loans due to a competition-impact that brings-down prices while augmenting quantity.

As concerns market-related characteristics, the following are worthwhile. First, while GDP per capita growth which has been included to control for business cycle fluctuations is

intuitively expected to positively influence the quantity of loans, the expected sign on loan price remains ambiguous because it depends on market expansion and dynamism. Nonetheless, decreasing GDP per capita is likely to affect loan price and loan quantity due to low demand. Therefore, negative signs are expected because over the past decade, GDP per capita has been depleting in most African countries because GDP growth has been increasing at a lower rate than population growth (Asongu, 2013a). Second, population density should affect both quantity and price of loans positively. Accordingly, more demand in bank loans due to high population density drives-up the price of loans. Third, inflation should increase (decrease) the price (quantity) of loans. Investors have been documented to prefer investing in less ambiguous economic environments (see Le Roux & Kelsey, 2016; Kelsey & Le Roux, 2016). Accordingly, there is likely to be less investment (or quantity of loans) in periods of economic uncertainty (like high inflation) and therefore the price of loans is expected to increase with uncertainty in inflation because interest rates are adjusted for inflation.

It is difficult to establish the expected signs of the dummy variables used to control for the unobserved heterogeneity. For instance, bank size (small vs. big) could be linked to both positive and negative impacts on loan dynamics, contingent on the organisation and co-ordination of concerns linked with larger bank size. Moreover, dealing with more branches that are associated with big banks can also generate inefficiencies due to concerns encountered while meeting customer requirements and needs. Within the same perspective, the incidence of ownership (foreign vs. domestic) and compliance with Sharia finance (Islamic vs. non-Islamic) is contingent on a multitude of factors, *inter alia*: organizational capabilities of staff and dynamism and expansion of markets. The expected signs of the control variables are disclosed in Appendix 1 while the definition of variables and corresponding sources are provided in Appendix 2. The summary statistics and correlation matrix are disclosed respectively in Appendix 3 and Appendix 4.

3.2 Methodology

3.2.1 Generalised methods of moments: specification, identification and exclusion restrictions

The GMM empirical strategy is adopted for five main reasons; the first-two are basic requirements for employing the technique whereas the last-three are advantages that are linked to the choice of the empirical strategy. First, the technique accounts for persistence in loan quantity and price since the criterion for persistence are met. Accordingly, the correlations between loan quantity and price and their first lags are respectively 0.996 and

0.845 which are above the 0.800 criterion used to ascertain persistence in dependent variables. Second, the N (or 162)>T(or 11) criterion for the employment of the GMM technique is also met because the number of cross sections is higher than the number of time series in each cross section. Third, the technique controls for endogeneity in all regressors by employing instrumental values of regressors and accounting for time invariant omitted variables. Fourth, the system GMM estimator also corrects for small sample biases in the difference GMM estimator. Fifth, cross-country differences are considered in the specifications.

Whereas the *system* GMM estimator (see Blundell & Bond, 1998; Arellano & Bond, 1995) has been documented (see Bond et al., 2001, pp. 3-4) to have better properties than the *difference* estimator (Arellano & Bond, 1991), this inquiry adopts the Roodman (2009ab) extension of Arellano and Bover (1995) that employs forward orthogonal deviations as opposed to first differences because the technique has been documented to limit instrument proliferation and restrict over-identification (see Baltagi, 2008; Love & Zicchino, 2006). A *two-step* approach is preferred to the *one-step* specification because it controls for heteroscedasticity.

The following equations in levels (1) and first difference (2) summarize the standard system GMM estimation procedure for loan prices.

$$P_{i,t} = \sigma_0 + \sigma_1 P_{i,t-\tau} + \sigma_2 PCR_{i,t} + \sigma_3 PCB_{i,t} + \sum_{h=1}^{5} \delta_h W_{h,i,t-\tau} + \eta_i + \xi_t + \varepsilon_{i,t} \tag{1}$$

$$\begin{aligned} P_{i,t} - P_{i,t-\tau} &= \sigma_1 (P_{i,t-\tau} - P_{i,t-2\tau}) + \sigma_2 (PCR_{i,t} - PCR_{i,t-\tau}) + \sigma_3 (PCB_{i,t} - PCB_{i,t-\tau}) \\ &+ \sum_{h=1}^{5} \delta_h (W_{h,i,t-\tau} - W_{h,i,t-2\tau}) + (\xi_t - \xi_{t-\tau}) + \varepsilon_{i,t-\tau} \end{aligned} \tag{2}$$

Where: $P_{i,t}$ is the loan price of bank i at period t; $PCR_{i,t}$, represents public credit registries whereas $PCB_{i,t}$ denotes private credit bureaus; σ_0 is a constant; τ is the degree of auto-regression; W is the vector of control variables (*GDP per capita growth, Inflation, Population density, Deposit/Assets* and *Bank Branches),* η_i is the country-specific effect, ξ_t is the time-specific constant and $\varepsilon_{i,t}$ the error term. Dummy variables are not included in the GMM specifications because fixed effects are eliminated. Eqs (1) and (2) are replicated when the dependent variable is loan quantity.

It is important to allocate space to engage identification and exclusion restrictions. Consistent with recent literature, all explanatory variables are acknowledged as predetermined or suspected endogenous while only *years* are treated as strictly exogenous (see Dewan & Ramaprasad, 2014; Asongu & Nwachukwu, 2016a), principally because it is not apparent for *years* to become endogenous in first-difference (see Roodman, 2009b). Hence, the approach for treating *ivstyle* (years) is 'iv(years, eq(diff))' while the *gmmstyle* is used for suspected endogenous variables.

In the light of the above, years or strictly exogenous instruments affect the outcome variables exclusively via the endogenous explaining or predetermined variables. Moreover, the statistical validity of the exclusion restriction is investigated with the Difference in Hansen Test (DHT) for instrument exogeneity. In essence, the alternative hypothesis of this test should be rejected in order for the instruments to elicit the outcome variables exclusively through the suspected endogenous variables. Therefore, while in the standard instrumental variable (IV) technique, a rejection of the null hypothesis of the Sargan Overidentifying Restrictions (OIR) test indicates that the instruments explain the outcome variables beyond the suspected endogenous variables (see Beck et al., 2003; Asongu & Nwachukwu, 2016b), in the GMM approach which uses forward orthogonal deviations, the information criterion used to investigate if years exhibit strict exogeneity is the DHT. In the results that are reported in Section 4, the exclusion restriction assumption is validated if the null hypothesis of the DHT corresponding to IV (year, eq(diff)) is not rejected.

3.2.2 Instrumental Quantile regressions

In order to control for initial levels of loan quantity and loan price, the inquiry is consistent with the literature on conditional determinants by adopting a Quantile Regressions (QR) estimation approach (see Keonker & Hallock, 2001; Billger & Goel, 2009; Okada & Samreth, 2012; Asongu, 2013b). Accordingly, the QR approach consists of investigating the relationship between information sharing offices and the outcome variables throughout the conditional distributions of the outcome variables.

The existing information sharing literature has focused on the conditional mean of financial access (see Triki & Gajigo, 2014; Asongu et al., 2016b). Whereas mean effects are important, we extend the literature by using an estimation approach that accounts for initial levels of loan price and quantity. Moreover, studies that articulate mean impacts with Ordinary Least Squares (OLS) are founded on the assumption of normally distributed error

terms. This hypothesis of error terms that are normally distributed does not hold with QR. Moreover, the QR approach enables the inquiry to assess the relationship between information sharing and financial access with particular emphasis on banks with high, intermediate and low levels of loan and quantity price. The QR approach which is robust to the presence of outliers therefore enables investigation of parameter estimates at various points of the conditional distribution of the outcome variable (Koenker & Bassett, 1978).

The issue of endogeneity is tackled by employing an Instrumental Variable QR (IVQR) procedure. The instrumentation procedure for an information sharing office (e.g. public credit registries) is in Eq. (3) below.

$$PCR_{i,t} = \alpha + \delta_j \left(PCR_{i,t-1}\right) + \varepsilon_{i,t} \qquad (3)$$

Where: $PCR_{i,t}$, is the public credit registries indicator of bank i at period t, α is a constant, $PCR_{i,t-1}$, represents public credit registries in bank i at period $t-1$, and $\varepsilon_{i,t}$ the error term. The instrumentation procedure consists of regressing the information asymmetry independent variables of interest on their first lags and then saving the fitted values that are subsequently used as the main independent variables in Eq. (4). The specifications are Heteroscedasticity and Autocorrelation Consistent (HAC) in standard errors. The θth quintile estimator of financial access is obtained by solving for the following optimization problem, which is presented without subscripts for simplicity in Eq. (4)

$$\min_{\beta \in R^k} \left[\sum_{i \in \{i: y_i \geq x_i'\beta\}} \theta \left| y_i - x_i'\beta \right| + \sum_{i \in \{i: y_i < x_i'\beta\}} (1-\theta) \left| y_i - x_i'\beta \right| \right] \qquad (4)$$

Where $\theta \in (0,1)$. As opposed to OLS which is fundamentally based on minimizing the sum of squared residuals, with QR, the weighted sum of absolute deviations are minimised. For example, the 25th or 75th quintiles (with θ=0.25 or 0.75 respectively) are assessed by approximately weighing the residuals. The conditional quintile of financial access or y_i given x_i is:

$$Q_y(\theta / x_i) = x_i'\beta_\theta \qquad (5)$$

Where unique slope parameters are modelled for each θth specific quintile. This formulation is analogous to $E(y/x) = x_i'\beta$ in the OLS slope where parameters are investigated only at the mean of the conditional distribution of loan price and quantity. For the model in Eq. (5),

the dependent variable y_i is either loan price or loan quantity while x_i contains a constant term, *Public credit registries, Private credit bureaus, GDP per capita growth, Inflation, Population density, Deposit/Assets, Bank Branches, Small banks, domestic banks* and *Islamic banks.*

4. Empirical results

4.1 Presentation of results

Table 1 and Table 2 present GMM findings related respectively to loan price and loan quantity. Each table has three sets of specifications corresponding to public credit registries, private credit bureaus and information sharing offices (including both public credit registries and private credit bureaus). The full sample is from 2001-2011 whereas the partial sample is from 2005-2011. The partial sample is adopted for a twofold reason. First, it enables the study to limit instrument proliferation or over-identification because T is reduced. Second, data on information sharing offices in most countries are from the year 2005. Four principal information criteria are employed to assess the validity of the GMM model with forward orthogonal deviations[3]. Based on the information criteria it can be established that public credit registries decrease loan price. The significant control variables have expected signs.

[3] "*First, the null hypothesis of the second-order Arellano and Bond autocorrelation test (AR(2)) in difference for the absence of autocorrelation in the residuals should not be rejected. Second the Sargan and Hansen overidentification restrictions (OIR) tests should not be significant because their null hypotheses are the positions that instruments are valid or not correlated with the error terms. In essence, while the Sargan OIR test is not robust but not weakened by instruments, the Hansen OIR is robust but weakened by instruments. In order to restrict identification or limit the proliferation of instruments, we have ensured that instruments are lower than the number of cross-sections in most specifications. Third, the Difference in Hansen Test (DHT) for exogeneity of instruments isalso employed to assess the validity of results from the Hansen OIR test. Fourth, a Fischer test for the joint validity of estimated coefficients is also provided*" (Asongu & De Moor, 2017, p.200)

Table 1: Price Effects of Reducing Information Asymmetry

	Dependent Variable: Price of Loans					
	Public Credit Registries (PCR)		Private Credit Bureaus (PCB)		Information Sharing Offices	
	Full Sample	Partial Sample	Full Sample	Partial Sample	Full Sample	Partial Sample
Constant	-0.001	-0.038	-0.006	**0.176*** **	-0.004	-0.078
	(0.912)	(0.743)	(0.582)	**(0.000)**	(0.695)	(0.374)
Price of Loans (-1)	**0.627*** **	**0.783*** **	**0.652*** **	**0.774*** **	**0.634*** **	**0.798*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
PCR	**-0.0004** **	**-0.0003* **	---	---	**-0.0006*** **	**-0.0005*** **
	(0.012)	**(0.087)**			**(0.000)**	**(0.005)**
PCB	---	---	**0.0006*** **	-0.00004	**0.0006*** **	-0.00002
			(0.000)	(0.593)	**(0.008)**	(0.794)
GDPpcg	0.0006	0.000005	0.0002	0.00007	0.0002	0.0003
	(0.101)	(0.992)	(0.413)	(0.874)	(0.447)	(0.390)
Inflation	**0.0005*** **	**0.001*** **	**0.0005*** **	0.0005	**0.0005*** **	**0.0006** **
	(0.001)	**(0.001)**	**(0.004)**	(0.114)	**(0.006)**	**(0.043)**
Pop. density	**0.00002* **	0.00001	**0.00006*** **	0.000008	**0.00008*** **	0.013
	(0.099)	(0.322)	**(0.002)**	(0.505)	**(0.001)**	(0.364)
Deposit/Assets	**0.050*** **	0.043	**0.053*** **	0.028	**0.052*** **	-0.0004
	(0.000)	(0.143)	**(0.000)**	(0.206)	**(0.000)**	(0.120)
Bank Branches	-0.0003	-0.0002	**-0.001*** **	**-0.0007** **	**-0.0009*** **	0.079
	(0.123)	(0.404)	**(0.000)**	**(0.019)**	**(0.009)**	(0.353)
AR(1)	(0.000)	**(0.624)**	(0.000)	(0.000)	(0.000)	(0.004)
AR(2)	**(0.969)**	**(0.764)**	**(0.998)**	(0.009)	**(0.695)**	(0.003)
Sargan OIR	(0.003)	**(0.879)**	(0.000)	**(0.258)**	(0.000)	**(0.785)**
Hansen OIR	(0.020)	**(0.591)**	(0.003)	(0.067)	(0.015)	**(0.140)**
DHT for instruments						
(a)Instruments in levels						
H excluding group	(0.018)	**(0.584)**	(0.003)	**(0.481)**	(0.033)	**(0.463)**
Dif(null, H=exogenous)	**(0.149)**	**(0.504)**	(0.082)	(0.040)	(0.074)	(0.099)
(b) IV (years, eq(diff))						
H excluding group	(0.060)	**(0.371)**	(0.064)	(0.015)	**(0.110)**	**(0.128)**
Dif(null, H=exogenous)	(0.067)	**(0.817)**	(0.005)	**(0.848)**	(0.018)	**(0.346)**
Fisher	**56.14*** **	**47.64*** **	**30.18*** **	**44.30*** **	**36.53*** **	**80.41*** **
Instruments	34	33	34	32	38	36
Banks	144	112	144	109	144	106
Observations	698	140	690	138	678	132

*,**,***: significance levels of 10%, 5% and 1% respectively. DHT: Difference in Hansen Test for Exogeneity of Instruments' Subsets. Dif: Difference. OIR: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients and the Fisher statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the AR(1) and AR(2) tests and; b) the validity of the instruments in the Sargan OIR test. The full sample is from 2001-2011 whereas the partial sample is from 2005-2011.

Table 2: Quantity Effects of Reducing Information Asymmetry

	Dependent Variable: Quantity of Loans					
	Public Credit Registries (PCR)		Private Credit Bureaus (PCB)		Information Sharing Offices	
	Full Sample	Partial Sample	Full Sample	Partial Sample	Full Sample	Partial Sample
Constant	0.095	0.121	**0.286*** **	0.074	**0.292*** **	0.249
	(0.179)	(0.710)	**(0.000)**	(0.362)	**(0.000)**	(0.208)
Quantity of Loans(-1)	**0.991*** **	**1.003*** **	**0.946*** **	**1.006*** **	**0.943*** **	**1.009*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
PCR	-0.0003	0.0004	---	---	-0.0004	-0.0002
	(0.542)	(0.685)			(0.560)	(0.817)
PCB	---	---	**-0.003*** **	0.00005	**-0.002*** **	-0.0005
			(0.004)	(0.888)	**(0.004)**	(0.280)
GDPpcg	**0.005*** **	**0.006* **	**0.005*** **	**0.006** **	**0.005*** **	**0.006** **
	(0.003)	**(0.080)**	**(0.004)**	**(0.033)**	**(0.002)**	**(0.042)**
Inflation	0.001	-0.0008	**0.002** **	0.0002	**0.002*** **	-0.001
	(0.246)	(0.573)	**(0.010)**	(0.866)	**(0.006)**	(0.311)
Pop. density	0.00008	-0.00003	**-0.0001* **	0.00005	**-0.0002** **	-0.00001
	(0.131)	(0.729)	**(0.059)**	(0.282)	**(0.019)**	(0.828)
Deposit/Assets	-0.020	0.133	0.009	-0.001	0.024	0.033
	(0.824)	(0.394)	(0.912)	(0.992)	(0.760)	(0.793)
Bank Branches	**-0.002** **	**-0.004** **	0.001	**-0.002* **	0.001	**-0.003** **
	(0.023)	**(0.015)**	(0.351)	**(0.096)**	(0.293)	**(0.030)**
AR(1)	(0.000)	(0.681)	(0.000)	(0.256)	(0.000)	(0.158)
AR(2)	**(0.549)**	**(0.919)**	**(0.612)**	**(0.974)**	**(0.874)**	**(0.844)**
Sargan OIR	(0.000)	(0.030)	(0.001)	(0.004)	(0.004)	(0.081)
Hansen OIR	(0.001)	**(0.366)**	**(0.107)**	**(0.372)**	(0.094)	**(0.290)**
DHT for instruments						
(a)Instruments in levels						
H excluding group	**(0.951)**	**(0.579)**	**(0.685)**	**(0.337)**	**(0.691)**	**(0.351)**
Dif(null, H=exogenous)	(0.000)	**(0.262)**	(0.042)	**(0.406)**	(0.034)	**(0.298)**
(b) IV (years, eq(diff))						
H excluding group	(0.003)	**(0.371)**	(0.077)	**(0.298)**	(0.028)	**(0.380)**
Dif(null, H=exogenous)	(0.023)	**(0.364)**	**(0.390)**	**(0.587)**	**(0.785)**	**(0.202)**
Fisher	**869.92*** **	**1162.24*** **	**467.63*** **	**2897.38*** **	**517.49*** **	**1384.66*** **
Instruments	34	34	34	30	38	35
Banks	145	115	145	112	145	137
Observations	735	115	728	144	715	137

*,**,***: significance levels of 10%, 5% and 1% respectively. DHT: Difference in Hansen Test for Exogeneity of Instruments' Subsets. Dif: Difference. OIR: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients and the Fisher statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the AR(1) and AR(2) tests and; b) the validity of the instruments in the Sargan OIR test. The full sample is from 2001-2011 whereas the partial sample is from 2005-2011.

Tables 3 and 4 present QR findings corresponding respectively to loan price and loan quantity. Like with GMM findings, each table has three sets of specifications corresponding to public credit registries, private credit bureaus and information sharing offices (including both public credit registries and private credit bureaus). Consistent differences in information sharing offices estimated coefficients between OLS and quintiles (in terms of sign, significance and magnitude of significance) justify the relevance of adopting the empirical strategy.

The following findings can be established from Table 3. Public credit registries consistently decrease the price of loans whereas private credit bureaus consistently have the opposite effect. Most of the significant control variables have the expected signs. In Table 4, public credit registries increase loan quantity in bottom quintiles while private credit bureaus increase loan quantity in top quintiles.

Table 3: Price Effects of Reducing Information Asymmetry (IV QR)

	Dependent Variables: Price of Loans																	
	Public Credit Registries (PCR)						Private Credit Bureaus (PCB)						Information Sharing Offices					
	OLS	**Q.10**	**Q.25**	**Q.50**	**Q.75**	**Q.90**	**OLS**	**Q.10**	**Q.25**	**Q.50**	**Q.75**	**Q.90**	**OLS**	**Q.10**	**Q.25**	**Q.50**	**Q.75**	**Q.90**
Constant	**0.080*** **	**0.051*** **	**0.065*** **	**0.073*** **	**0.091*** **	**0.098*** **	**0.072*** **	**0.062*** **	**0.056*** **	**0.061*** **	**0.078*** **	**0.091*** **	**0.075*** **	**0.055*** **	**0.059*** **	**0.065*** **	**0.085*** **	**0.097*** **
	(0.000)	**(0.001)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
PCR (IV)	**-0.001*** **	**-0.001*** **	**-0.001*** **	**-0.001*** **	**-0.001*** **	**-0.001*** **	---	---	---	---	---	---	**-0.001*** **	**-0.001*** **	**-0.001*** **	**-0.001*** **	**-0.001*** **	**-0.001*** **
	(0.000)	**(0.001)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**							**(0.000)**	**(0.001)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
PCB (IV)	---	---	---	---	---	---	**0.0005*** **	**0.0007*** **	**0.0005*** **	**0.0004*** **	**0.0002** **	**0.0003*** **	**0.0004*** **	**0.0006*** **	**0.0003*** **	**0.0003*** **	**0.0002* **	**0.0002* **
							(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.030)**	**(0.001)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.062)**	**(0.061)**
GDPpcg	**-0.0007* **	0.0002	-0.00008	-0.0006	0.0007	**-0.001* **	-0.0004	0.0003	-0.0001	-0.0003	-0.00002	-0.00002	-0.0003	0.0007	0.00009	-0.0001	-0.0004	-0.0007
	(0.075)	(0.820)	(0.855)	(0.185)	(0.114)	**(0.084)**	(0.298)	(0.625)	(0.847)	(0.489)	(0.965)	(0.958)	(0.352)	(0.331)	(0.854)	(0.797)	(0.504)	(0.238)
Inflation	**0.001*** **	0.0003	**0.001*** **	**0.002*** **	**0.002*** **	**0.003*** **	**0.002*** **	0.0005	**0.001*** **	**0.002*** **	**0.002*** **	**0.003*** **	**0.001*** **	0.0008	**0.001*** **	**0.002*** **	**0.002*** **	**0.002*** **
	(0.000)	(0.605)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	(0.212)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	(0.126)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Pop. density	**0.00007*** **	0.00006	**0.00007*** **	**0.00008*** **	**0.00007*** **	**0.00007*** **	**0.00005*** **	**0.00006** **	**0.00003* **	**0.00005*** **	**0.00005*** **	**0.00007*** **	**0.00009*** **	**0.00007** **	**0.00008* **	**0.00009* **	**0.00009* **	**0.00008* **
	(0.000)	(0.169)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.001)**	**(0.000)**	**(0.013)**	**(0.087)**	**(0.003)**	**(0.005)**	**(0.000)**	**(0.000)**	**(0.030)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.002)**
Deposit/Assets	**0.017** **	0.009	**0.012* **	**0.018** **	**0.022** **	**0.032** **	**0.022*** **	-0.004	**0.022** **	**0.027*** **	**0.031*** **	**0.040*** **	**0.019*** **	-0.006	**0.017** **	**0.022*** **	**0.022* **	**0.037*** **
	(0.016)	(0.513)	**(0.099)**	**(0.024)**	**(0.014)**	**(0.016)**	**(0.001)**	(0.620)	**(0.038)**	**(0.003)**	**(0.005)**	**(0.000)**	**(0.014)**	(0.559)	**(0.037)**	**(0.055)**	**(0.055)**	**(0.003)**
Bank Branches	**-0.001*** **	-0.0003	**-0.001*** **	**-0.001*** **	**-0.001*** **	-0.0003	**-0.002*** **	**-0.002*** **	**-0.002*** **	**-0.002*** **	**-0.001*** **	**-0.002*** **	**-0.001*** **	**-0.001*** **	**-0.001*** **	**-0.001*** **	**-0.001*** **	-0.0004
	(0.000)	(0.930)	**(0.000)**	**(0.000)**	**(0.000)**	(0.374)	**(0.000)**	**(0.000)**	**(0.000)**	**(0..000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.003)**	(0.341)
Small Banks	**0.006* **	0.009	**0.007* **	0.0003	-0.0001	0.004	0.005	0.005	0.0005	0.003	0.003	0.007	0.005	0.007	0.004	0.0009	0.001***	0.002
	(0.098)	(0.271)	**(0.077)**	(0.944)	(0.977)	(0.520)	(0.144)	(0.378)	(0.928)	(0.520)	(0.575)	(0.214)	(0.168)	(0.282)	(0.309)	(0.835)	(0.003)	(0.746)
Domestic Banks	0.001	**-0.014* **	-0.001	**0.007** **	**0.008** **	0.001	-0.001	**-0.012** **	-0.001	0.003	0.005	0.001	-0.001	**-0.016*** **	-0.002	0.004	0.006	0.001
	(0.581)	**(0.050)**	(0.604)	**(0.043)**	**(0.045)**	(0.783)	(0.714)	**(0.021)**	(0.798)	(0.434)	(0.326)	(0.797)	(0.693)	**(0.005)**	(0.556)	(0.279)	(0.260)	(0.846)
Islamic Banks	**-0.017** **	0.0002	**-0.015* **	**-0.018* **	-0.011	-0.014	**-0.013** **	-0.002	-0.008	-0.010	-0.012	-0.018	**-0.011* **	0.0007	-0.009	-0.011	-0.009	-0.010
	(0.010)	(0.987)	**(0.054)**	**(0.056)**	(0.263)	(0.299)	**(0.031)**	(0.844)	(0.457)	(0.293)	(0.341)	(0.111)	**(0.076)**	(0.952)	(0.305)	(0.228)	(0.490)	(0.457)
Pseudo R^2/R^2	0.211	0.088	0.144	0.157	0.147	0.134	0.223	0.124	0.152	0.155	0.143	0.132	0.241	0.132	0.165	0.171	0.157	0.141
Fisher	**25.31*** **						**25.40*** **						**25.06*** **					
Observations	730	730	730	730	730	730	731	731	731	731	731	731	710	710	710	710	710	710

***,**,*: significance levels of 1%, 5% and 10% respectively. IV: Instrumented Variable. OLS: Ordinary Least Squares. R^2 (Pseudo R^2) for OLS (Quantile Regressions). Lower quantiles (e.g., Q 0.1) signify nations where price of loans is least. Bold values represent significant estimated coefficients and significant Fisher statistics for the overall validity of the model.

Table 4: Quantity Effects of Reducing Information Asymmetry (QR)

	Dependent Variable: Quantity of Loans																	
	Public Credit Registries (PCR)						Private Credit Bureaus (PCB)						Information Sharing Offices					
	OLS	**Q.10**	**Q.25**	**Q.50**	**Q.75**	**Q.90**	**OLS**	**Q.10**	**Q.25**	**Q.50**	**Q.75**	**Q.90**	**OLS**	**Q.10**	**Q.25**	**Q.50**	**Q.75**	**Q.90**
Constant	**3.971*** **	**2.800*** **	**3.146*** **	**3.743*** **	**4.959*** **	**5.369*** **	**3.824*** **	**2.521*** **	**2.939*** **	**3.685*** **	**4.864*** **	**5.177*** **	**3.846*** **	**2.682*** **	**3.040*** **	**3.665*** **	**4.859*** **	**5.159*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
PCR (IV)	**0.012** **	**0.012* **	**0.032*** **	0.014	-0.005	-0.001	---	---	---	---	---	---	0.009	**0.015** **	**0.027** **	0.008	-0.010	0.001
	(0.044)	**(0.051)**	**(0.004)**	(0.254)	(0.609)	(0.879)							(0.130)	**(0.023)**	**(0.017)**	(0.462)	(0.316)	(0.823)
PCB (IV)	---	---	---	---	---	---	0.001	0.003	0.001	**-0.007* **	**0.005* **	**0.003* **	0.0007	0.0006	0.001	**-0.006** **	0.003	0.003
							(0.624)	(0.128)	(0.750)	**(0.051)**	**(0.078)**	**(0.080)**	(0.781)	(0.794)	(0.713)	**(0.048)**	(0.194)	(0.114)
GDPpcg	-0.017	**0.022** **	-0.021	**-0.039* **	-0.019	**-**	-0.009	**0.016* **	-0.015	-0.035	-0.018	**-**	-0.012	**0.025** **	-0.018	**-0.038** **	-0.014	**-**
						0.037* **						**0.024*** **						**0.026*** **
	(0.140)	**(0.025)**	(0.209)	**(0.057)**	(0.172)	**(0.001)**	(0.434)	**(0.082)**	(0.450)	(0.107)	(0.245)	**(0.009)**	(0.284)	**(0.017)**	(0.330)	**(0.033)**	(0.332)	**(0.004)**
Inflation	**-**	**-**	-0.011	**-**	**-**	**-0.017** **	**-**	**-0.012** **	-0.013	**-**	**-**	-0.008	**-**	**-**	-0.013	**-**	**-**	**-0.013** **
	0.028* **	**0.017*** **		**0.042*** **	**0.030*** **		**0.023*** **			**0.034*** **	**0.025*** **		**0.026*** **	**0.017*** **		**0.035*** **	**0.029*** **	
	(0.000)	**(0.003)**	(0.256)	**(0.000)**	**(0.000)**	**(0.010)**	**(0.000)**	**(0.023)**	(0.245)	**(0.006)**	**(0.002)**	(0.109)	**(0.000)**	**(0.004)**	(0.222)	**(0.001)**	**(0.001)**	**(0.019)**
Pop. density	**-**	**-**	**-**	-0.001	**-**	**-**	**-**	**-0.0007**	-0.0005	-0.0008	**-**	**-**	**-**	**-**	**-0.001** **	-0.001	-0.0009	**-**
	0.001* **	**0.001*** **	**0.002*** **		**0.001*** **	**0.001*** **	**0.001*** **	**** **			**0.001*** **	**0.0009** **	**0.001*** **	**0.001*** **				**0.0009** **
	(0.000)	**(0.000)**	**(0.001)**	(0.138)	**(0.006)**	**(0.009)**	**(0.002)**	**(0.003)**	(0.297)	(0.238)	**(0.009)**	**(0.011)**	**(0.001)**	**(0.000)**	**(0.041)**	(0.120)	(0.102)	**(0.011)**
Deposit/Assets	**1.860*** **	**1.260*** **	**1.953*** **	**2.400*** **	**1.336*** **	**1.153*** **	**1.925*** **	**1.333*** **	**1.984*** **	**2.260*** **	**1.474*** **	**1.297*** **	**1.931*** **	**1.403*** **	**2.046*** **	**2.304*** **	**1.443*** **	**1.357*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Bank Branches	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-0.005	**-0.027** **	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	0.048* **	**0.015*** **	**0.038*** **	**0.060*** **	**0.049*** **	**0.040*** **	**0.042*** **			**0.041*** **	**0.055*** **	**0.039*** **	**0.047*** **	**0.018*** **	**0.037*** **	**0.048*** **	**0.046*** **	**0.042*** **
	(0.000)	**(0.001)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	(0.378)	**(0.040)**	**(0.001)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.001)**	**(0.000)**	**(0.000)**	**(0.000)**
Small Banks	**-**	**-**	**-**	**-**	**-0.338** **	-0.190	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-0.192** **
	0.742* **	**1.023*** **	**1.261*** **	**0.716*** **			**0.757*** **	**0.957*** **	**1.191*** **	**0.714*** **	**0.413*** **	**0.278*** **	**0.706*** **	**1.037*** **	**1.235*** **	**0.671*** **	**0.390*** **	
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.011)**	(0.110)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.007)**	**(0.004)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.007)**	**(0.047)**
Domestic Banks	**0.410*** **	**0.046**	**0.417*** **	**0.463*** **	**0.582*** **	**-**	**0.379*** **	0.026	**0.461*** **	**0.517*** **	**0.563*** **	**0.482*** **	**0.420*** **	0.107	**0.433** **	**0.543*** **	**0.553*** **	**0.436*** **
						1.507* **												
	(0.000)	**(0.658)**	**(0.007)**	**(0.005)**	**(0.000)**	**(0.000)**	**(0.000)**	(0.778)	**(0.009)**	**(0.003)**	**(0.000)**	**(0.000)**	**(0.000)**	(0.338)	**(0.010)**	**(0.000)**	**(0.000)**	**(0.000)**
Islamic Banks	**-**	0.333	-0.154	-0.351	**-**	**-**	**-**	**0.498** **	0.086	-0.385	**-**	**-**	**-**	0.310	-0.067	-0.436	**-**	**-**
	0.608* **				**1.354*** **	**1.507*** **	**0.513*** **				**1.342*** **	**1.290*** **	**0.585*** **				**1.308*** **	**1.341*** **
	(0.000)	(0.143)	(0.677)	(0.362)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.018)**	(0.834)	(0.338)	**(0.000)**	**(0.000)**	**(0.000)**	(0.197)	(0.865)	(0.188)	**(0.000)**	**(0.000)**
Pseudo R^2/R^2	0.194	0.075	0.114	0.150	0.102	0.114	0.190	0.074	0.105	0.149	0.107	0.119	0.193	0.081	0.119	0.150	0.103	0.116
Fisher	**36.98*** **						**36.88*** **						**32.45*** **					
Observations	753	753	753	753	753	753	756	756	756	756	756	756	733	733	733	733	733	733

***,**,*: significance levels of 1%, 5% and 10% respectively. IV: Instrumented Variable. OLS: Ordinary Least Squares. R^2 (Pseudo R^2) for OLS (Quantile Regressions). Lower quantiles (e.g., Q 0.1) signify nations where quantity of loans is least. Bold values represent significant estimated coefficients and significant Fisher statistics for the overall validity of the model.

4.2 Further discussion of results and policy implications

This section is engaged in two main strands, namely: the nexus with the literature and implication of the findings. First, on the relationship with existing literature, beyond the established significant estimates in distinct quintiles of loan quantity and price (which we discuss in the second strand), the main findings can be summarised as follows: while both information sharing offices are important for increasing loan quantity, public credit registries are comparatively better for financial access because they decrease loan prices compared to private credit bureaus that increase it. Hence, in the narrative that follows it is assumed that public credit registries have an edge in reducing financing constraints.

From a broad angle, the findings are in accordance with Singh et al. (2009) who have reached the conclusion that African countries which promote information sharing offices enjoy higher levels of financial access. The findings are also in line with Galindo and Miller (2001) in the view that countries with comparatively improved credit registries would enjoy less restrictions to financial access compared to their counterparts with less developed information sharing offices. This narrative accords with this study because private credit bureaus are relatively undeveloped compared to public credit registries. Appendix 5 which substantiates this perspective shows that many countries have public credit registries compared to private credit bureaus.

The findings are not in agreement with Love and Mylenko (2003) because they have concluded that private credit bureaus are linked to higher levels of financial access while public credit registries do not have any substantial effect in mitigating financial access constraints. Our results do not also align with Triki and Gajigo (2014) who have established that financial access is comparatively higher in nations with private credit bureaus compared to those with public credit registries or neither institution.

In the second strand, the following implication is directly derivable from the findings. (1) Public credit registries are more useful in increasing financial access from banks with comparatively low levels of quantity of loans and private credit bureaus are more instrumental in improving financial access from banks with comparatively high levels of quantity of loans. As a direct policy implication, in order to increase loan quantity, public credit registries should target banks offering comparatively lower quantity of loans while private credit bureaus should target banks offering higher quantity of loans.

5. Conclusion and future research directions

The purpose of this study has been to assess how information sharing offices affect loan price and quantity in the African banking industry. The empirical evidence is based on a panel of 162 banks in 42 countries for the period 2001-2011. From the Generalised Method of Moments, public credit registries decrease loan prices. With instrumental Quantile Regressions, two main findings are established. Public credit registries consistently decrease the price of loans whereas private credit bureaus consistently have the opposite effect. Public credit registries increase loan quantity in bottom quintiles (or banks associated with lower loan quantities) while private credit bureaus increase loan quantity in top quintiles (or banks associated with higher loan quantities).

Future studies can improve the extant literature by assessing the role of information and communication technologies in the established linkages. Furthermore, engaging country-specific inquiries is worthwhile for more targeted policy implications.

Appendices

Appendix 1: Summary of expected signs

	Variables	Expected sign on loan price	Expected sign on loan quantity
Bank-oriented features	Deposit/Asset ratio	+	+
	Bank Branches	-	+
Market-related characteristics	GDP per capita growth	Uncertain	+
	Population density	+	+
	Inflation	+	-
Characteristics of the unobserved heterogeneity	Small versus(vs). Big banks	Uncertain	Uncertain
	domestic vs. foreign banks	Uncertain	Uncertain
	Islamic vs. non-Islamic banks	Uncertain	Uncertain

Appendix 2: Variable Definitions

Variables	Signs	Variable Definitions	Sources
Quantity	Qty	Logarithm of Loans	BankScope
Price (charged on Loans or Quantity)	Price	(Gross Interest and Dividend income +Total Non-Interest Operating Income)/Total Assets	BankScope
Public credit registries	PCR	Public credit registry coverage (% of adults)	WDI (World Bank)
Private credit bureaus	PCB	Private credit bureaus coverage (% of adults)	WDI (World Bank)
GDP per capita	GDP	GDP per capita growth (annual %)	WDI (World Bank)
Inflation	Infl.	Consumer Price Index (annual %)	WDI (World Bank)
Populaton density	Pop.	People per square kilometers of land area	WDI (World Bank)
Deposits/Assets	D/A	Deposits on Total Assets	BankScope
Bank Branches	Bbrchs	Number of Bank Branches (Commercial bank branches per 100 000 adults)	BankScope
Small Banks	Ssize	Ratio of Bank Assets to Total Assets (Assets in all Banks for a given period) ≤ 0.50	Authors' calculation and BankScope
Large Banks	Lsize	Ratio of Bank Assets to Total Assets (Assets in all Banks for a given period)>0.50	Authors' calculation and BankScope
Domestic/Foreign banks	Dom/Foreign	Domestic/Foreign banks based on qualitative information: creation date, headquarters, government/private ownership, % of foreign ownership, year of foreign/domestic ownership…etc	Authors' qualitative content analysis.
Islamic/Non-Islamic	Islam/NonIsl.	Islamic/Non-Islamic banks based on financial statement characteristics (trading in derivatives and interest on loan payments…etc)	Authors' qualitative content analysis; Beck et al. (2010); Ali (2012).

WDI: World Development Indicators. GDP: Gross Domestic Product. The following are dummy variables: Ssize, Lsize, Open, Close, Dom/Foreign and Islam/NonIsl.

Appendix 3: Summary Statistics

		Mean	S.D	Minimum	Maximum	Observations
Dependent variables	Price of Loans	0.338	0.929	0.000	25.931	1045
	Quantity of Loans (ln)	3.747	1.342	-0.045	6.438	1091
Independent variables	Public credit registries	2.056	6.206	0.000	49.800	1240
	Private credit bureaus	7.496	18.232	0.000	64.800	1235
Market variables	GDP per capita growth	13.912	96.707	-15.306	926.61	1782
	Inflation	10.239	22.695	-9.823	325.00	1749
	Population density	81.098	106.06	2.085	633.52	1782
Bank level variables	Deposits/Assets	0.664	0.198	0.000	1.154	1052
	Bank Branches	6.112	6.158	0.383	37.209	1129
Dummy variables	Small Size	0.804	0.396	0.000	1.000	1255
	Large Size	0.195	0.396	0.000	1.000	1255
	Domestic	0.753	0.431	0.000	1.000	1782
	Foreign	0.246	0.431	0.000	1.000	1782
	Islamic	0.037	0.188	0.000	1.000	1782
	Non-Islamic	0.962	0.188	0.000	1.000	1782

Ln: Logarithm. GDP: Gross Domestic Product. S.D: Standard Deviation. GDP: Gross Domestic Product. Indep: Independent. Vble: Variable.

Appendix4: Correlation Matrix

Info. Sharing		Market-Level Controls			Bank-Level Controls		Dummy-Controls						Dependent Variables		
PCB	PCR	GDP	Infl.	Pop.	D/A	Bbrchs	Ssize	Lsize	Dom.	Foreign	Islam	NonIsl.	Price	Quantity	
1.00	-0.13	0.022	-0.12	-0.18	-0.10	0.143	0.103	-0.10	0.176	-0.176	-0.080	0.080	0.111	-0.032	PCB
	1.000	0.040	-0.20	0.435	-0.01	0.553	-0.08	0.084	0.012	-0.012	0.026	-0.026	-0.282	-0.08	PCR
		1.000	-0.03	-0.08	0.048	-0.057	-0.08	0.085	0.065	-0.065	-0.021	0.021	-0.017	0.021	GDP
			1.000	-0.05	0.057	-0.012	0.069	-0.06	0.053	-0.053	-0.025	0.025	0.107	0.024	Infl.
				1.000	0.126	0.350	-0.04	0.040	-0.033	0.033	-0.112	0.112	0.045	-0.128	Pop.
					1.000	0.028	-0.13	0.135	-0.073	0.073	-0.236	0.236	0.106	0.292	D/A
						1.000	-0.07	0.076	0.143	-0.143	-0.036	0.036	-0.266	-0.182	Bbrchs
							1.000	-1.00	0.033	-0.033	0.026	-0.026	0.049	-0.218	Ssize
								1.000	-0.033	0.033	-0.026	0.026	-0.049	0.218	Lsize
									1.000	-1.000	0.112	-0.112	0.017	0.038	Dom
										1.000	-0.112	0.112	-0.017	-0.038	Foreign
											1.000	-1.000	-0.106	0.116	Islamic
												1.000	0.106	-0.036	NonIsl.
													1.000	-0.036	Price
														1.000	Quantity

Info: Information. PCB: Private Credit Bureaus. PCR: Public credit registries. GDP: GDP per capita growth. Infl: Inflation. Pop: Population growth. D/A: Deposit on Total Assets. Bbrchs: Bank branches. Szize: Small banks. Lsize: Large banks. Open: Capital openness. Closed: Capital closedness. Domestic: Domestic banks. Foreign: Foreign banks. Islam: Islamic banks. NonIsl: Non-Islamic banks. Price: Price of Loans. Quantity: Quantity of Loans.

Appendix 5: Country-specific average values from information sharing bureaus

	Public Credit Registries	Private Credit Bureaus
1) Algeria	0.216	0 .000
2) Angola	2.412	0.000
3) Benin	8.037	0.000
4) Botswana	0 .000	48.150
5) Burkina Faso	1.750	0.000
6) Burundi	0.212	0.000
7) Cameroon	2.312	0.000
8) Cape Verde	17.042	0.000
9) Central African Republic	1.412	0.000
10) Chad	0.400	0.000
11) Comoros	0.000	0.000
12) Congo Democratic Republic	0.000	0.000
13) Congo Republic	3.400	0.000
14) Côte d'Ivoire	2.487	0.000
15) Djibouti	0.200	0.000
16) Egypt	2.062	5.271
17) Equatorial Guinea	2.566	0.000
18) Eritrea	0.000	0.000
19) Ethiopia	0.087	0.000
20) Gabon	12.716	0.000
21) The Gambia	0.000	0.000
22) Ghana	0.000	1.700
23) Guinea	0.000	0.000
24) Guinea-Bissau	1.000	0.000
25) Kenya	0.000	1.750
26) Lesotho	0.000	0.000
27)Liberia	0.280	0.000
28) Libya	na	na
29) Madagascar	0.162	0.000
30) Malawi	0.000	0.000
31) Mali	2.812	0.000
32) Mauritania	0.187	0.000
33) Mauritius	27.866	0.000
34) Morocco	1.200	4.812
35) Mozambique	1.637	0.000
36) Namibia	0.000	50.362
37) Niger	0.825	0.000
38) Nigeria	0.025	0.000
39) Rwanda	0.425	0.275
40) Sao Tome & Principe	0.000	0.000
41) Senegal	3.787	0.000
42) Seychelles	0.000	0.000
43) Sierra Leone	0.000	0.000
44) Somalia	na	na
45) South Africa	0.000	57.312
46) Sudan	0.000	0.000
47) Swaziland	0.000	40.216
48) Tanzania	0.000	0.000
49) Togo	2.550	0.000
50) Tunisia	15.975	0.000
51) Uganda	0.000	0.512
52)Zambia	0.000	0.975
53) Zimbabwe	0.000	0.000

na: not applicable because of missing observations.

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