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## Information sharing and conditional financial development in Africa

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WP/16/001

**Information sharing and conditional financial development in Africa**

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**AGDI Working Paper**

Research Department

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**Abstract**

This study examines conditional financial development from information sharing in 53 African countries for the period 2004-2011, using contemporary and non-contemporary quantile regressions (QR) which enable the assessment of the effect of information sharing throughout the conditional distributions of financial development dynamics. The policy relevance of the QR approach builds on the motivation that blanket policies on the role of information sharing in financial development may not be effective unless they are contingent on initial levels of financial development and tailored differently across countries with low, intermediate and high levels of financial development. Information sharing is measured with private credit bureaus (PCB) and public credit registries (PCR) while financial development is proxied with dynamics of depth, efficiency, activity and size. The following findings are established. First, for financial depth, while there is a positive threshold effect from PCR in money supply and liquid liabilities, the effect from PCB is mixed. Second, for financial efficiency, there is a: (i) contemporary positive threshold from PCR and mixed effect from PCB in banking system efficiency and (ii) U-shape and positive threshold from PCR and PCB respectively in financial system efficiency. Third, for financial activity, there are consistent positive thresholds from PCR and PCB in banking system activity and financial system activity. Fourth, there are negative thresholds from PCR and PCB in financial size. Positive thresholds are consistent incremental financial development rewards from PCR and/or PCB with increasing financial development and vice-versa for negative thresholds. Mixed effects are characterised by S-shaped, Kuznets or wave-like patterns. As a main policy implication, initial conditions in financial development are essential to materialise incremental benefits from PCR and PCB. Other policy implications are discussed.

*JEL Classification:* G20; G29; O16; O55; C52

*Keywords:* Information Sharing; Financial Development; Quantile regression

## 1. Introduction

Access to finance in Africa has been substantially hampered by concerns of surplus liquidity (Saxegaard, 2006; Asongu, 2014a, p.70). Over the past decade and a half, the African financial intermediary landscape has witnessed the introduction of private credit bureaus (PCB) and public credit registries (PCR) as instruments of information sharing in order to mitigate information asymmetry between lenders and borrowers (Triki & Gajigo, 2014). The prime motivation for introducing these information sharing offices (ISO)<sup>1</sup> has been to mitigate moral hazard and adverse selection in bank lending. Accordingly, policies favouring underlying ISO have built on substantially documented evidence that basic financial access is constrained by a series of factors that are endogenous to information asymmetry, notably: affordability, physical access and eligibility to bank lending (Batuo & Kupukile, 2010; Allen *et al.*, 2011). In essence, ISO play the role of brokers in financial intermediation. Hence, by sharing information, ISO facilitate: increased credit and market competition, reduced credit constraints and efficient capital allocation (Jappelli & Pagano, 2002). Unfortunately, recent evidence suggests that, *inter alia*: (i) the concern about surplus liquidity is still very severe in African financial institutions (Fouda, 2009) and (ii) PCR and PCB are weighing negatively on financial intermediary development on the continent (Asongu *et al.*, 2015). In essence, the relationship between the sharing of information and bank lending has been an open debate in empirical and theoretical literature (Jappelli & Pagano, 2002)<sup>2</sup>.

In light of the above, one may reasonably infer that financial institutions on the continent have been taking advantage of ISO to pursue a ‘quiet life’<sup>3</sup>: using shared information from ISO for higher profits margins instead of intermediation efficiency<sup>4</sup>. To the best of our knowledge, the interesting body of literature (which we substantially engage in Section 2) on the role of ISO in financial development has left room for improvement in at least three areas, notably, the need:

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<sup>1</sup> We use ISO interchangeably with ‘PCB and PCR’ throughout the study.

<sup>2</sup> “On the whole, all three models agree on the prediction that information sharing (in one form or another) reduces default rates, whereas the prediction concerning its effect on lending is less clear-cut” (Jappelli & Pagano, 2002, p. 2020).

<sup>3</sup> Quiet life is the short form of the Quiet Life Hypothesis (QLH). According to Coccoresse and Pellecchia (2010), the QLH is an assumption that financial establishments with relatively higher market power would invest little in pursuing financial intermediation efficiency. On the contrary, they would use their advantage to grant fewer loans at affordable prices to borrowers because they would rather prefer to exploit opportunities for higher profit margins or a ‘quiet life’.

<sup>4</sup> Financial intermediation efficiency within the context of mitigating surplus liquidity refers to the ability of banks to transform mobilized deposits into credit for economic operators.

to narrow inquiries to scopes with severe issues of financial access; for holistic financial development indicators and to account for initial conditions in financial development.

First, on the scope front, despite the substantially documented issues of surplus liquidity in Africa, as far as we have reviewed, little scholarly focus has been devoted to the continent experiencing the most acute concerns of limited financial access. Moreover, studies on the continent have been limited in scope with a selected number of countries. Galindo and Miller (2001) have involved no African country. Love and Mylenko (2003) have positioned their inquiry on four countries. Barth et al. (2009) have targeted nine countries. Triki and Gajigo (2014) have focused on 42 countries for the period 2006-2009. This line of inquiry focuses on 53 African countries for the period 2004-2011. Positioning the inquiry on Africa is essentially due to the scarce literature in the area, despite evolving concerns about whether financial institutions on the continent have been tailoring information from ISO to enhancing allocation activity and efficiency (Triki & Gajigo, 2014) and recommendations for more scholarly research on the subject (Singh *et al.*, 2009, p. 13).

Second, on the measurement of financial development, it is interesting to note that the broad and African-specific literatures on information asymmetry (Ivashina, 2009; Tanjung *et al.*, 2010; Houston *et al.*, 2010) and information sharing have specifically been oriented towards the measurement of constraints in access to finance. We steer clear of the mainstream literature by employing all financial dimensions documented by the Financial Development and Structure Database (FDSD) of the World Bank. These include financial dynamics of depth, efficiency, activity and size. We have already observed that the fundamental aim of ISO is to boost financial intermediation efficiency. Increasing efficiency by reducing informational rents and boosting competition ultimately results in more financial activity or lending (Pagano & Jappelli, 1993, p. 2019). It should be noted that financial efficiency is generally the ratio of financial activity to financial depth (credit/deposit ratio).

Third, on the need to account for initial levels of financial development, we argue that blanket policies of financial development from modelling exercises based on mean values of the dependent variable are unlikely to be effective unless they are contingent on initial levels of financial development and tailored differently across countries with high- medium- and low-levels of financial development. The underpinning idea is that certain initial conditions of financial development may be required for the benefits of financial development from

information sharing by ISO. To the end, any resulting threshold effect (in terms of increasing or decreasing marginal returns from ISO estimates) should validate the hypothesis of initial conditions and hence, avail more room for policy implications. The use of quantile regressions to account for initial conditions steers clear of two studies closest to the present line of inquiry, which have based their empirical strategies on mean values of financial development, notably: Triki and Gajigo (2014) and Asongu *et al.* (2015) have respectively adopted Probit models and Generalised Method of Moments (GMM).

The rest of the study is structured as follows. Section 2 covers the theoretical and empirical literature. The data and methodology are discussed in Section 3. Section 4 presents the results and discussions while Section 5 concludes with implications.

## **2. Theoretical highlights and empirical literature**

Consistent with Claus and Grimes (2003), there are two main strands in the literature documenting the theoretical basis for an association between information sharing and existence of financial intermediaries. The first strand articulates the provision of liquidity by financial intermediaries whereas the second is concerned with the ability of financial intermediaries to transform the risk features of assets. Both strands build on the fundamental role of financial intermediation which is to increase allocation efficiency by mitigating the cost of channelling mobilised resources from borrowers to lenders. Corresponding theories on the role of financial intermediaries build on the literature of imperfect market information. In essence, financial intermediaries have the primary task of reducing information and transaction costs arising from information asymmetry (IA) between borrowers and lenders. Hence, the relevance of ISO build on the need for mechanisms by which the mitigation of IA can be enhanced in the financial sector.

Consistent with Asongu *et al.* (2015), a substantial bulk of empirical studies on IA has focused on: the role of information sharing among creditors and the impacts of creditors' rights to more information. The latter has principally been concerned with the influence of stronger creditors' rights in, *inter alia*: (i) bank risk-taking by Houston *et al.* (2010) and Acharya *et al.* (2011); (ii) bankruptcy with notable works from Claessens and Klapper (2005), Djankov *et al.* (2007) and Brockman and Unlu (2009) and (iii) capital structure by El Ghouli *et al.* (2012). The former strand has been concerned with assessing how reducing IA: enhances the availability of

credit (Djankov *et al.*, 2007; Brown *et al.*, 2009; Triki & Gajigo, 2014); reduces defaulting rates (Jappelli & Pagano, 2002); decreases the cost of credit (Brown *et al.*, 2009); affects antitrust intervention (Coccoresse, 2012); influences corrupt lending (Barth *et al.*, 2009) and affects bank loans that are syndicated (Ivashina, 2009; Tanjung *et al.*, 2010).

Noticeably, the engaged literature is skewed towards developed and developing countries where issues of financial access are comparatively less severe. In other words, whereas a substantial body of literature has focused on the Organisation of Economic Cooperation (OECD) economies and the emerging countries of Latin America and Asia, not much is known about Africa: a continent that has been documented to host firms and citizens with comparatively lower levels of access to finance (Asongu *et al.*, 2015).

Galindo and Miller (2001) investigate macroeconomic evidence on the underlying issues to conclude that relatively advanced economies with credit registries enjoy less financial restrictions compared to less developed economies with credit bureaus. In particular, well-performing PCR contribute substantially to firms' decreasing sensitivity to investment decisions for 'cash flows availability': a typical financial constraint proxy. The authors also establish that there has been about a 50% performance reduction by credit registries, notably: on the sensitivity of investment decisions to internal funds.

Love and Mylenko (2000) have used a combination credit registries (privates and public) and of firm-oriented data from the World Bank Business Environment Survey (WBES) to assess two main concerns, notably: whether as a result of more financial sharing from banks and the perception of managers, credit registries are negatively related to constraints in the financing of credit. The results have shown that PCB are associated with lower financing constraints and a higher sharing of financing from banks, while PCR do not have any significant effect on reducing financing constraints.

Barth *et al.* (2009) have examined the effect of: (i) information sharing and (ii) borrower and lender competition on 'lending corruption' via ISO using WEBS from 56 countries covering 4000 firms and private credit in 129 countries. The authors reveal two main results. First, corruption in lending is mitigated by banking competition and information sharing plays a positive role in the mitigating effect. Second, the ownership structure of firms and banks, firm competition and the legal environment have substantial impacts on corrupt lending.

Triki and Gajigo (2014) have assessed two main concerns: the effect of ISO in firms' access to finance and the impact of the design of PCR on the degree of financing constraint. Their results reveal that: financial access is relatively higher in economies with PCB compared to those with PCR or no ISO and substantial heterogeneity exists in access to finance and the design of ISO with PCR, among countries.

Asongu *et al.* (2015) have examined policy thresholds of information sharing in financial development and concluded on the following. PCB and PCR exert negative impacts on financial depth, with the relatively higher magnitude from the latter. PCB has a negative effect on banking system efficiency while the impact of PCR is insignificant. PCB and PCR both have negative effects on financial activity, with a higher magnitude from the former. Effects of ISO are positive on financial size, with the impact from PCB lower in magnitude.

As discussed in the introduction, the present line of inquiry complements the engaged literature in three main dimensions, notably, in the need to narrow inquiries to scopes with severe issues of financial access; for holistic financial development indicators; and to account for initial conditions in financial development. To these ends, the empirical evidence is based on 53 African countries, using all dimensions identified by the financial development and structure database of the World Bank and quantile regressions to articulate existing levels of financial development in the investigated nexuses.

### **3. Data and Methodology**

#### **3.1 Data**

Consistent with Asongu *et al.* (2015), we investigate a panel of 53 African countries with data for the period 2004-2011 from the Financial Development and Structure Database (FDSD) and African Development Indicators (ADI) of the World Bank. The starting- and ending-year are constrained by data availability. In line with the motivation of the inquiry, financial indicators from the FDSD are transformed to obtained variables of depth, efficiency, activity and size. The computation which is consistent with Asongu (2013) is also motivated by the need to avail room for more policy implications.

First, financial depth encompasses: (i) financial system deposits (*Fdgd*) or liquid liabilities and (ii) overall-economic depth (M2/GDP) denoting the monetary base plus time, savings and demand deposits. It is important to distinguish these measures because a great chunk



of the monetary base in African countries circulates outside the formal financial sector. Second, financial intermediation efficiency in the context of this study refers to the ability of financial institutions to fulfil their fundamental mission of converting mobilised resources into credit for economic operators. Two indicators are used, namely: (i) financial-system-efficiency ('financial system credit on financial system deposits: *Fcfd*') and (ii) banking-system-efficiency (with bank credit on bank deposits: *Bcbd*'). Third, financial intermediary activity represents the ability of banks to grant credit to economic operators. Two measurements are used to this end, namely: (i) financial system activity (with 'private credit by domestic banks and other financial institutions: *Pcrbof*') and (ii) banking system activity (with 'private domestic credit by deposit banks: *Pcrb*'). Fourth, financial size is measured as the ratio of 'deposit bank assets' to 'total assets' ('deposit bank assets on central bank assets plus deposit bank assets': *Dbacba*).

In accordance with Asongu *et al.* (2015), control variables include: foreign aid, trade, GDP growth, public investment and inflation. The covariates have also been amply documented in financial development studies (Huang, 2005; Osabuohain *et al.*, 2013; Asongu, 2014b). First, like with remittances (Aggarwal *et al.*, 2011; Efobi *et al.*, 2014), development assistances that is utilised effectively in recipient countries and survives the capture of consultancy services in donor countries, has a high likelihood of improving financial development in the recipient countries.

Second, a substantial body of the literature has concluded on a positive growth-finance nexus (Greenwood & Jovanovic, 1999; Saint-Paul, 1992). Consistent with this bulk of studies, economic growth is generally linked to reducing financial intermediation cost, resulting from intensive competition which involves an increasing bulk of financial resources allocated for investment purposes. In addition, the relevance of income levels in financial development is abundant in the broad (Levine, 1997) and African-specific (Asongu, 2012) literatures. Accordingly, whereas Asongu (2012) has established that higher income levels are associated with higher levels of financial development in Africa, Jaffee and Levonian (2001) had long concluded that income levels have a positive effect on banking system structure. Conversely, growth associated with financial crises may decrease financial development (Asongu, 2015).

Third, a strand in the literature is supportive of the view that openness-friendly policies (especially in trade) are likely to engender a positive outcome in financial development (Do & Levchenko, 2004; Huang & Temple, 2005). Fourth, the relationship between financial

development and investment has been investigated by Huang (2011) who has established a positive link. Fifth, some principal domestic macroeconomic policies like the maintenance of higher investment and low/stable inflation are conducive for financial development (Huybens & Smith, 1999; Boyd *et al.*, 2001; Huang, 2011). In essence, Boyd *et al.* (2001) on the one hand and Huybens and Smith (1999) on the other hand, have respectively empirically and theoretically established that countries with higher/chaotic inflation are very likely to be rewarded with less active, smaller and less efficient financial institutions.

Note should taken of the fact that, expected signs of discussed covariates cannot be established with certainty because the underpinning financial variables are conflicting by definition and measurement. For instance, the second variable or financial intermediation efficiency is defined and appreciated as the ratio of the third (financial activity) and first (financial depth), notably: credit/deposit ratio.

Sources and definitions of variables are provided in Appendix 1, the summary statistics in Appendix 2, whereas the correlation matrix is disclosed in Appendix 3. Two points are note worthy from the summary statistics: the means of variables are comparable and the substantial degree of variation is an indication that reasonable estimated linkages would emerge. The objective of the correlation matrix is to mitigate potential concerns of multicollinearity that could considerably bias estimated coefficients.

### **3.2 Methodology**

We have motivated this inquiry with the need to account for initial levels of financial development. For this purpose, we are consistent with conditional development literature (Billger & Goel, 2009; Okada & Samreth, 2012) in examining the effect of ISO on financial development throughout the distributions of financial development dynamics (Keonker & Hallock, 2001).

Previous studies on information sharing have assessed the nexus between ISO and financial development by reporting parameter estimates at the conditional mean of financial access indicators (Triki & Gajigo, 2014; Asongu *et al.*, 2015). While mean effects are important, we extend the underlying stream of ISO literature by employing a QR technique which distinguishes initial levels of financial development. Moreover, whereas Ordinary Least Squares (OLS)-related regressions are founded on the hypothesis that errors terms and financial

development variables are normally distributed, the QR strategy is not based on such an assumption of normally distributed error terms.

The QR technique estimates parameters at multiple points of the conditional distribution of financial development. Hence, the strategy aligns with our motivation to distinguish countries of low- medium- and high-initial financial development using contemporary and non-contemporary quantile regressions. In essence, the policy relevance of the QR approach builds on the motivation that blanket policies on the role of information sharing in financial development may not be effective unless they are contingent on initial levels of financial development and tailored differently across countries with low, intermediate and high levels of financial development.

The  $\theta^{\text{th}}$  quantile estimator of a financial development dynamic is obtained by solving for the optimization problem in Eq. (1), which is disclosed without subscripts for ease of presentation and simplicity.

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

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 instance the 25<sup>th</sup> or 75<sup>th</sup> quantiles (with  $\theta=0.25$  or  $0.75$  respectively) by approximately weighing the residuals. The conditional quantile of financial development or  $y_i$  given  $x_i$  is:

$$Q_y(\theta / x_i) = x_i' \beta_\theta \quad (2)$$

where unique slope parameters are modelled for each  $\theta^{\text{th}}$  specific quantile. This formulation is analogous to  $E(y / x) = x_i' \beta$  in the OLS slope where parameters are examined only at the mean of the conditional distribution of financial development. For the model in Eq. (2) the dependent variable  $y_i$  is a financial development indicator while  $x_i$  contains a constant term, *foreign aid, trade, GDP growth, public investment and inflation*.

## 4. Empirical Analysis

### 4.1 Presentation of results

Tables 1, 2, 3 and 4 respectively present findings corresponding to financial dynamics of depth, efficiency, activity and size. While the left-hand-side (LHS) of tables corresponds to contemporary estimations, the right-hand-side (RHS) entails non-contemporary regressions. The interest of lagging the independent variables in the RHS by one year is to have some bite on endogeneity (see Mlachila et al., 2014, p. 21). Consistent differences in ISO estimated coefficients between OLS and quantiles (in terms of sign, significance and magnitude of significance) justify the relevance of adopted empirical strategy.

Given that the effects of ISO are examined throughout the conditional distributions of underlying financial development dynamics, corresponding tendencies may take several patterns, namely: U-shape, inverted U-shape, S-shape and positive or negative threshold shapes. Thresholds within the context of this study are in accordance with Asongu (2014b). Positive thresholds are established when corresponding estimates from ISO consistently display decreasing negative magnitudes and/or increasing positive magnitude throughout the conditional distributions of a given financial development dynamic. Conversely, negative thresholds are denoted by consistent increasing negative or decreasing positive magnitudes from estimated ISO coefficients. Hence, evidence of a threshold tendency confirms the intuition of modelling based on initial financial development conditions, with the view that financial development benefits from information sharing may consistently increase or decrease concurrently with increasing initial levels of financial development.

From Table 1, the following findings can be established. First, the positive threshold effect from PCR is consistent across panels and non-contemporary specifications. Second, the impact of PCB is mixed, with a: negative threshold between the 0.10<sup>th</sup> and 0.75<sup>th</sup> quantiles on the LHS of Panel A; (ii) Kuznets-shape with a negative threshold from the 0.25<sup>th</sup> to the 0.75<sup>th</sup> quantile on the RHS of Panel A and (iii) a consistent S-shape from the 0.10<sup>th</sup> to the 0.75<sup>th</sup> quantile on the LHS and RHS of Panel B. Third, most of the significant control variables have the expected signs. (i) Inflation negatively affects financial depth because it is high with a mean value of 7.801 (see Appendix 1). (ii) Public investment has a positive effect probably because investments from the public sector circulate through formal financial establishments and hence, increase money supply. (iii) The effect of trade is positive and negative contingent on specific

quantiles. (iv) The negative effect of foreign aid is likely due to development assistance disbursements captured in donor countries (for consultancy, bureaucracy, purchase of commodities...etc) and only thinly reaching recipient countries. It could also be due to massive corruption schemes associated with development assistance, such that foreign aid does not benefit domestic money supply because it is surreptitiously funnelled back to tax havens in developed countries by the ruling elite. (v) The negative effect of growth is consistent with Asongu et al. (2015).

**Table 1: Financial Depth and Information Sharing**

Financial Depth												
Panel A: Overall Economic Depth (Money Supply)												
	Contemporary						Non-Contemporary					
	OLS	Q.10	Q.25	Q.50	Q.75	Q.90	OLS	Q.10	Q.25	Q.50	Q.75	Q.90
Constant	35.43*** (0.000)	18.927*** (0.000)	19.601*** (0.000)	17.579*** (0.000)	30.570*** (0.000)	72.410*** (0.003)	36.240*** (0.000)	20.596*** (0.000)	20.417*** (0.000)	17.783*** (0.000)	29.837*** (0.000)	67.571** (0.011)
PCR	1.419*** (0.000)	0.359*** (0.001)	1.591*** (0.000)	1.427*** (0.000)	1.831*** (0.000)	2.074*** (0.005)	1.520*** (0.000)	0.787*** (0.000)	1.652*** (0.000)	1.906*** (0.000)	1.928*** (0.012)	2.127*** (0.003)
PCB	0.202*** (0.000)	0.394*** (0.000)	0.389*** (0.000)	0.296*** (0.000)	0.175* (0.050)	0.069 (0.840)	0.192*** (0.002)	0.386*** (0.000)	0.395*** (0.000)	0.330*** (0.000)	0.198** (0.012)	0.110 (0.784)
GDP growth	-0.442* (0.054)	-0.110 (0.612)	-0.236 (0.210)	-0.630*** (0.000)	-0.597** (0.028)	0.093 (0.916)	-0.359 (0.166)	-0.103 (0.774)	-0.266* (0.053)	-0.360* (0.066)	-0.475** (0.018)	0.297 (0.746)
Inflation	-0.045*** (0.008)	0.023* (0.054)	0.011 (0.339)	-0.014 (0.172)	-0.040 (0.160)	-0.114 (0.206)	-0.068** (0.015)	0.021 (0.256)	0.007 (0.465)	-0.021 (0.192)	-0.060*** (0.003)	-0.116 (0.301)
Public Inv.	0.188 (0.503)	0.042 (0.882)	0.187 (0.202)	0.949*** (0.000)	1.210*** (0.000)	-0.260 (0.733)	0.125 (0.675)	-0.014 (0.948)	0.238** (0.043)	0.455*** (0.009)	0.872*** (0.000)	-0.188 (0.805)
Foreign Aid	-0.492*** (0.005)	0.009 (0.932)	0.055 (0.483)	-0.052 (0.253)	-0.516** (0.022)	-1.232 (0.307)	-0.531*** (0.003)	-0.067 (0.581)	0.048 (0.445)	-0.009 (0.927)	-0.335** (0.044)	-1.173 (0.394)
Trade	-0.015 (0.658)	-0.074*** (0.004)	-0.054*** (0.006)	0.043*** (0.000)	0.001 (0.969)	-0.101 (0.546)	-0.009 (0.805)	-0.076*** (0.009)	-0.057*** (0.000)	0.065** (0.016)	0.028 (0.412)	-0.095 (0.619)
Pseudo R <sup>2</sup> /R <sup>2</sup> Fisher	0.250 20.10***	0.123	0.139	0.208	0.229	0.246	0.252 17.83***	0.122	0.149	0.203	0.223	0.239
Observations	293	293	293	293	293	293	257	257	257	257	257	257

  

Panel B: Financial System Depth (Liquid Liabilities)												
	Contemporary						Non-Contemporary					
	OLS	Q.10	Q.25	Q.50	Q.75	Q.90	OLS	Q.10	Q.25	Q.50	Q.75	Q.90
Constant	25.878*** (0.000)	11.572*** (0.006)	14.759*** (0.000)	9.642*** (0.000)	20.395*** (0.000)	55.189*** (0.003)	26.550*** (0.000)	10.856** (0.020)	14.928*** (0.000)	10.567*** (0.001)	20.267*** (0.000)	59.695*** (0.006)
PCR	1.418*** (0.000)	0.453*** (0.002)	1.277*** (0.000)	1.432*** (0.000)	1.791*** (0.000)	2.033*** (0.000)	1.514*** (0.000)	0.524*** (0.002)	1.366*** (0.000)	1.804*** (0.000)	1.730*** (0.000)	2.110*** (0.001)
PCB	0.423 (0.000)	0.527*** (0.000)	0.475*** (0.000)	0.534*** (0.000)	0.552*** (0.000)	0.254 (0.366)	0.425*** (0.000)	0.524*** (0.000)	0.509*** (0.000)	0.556*** (0.000)	0.540*** (0.000)	0.238 (0.484)
GDP growth	-0.254 (0.220)	-0.047 (0.904)	-0.241** (0.026)	-0.274** (0.047)	-0.598*** (0.000)	-0.069 (0.935)	-0.194 (0.409)	-0.041 (0.926)	-0.174 (0.348)	-0.251 (0.207)	-0.377** (0.021)	0.054 (0.944)
Inflation	-0.016 (0.225)	0.038** (0.023)	0.015 (0.124)	0.004 (0.793)	-0.025 (0.107)	-0.090 (0.211)	-0.032 (0.139)	0.040 (0.105)	0.018 (0.173)	-0.002 (0.895)	-0.040 (0.011)	-0.110 (0.287)
Public Inv.	0.269 (0.279)	0.201 (0.228)	-0.001 (0.991)	0.615*** (0.000)	1.183*** (0.000)	-0.136 (0.829)	0.244 (0.375)	0.131 (0.413)	0.044 (0.785)	0.661*** (0.000)	0.846*** (0.000)	-0.256 (0.690)
Foreign Aid	-0.389** (0.011)	0.080 (0.564)	0.134** (0.041)	0.038 (0.619)	-0.331*** (0.006)	-0.983 (0.313)	-0.429*** (0.006)	-0.032 (0.814)	0.096 (0.292)	0.006 (0.951)	-0.260** (0.045)	-1.059 (0.346)
Trade	-0.018 (0.588)	-0.079** (0.019)	-0.042** (0.014)	0.057*** (0.002)	0.025 (0.290)	-0.043 (0.734)	-0.011 (0.742)	-0.062 (0.105)	-0.044** (0.044)	0.046* (0.080)	0.050* (0.078)	-0.065 (0.669)
Pseudo R <sup>2</sup> /R <sup>2</sup> Fisher	0.323 29.68***	0.138	0.147	0.218	0.300	0.273	0.323 27.91***	0.136	0.156	0.222	0.294	0.263

Observations	293	293	293	293	293	293	257	257	257	257	257	257
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\* \*\* \*\*\*: significance levels of 10%, 5% and 1% respectively. GDPg: GDP growth rate. Public Invt: Public Investment. OLS: Ordinary Least Squares. R<sup>2</sup> for OLS and Pseudo R<sup>2</sup> for quantile regression. Lower quantiles (e.g., Q 0.1) signify nations where financial depth is least. PCR: Public Credit Registries. PCB: Private Credit Bureaus.

The following findings can be established in relation to Table 2 on financial efficiency. First, with respect to banking system efficiency in Panel A: (i) there is a positive threshold effect from PCR (0.25<sup>th</sup> to 0.90<sup>th</sup> quantile) and S-shape from PCB on the LHS and (ii) positive wave-like patterns from PCR and Kuznets-shape (with a median peak) from PCB in the RHS. Second, in relation to financial system efficiency in Panel B: (i) there are consistent U-shapes (with median troughs) and positive thresholds from PCR and PCB respectively across contemporary and non-contemporary regressions.

With regard to Table 3 on the relationship between information sharing and financial activity, but for some thin exceptions, there are consistent positive thresholds across: panels, ISO, and ‘contemporaneous character of specifications’. Exceptions include: 0.90<sup>th</sup> quantiles of PCB specifications in Panel A and 0.90<sup>th</sup> quantile of PCR on the LHS of Panel B.

The following finding can be established for Table 4 on contemporary and non-contemporary linkages between ISO and financial size. But for a thin exception (0.90<sup>th</sup> quantile of PCR), there is an overwhelming evidence of negative thresholds (or decreasing positive magnitude).

The significant control variables in Tables 2 have signs that are somewhat contrasting with Tables 1 and 3 because the measurement of financial allocation efficiency (in Table 2) is broadly the ratio of financial activity (in Table 3) to financial depth (in Table 1). As we have alluded to, financial efficiency is the ability of financial institutions to transform mobilised resources (deposits) into credit (activity). The significant control variables in Table 4 have signs that are broadly consistent with the discourse provided for those in Table 1.

**Table 2: Financial Efficiency and Information Sharing**

<b>Financial Efficiency</b>												
<b>Panel A: Banking System Efficiency</b>												
	<b>Contemporary</b>						<b>Non-Contemporary</b>					
	OLS	Q.10	Q.25	Q.50	Q.75	Q.90	OLS	Q.10	Q.25	Q.50	Q.75	Q.90
Constant	<b>88.266***</b> (0.000)	<b>47.101***</b> (0.000)	<b>75.782***</b> (0.000)	<b>94.267***</b> (0.000)	<b>106.87***</b> (0.000)	<b>99.890***</b> (0.000)	<b>87.063***</b> (0.000)	<b>49.241***</b> (0.000)	<b>73.944***</b> (0.000)	<b>90.644***</b> (0.000)	<b>101.68***</b> (0.000)	<b>122.36***</b> (0.000)
PCR	<b>1.077***</b> (0.000)	<b>1.296***</b> (0.000)	<b>1.109***</b> (0.002)	<b>1.116***</b> (0.000)	<b>1.301***</b> (0.000)	<b>2.187***</b> (0.000)	<b>1.273***</b> (0.000)	<b>1.348***</b> (0.000)	<b>1.363***</b> (0.001)	<b>1.193***</b> (0.000)	<b>1.713***</b> (0.000)	<b>1.158***</b> (0.009)
PCB	<b>0.581***</b> (0.000)	<b>0.355***</b> (0.000)	<b>0.475***</b> (0.000)	<b>0.760***</b> (0.000)	<b>0.709***</b> (0.000)	<b>0.692***</b> (0.002)	<b>0.555***</b> (0.000)	<b>0.455***</b> (0.001)	<b>0.490***</b> (0.000)	<b>0.716***</b> (0.000)	<b>0.659***</b> (0.000)	<b>0.358*</b> (0.091)
GDP growth	0.430 (0.226)	<b>0.792***</b> (0.001)	0.731 (0.126)	-0.105 (0.760)	-0.231 (0.631)	0.662 (0.517)	0.492 (0.160)	<b>1.299***</b> (0.000)	<b>0.794*</b> (0.067)	0.299 (0.412)	-0.129 (0.878)	0.055 (0.956)
Inflation	- <b>0.0005***</b> (0.002)	<b>0.0008***</b> (0.000)	0.0001 (0.447)	- <b>0.0004***</b> (0.004)	<b>-0.001***</b> (0.000)	<b>-0.001**</b> (0.010)	<b>-0.029*</b> (0.099)	<b>0.023***</b> (0.000)	<b>-0.045***</b> (0.004)	-0.010 (0.211)	<b>-0.026***</b> (0.000)	- <b>0.044***</b> (0.001)
Public Invt.	<b>-0.814**</b> (0.024)	<b>-0.484*</b> (0.080)	<b>-1.178***</b> (0.004)	-0.255 (0.411)	-0.600 (0.169)	-0.580 (0.684)	<b>-0.767**</b> (0.028)	-0.384 (0.439)	<b>-1.183***</b> (0.002)	-0.433 (0.182)	-0.514 (0.226)	-0.973 (0.284)
Foreign Aid	-0.178 (0.313)	0.208 (0.349)	-0.277 (0.329)	-0.311 (0.128)	-0.374 (0.129)	0.233 (0.711)	-0.136 (0.408)	0.175 (0.553)	0.098 (0.707)	-0.214 (0.294)	<b>-0.384*</b> (0.073)	-0.644 (0.132)
Trade	<b>-0.209***</b> (0.000)	<b>-0.157***</b> (0.000)	<b>-0.229***</b> (0.000)	<b>-0.309***</b> (0.000)	<b>-0.249***</b> (0.000)	-0.141 (0.326)	<b>-0.199***</b> (0.000)	<b>-0.206***</b> (0.001)	<b>-0.232***</b> (0.000)	<b>-0.272***</b> (0.000)	<b>-0.190***</b> (0.000)	-0.166 (0.175)
Pseudo R <sup>2</sup> /R <sup>2</sup>	0.215	0.140	0.126	0.149	0.151	0.152	0.221	0.157	0.135	0.136	0.155	0.156
Fisher	<b>17.20***</b>						<b>8.82***</b>					
Observations	298	298	298	298	298	298	264	264	264	264	264	264

  

<b>Panel B: Financial System Efficiency</b>												
	<b>Contemporary</b>						<b>Non-Contemporary</b>					
	OLS	Q.10	Q.25	Q.50	Q.75	Q.90	OLS	Q.10	Q.25	Q.50	Q.75	Q.90
Constant	<b>100.67***</b> (0.000)	<b>43.217***</b> (0.000)	<b>80.296***</b> (0.000)	<b>101.36***</b> (0.000)	<b>117.03***</b> (0.000)	<b>116.93***</b> (0.000)	<b>98.998***</b> (0.00)	<b>46.012***</b> (0.000)	<b>76.460***</b> (0.000)	<b>99.955***</b> (0.000)	<b>113.10***</b> (0.000)	<b>114.63***</b> (0.000)
PCR	<b>1.177***</b> (0.000)	<b>1.250***</b> (0.000)	<b>1.046***</b> (0.005)	<b>0.923***</b> (0.000)	<b>1.339***</b> (0.000)	<b>2.377***</b> (0.000)	<b>1.360***</b> (0.000)	<b>1.367***</b> (0.000)	<b>1.213***</b> (0.003)	<b>1.148***</b> (0.000)	<b>2.274***</b> (0.000)	<b>2.279***</b> (0.000)
PCB	<b>1.313***</b> (0.000)	<b>0.384***</b> (0.000)	<b>0.477***</b> (0.001)	<b>1.063***</b> (0.000)	<b>2.245***</b> (0.000)	<b>2.743***</b> (0.000)	<b>1.347***</b> (0.000)	<b>0.417***</b> (0.002)	<b>0.452***</b> (0.000)	<b>0.887***</b> (0.000)	<b>2.432***</b> (0.000)	<b>2.678***</b> (0.000)
GDP growth	0.193 (0.656)	<b>0.953***</b> (0.000)	0.690 (0.161)	<b>-0.547**</b> (0.048)	-0.643 (0.318)	0.300 (0.810)	0.503 (0.234)	<b>1.351***</b> (0.000)	<b>1.190***</b> (0.002)	0.168 (0.546)	-0.292 (0.707)	0.269 (0.814)
Inflation	<b>-0.107*</b> (0.061)	<b>-0.053**</b> (0.030)	<b>-0.258***</b> (0.000)	<b>-0.095***</b> (0.005)	-0.130 (0.207)	-0.069 (0.390)	<b>-0.183*</b> (0.096)	<b>-0.141***</b> (0.004)	<b>-0.601***</b> (0.000)	<b>-0.244***</b> (0.000)	<b>-0.131***</b> (0.007)	<b>-0.155*</b> (0.071)
Public Invt.	<b>-0.881**</b> (0.046)	-0.373 (0.163)	<b>-1.158**</b> (0.014)	-0.210 (0.393)	-0.055 (0.922)	-0.804 (0.611)	<b>-0.924**</b> (0.041)	-0.257 (0.490)	-0.830 (0.050)	<b>-0.525**</b> (0.041)	-0.186 (0.787)	-0.575 (0.728)
Foreign Aid	-0.258 (0.211)	0.293 (0.164)	-0.284 (0.338)	<b>-0.374**</b> (0.019)	-0.325 (0.318)	-0.011 (0.986)	-0.232 (0.229)	0.264 (0.393)	-0.081 (0.752)	<b>-0.291*</b> (0.096)	-0.296 (0.431)	-0.065 (0.292)
Trade	<b>-0.333***</b> (0.000)	<b>-0.137***</b> (0.000)	<b>-0.249***</b> (0.000)	<b>-0.343***</b> (0.000)	<b>-0.428***</b> (0.000)	<b>-0.270*</b> (0.089)	<b>-0.321***</b> (0.000)	<b>-0.184***</b> (0.008)	<b>-0.244***</b> (0.000)	<b>-0.334***</b> (0.000)	<b>-0.384***</b> (0.000)	-0.254 (0.101)
Pseudo R <sup>2</sup> /R <sup>2</sup>	0.373	0.131	0.123	0.157	0.227	0.375	0.385	0.144	0.134	0.146	0.237	0.409
Fisher	<b>10.08***</b>						<b>8.38***</b>					
Observations	293	293	293	293	293	293	257	257	257	257	257	257

\*\*\*: significance levels of 10%, 5% and 1% respectively. GDPg: GDP growth rate. Public Invt: Public Investment. OLS: Ordinary Least Squares. R<sup>2</sup> for OLS and Pseudo R<sup>2</sup> for quantile regression. Lower quantiles (e.g., Q 0.1) signify nations where financial efficiency is least. PCR: Public Credit Registries. PCB: Private Credit Bureaus.

**Table 3: Financial Activity and Information Sharing**

Financial Activity												
Panel A: Banking System Activity												
	Contemporary						Non-Contemporary					
	OLS	Q.10	Q.25	Q.50	Q.75	Q.90	OLS	Q.10	Q.25	Q.50	Q.75	Q.90
Constant	22.642*** (0.000)	6.838*** (0.000)	8.135*** (0.003)	13.054*** (0.000)	17.085*** (0.000)	47.120*** (0.000)	22.969*** (0.000)	7.325*** (0.000)	9.273*** (0.002)	12.303*** (0.000)	18.938*** (0.000)	40.258*** (0.002)
PCR	1.545*** (0.000)	0.318*** (0.000)	1.441*** (0.000)	1.964*** (0.000)	2.076*** (0.000)	2.167*** (0.00)	1.719*** (0.000)	0.317*** (0.000)	1.528*** (0.000)	2.069*** (0.000)	2.203*** (0.000)	2.601*** (0.000)
PCB	0.576*** (0.000)	0.337*** (0.000)	0.433*** (0.000)	0.630*** (0.000)	0.969*** (0.000)	0.696*** (0.000)	0.583*** (0.000)	0.353*** (0.000)	0.428*** (0.000)	0.647*** (0.000)	0.894*** (0.000)	0.759*** (0.001)
GDP growth	-0.079 (0.602)	-0.025 (0.765)	-0.058 (0.754)	-0.233** (0.025)	0.107 (0.488)	-0.390 (0.357)	0.017 (0.920)	-0.019 (0.859)	-0.012 (0.961)	-0.053 (0.734)	0.272 (0.155)	-0.104 (0.829)
Inflation	-0.029* (0.051)	0.014*** (0.003)	0.005 (0.715)	-0.013 (0.322)	0.002 (0.881)	-0.081** (0.049)	-0.051** (0.046)	-0.0008 (0.932)	-0.022 (0.462)	-0.011 (0.388)	-0.021 (0.244)	-0.082 (0.136)
Public Invt.	-0.235* (0.058)	0.130** (0.016)	-0.022 (0.868)	0.125 (0.194)	0.013 (0.921)	-0.675* (0.082)	-0.276** (0.033)	0.101 (0.125)	-0.056 (0.721)	0.097 (0.475)	-0.173 (0.294)	-0.641 (0.208)
Foreign Aid	-0.302*** (0.006)	0.023 (0.606)	0.121 (0.221)	0.042 (0.514)	-0.081 (0.480)	-0.652 (0.211)	-0.325*** (0.003)	-0.004 (0.939)	0.078 (0.450)	0.030 (0.738)	-0.115 (0.397)	-0.492 (0.444)
Trade	-0.053** (0.022)	-0.047*** (0.000)	-0.038 (0.111)	-0.035** (0.021)	-0.027 (0.216)	-0.079 (0.303)	-0.048* (0.051)	-0.046*** (0.000)	-0.0365 (0.174)	-0.024 (0.253)	-0.027 (0.336)	-0.060 (0.560)
Pseudo R <sup>2</sup> /R <sup>2</sup>	0.481	0.151	0.168	0.274	0.387	0.424	0.488	0.154	0.176	0.278	0.391	0.430
Fisher	27.14***						22.42***					
Observations	293	293	293	293	293	293	257	257	257	257	257	257

  

Panel B: Financial System Activity												
	Contemporary						Non-Contemporary					
	OLS	Q.10	Q.25	Q.50	Q.75	Q.90	OLS	Q.10	Q.25	Q.50	Q.75	Q.90
Constant	27.368*** (0.000)	6.604*** (0.000)	7.898*** (0.002)	12.785*** (0.000)	15.214*** (0.000)	48.359*** (0.000)	27.611*** (0.000)	7.885*** (0.000)	8.419*** (0.000)	11.568*** (0.000)	19.545*** (0.000)	44.891*** (0.000)
PCR	1.633*** (0.000)	0.324*** (0.000)	1.432*** (0.000)	1.935*** (0.000)	2.241*** (0.000)	2.199*** (0.000)	1.824*** (0.000)	0.348*** (0.000)	1.546*** (0.000)	2.038*** (0.000)	2.343*** (0.000)	2.604*** (0.000)
PCB	0.990*** (0.000)	0.339*** (0.000)	0.425*** (0.000)	0.632*** (0.000)	1.791*** (0.000)	2.012*** (0.000)	1.034*** (0.000)	0.350*** (0.000)	0.448*** (0.000)	0.646*** (0.000)	1.933*** (0.000)	2.085*** (0.000)
GDP growth	-0.045 (0.816)	-0.024 (0.797)	-0.059 (0.740)	-0.235 (0.037)	0.042 (0.800)	-0.269 (0.482)	0.071 (0.756)	-0.020 (0.848)	-0.017 (0.930)	-0.139 (0.385)	0.123 (0.643)	-0.0006 (0.999)
Inflation	-0.027 (0.100)	0.016*** (0.003)	0.008 (0.574)	-0.012 (0.417)	0.008 (0.640)	-0.076** (0.048)	-0.052* (0.080)	-0.006 (0.517)	-0.056** (0.020)	-0.011 (0.403)	-0.023 (0.321)	-0.082 (0.141)
Public Invt.	-0.191 (0.233)	0.133** (0.033)	0.027 (0.846)	0.124 (0.246)	0.037 (0.804)	-0.643 (0.102)	-0.261 (0.131)	0.107 (0.160)	-0.049 (0.694)	0.159 (0.264)	-0.158 (0.501)	-0.648 (0.213)
Foreign Aid	-0.359*** (0.003)	0.035 (0.495)	0.112 (0.214)	0.080 (0.251)	0.019 (0.875)	-0.653 (0.175)	-0.379*** (0.002)	0.008 (0.887)	0.134* (0.097)	0.079 (0.379)	-0.079 (0.686)	-0.535 (0.403)
Trade	-0.118*** (0.001)	-0.046*** (0.000)	-0.038* (0.074)	-0.034** (0.036)	-0.023 (0.352)	-0.094 (0.185)	-0.113*** (0.003)	-0.052*** (0.000)	-0.031 (0.131)	-0.022 (0.311)	-0.032 (0.433)	-0.103 (0.313)
Pseudo R <sup>2</sup> /R <sup>2</sup>	0.476	0.133	0.146	0.233	0.355	0.509	0.490	0.135	0.153	0.234	0.365	0.512
Fisher	18.29***						14.63***					
Observations	295	295	295	295	295	295	259	259	259	259	259	259

\*, \*\*, \*\*\*: significance levels of 10%, 5% and 1% respectively. GDPg: GDP growth rate. Public Invt: Public Investment. OLS: Ordinary Least Squares. R<sup>2</sup> for OLS and Pseudo R<sup>2</sup> for quantile regression. Lower quantiles (e.g., Q 0.1) signify nations where financial activity is least. PCR: Public Credit Registries. PCB: Private Credit Bureaus.



**Table 4: Financial Size and Information Sharing**

	Financial Size											
	OLS	Contemporary					OLS	Non-Contemporary				
		Q.10	Q.25	Q.50	Q.75	Q.90		Q.10	Q.25	Q.50	Q.75	Q.90
Constant	<b>76.946***</b> (0.000)	<b>41.723***</b> (0.000)	<b>72.267***</b> (0.000)	<b>84.675***</b> (0.000)	<b>95.776***</b> (0.000)	<b>97.082***</b> (0.000)	<b>76.047***</b> (0.000)	<b>40.072***</b> (0.000)	<b>70.173***</b> (0.000)	<b>85.563***</b> (0.000)	<b>95.744***</b> (0.000)	<b>97.120***</b> (0.000)
PCR	<b>0.640***</b> (0.000)	<b>0.734*</b> (0.068)	<b>0.526***</b> (0.008)	<b>0.412***</b> (0.007)	<b>0.375***</b> (0.000)	<b>0.380***</b> (0.000)	<b>0.704***</b> (0.000)	<b>0.940*</b> (0.092)	<b>0.524*</b> (0.079)	<b>0.497***</b> (0.007)	<b>0.334***</b> (0.000)	<b>0.309***</b> (0.000)
PCB	<b>0.336***</b> (0.000)	<b>0.667***</b> (0.000)	<b>0.347***</b> (0.000)	<b>0.209***</b> (0.001)	<b>0.112***</b> (0.000)	<b>0.102***</b> (0.000)	<b>0.328***</b> (0.000)	<b>0.703***</b> (0.000)	<b>0.377***</b> (0.000)	<b>0.185**</b> (0.010)	<b>0.101***</b> (0.000)	<b>0.080***</b> (0.000)
GDP growth	-0.195 (0.438)	-0.325 (0.662)	<b>-0.696**</b> (0.016)	-0.235 (0.323)	<b>-0.151*</b> (0.053)	-0.055 (0.402)	0.014 (0.957)	0.050 (0.943)	-0.333 (0.431)	-0.032 (0.895)	-0.019 (0.785)	0.035 (0.550)
Inflation	<b>-0.079**</b> (0.018)	<b>-0.195***</b> (0.000)	<b>-0.079***</b> (0.000)	<b>-0.104***</b> (0.000)	<b>-0.063***</b> (0.000)	<b>-0.068***</b> (0.000)	<b>0.0005***</b> (0.000)	<b>0.001***</b> (0.000)	<b>0.0006***</b> (0.000)	<b>0.0002***</b> (0.009)	<b>-0.00001</b> (0.736)	<b>-0.0001***</b> (0.000)
Public Invt.	<b>0.824***</b> (0.000)	<b>0.934*</b> (0.052)	<b>0.498**</b> (0.028)	<b>0.559***</b> (0.005)	<b>0.353***</b> (0.000)	<b>0.240***</b> (0.000)	<b>0.728***</b> (0.000)	<b>0.971***</b> (0.003)	<b>0.464*</b> (0.054)	<b>0.499**</b> (0.025)	<b>0.288***</b> (0.000)	<b>0.204**</b> (0.010)
Foreign Aid	<b>-0.647***</b> (0.000)	-0.135 (0.695)	<b>-1.058***</b> (0.000)	<b>-0.727***</b> (0.000)	<b>-0.800***</b> (0.000)	<b>-0.353***</b> (0.000)	<b>-0.590***</b> (0.000)	<b>-0.170</b> (0.402)	<b>-0.734***</b> (0.000)	<b>-0.779***</b> (0.000)	<b>-0.761***</b> (0.000)	<b>-0.355***</b> (0.000)
Trade	0.015 (0.610)	0.139 (0.118)	<b>0.084***</b> (0.007)	0.025 (0.413)	-0.008 (0.504)	-0.010 (0.324)	0.024 (0.423)	<b>0.110*</b> (0.071)	<b>0.075*</b> (0.087)	0.021 (0.512)	-0.006 (0.583)	-0.009 (0.494)
Pseudo R <sup>2</sup> /R <sup>2</sup>	0.327	0.200	0.245	0.240	0.230	0.151	0.291	0.189	0.223	0.223	0.198	0.120
Fisher	<b>53.17***</b>						<b>50.41***</b>					
Observations	294	294	294	294	294	294	262	262	262	262	262	262

\*, \*\*, \*\*\*: significance levels of 10%, 5% and 1% respectively. GDPg: GDP growth rate. Public Invt: Public Investment. OLS: Ordinary Least Squares. R<sup>2</sup> for OLS and Pseudo R<sup>2</sup> for quantile regression. Lower quantiles (e.g., Q 0.1) signify nations where financial size is least. PCR: Public Credit Registries. PCB: Private Credit Bureaus.

## 4.2 Further discussion

We engage this section in four main strands, namely discussion on: the ‘quiet life hypothesis’ (QLH); comparative assessment with existing literature; and relevance of findings in the post-2015 development agenda.

First, the established positive effects of ISO on financial development (especially from dynamics of efficiency, activity and size) attest to a non-acceptance of the QLH<sup>5</sup>. Hence, it is reasonable to infer that African financial institutions are taking advantage of ISO to improve financial access across the continent. This inference does not negate the fact that underlying financial institutions are also using ISO to increase their profit margins. In essence, financial access and increasing profit margins move hand-in-glove. In line with the fundamental objectives of ISO, we might be tempted to go a step further to inferring that ISO are relevant in stimulating competition and mitigating the abuse of market power by big banks, notably through: reducing informational rents, sharing information to stimulate competition and rendering credit markets contestable (Pagano & Jappelli, 1993, p. 2019). The overwhelming positive role of ISO

<sup>5</sup> In our view, non-acceptance is preferable to rejection because, the cost and profit functions of financial institutions have to be assessed for a genuine assessment of the QLH in the African banking industry.

in financial access is also a response to an evolving stream of African business literature which is consistent on the position that lack of financial access is one of the most important challenges to doing business on the continent (Bartels et al., 2009; Kolstad & Wiig, 2011; Tuomi, 2011; Darley, 2012). It follows that encouraging ISO in Africa would improve financial access.

Second, it is important to discuss our findings in the light of engaged literature. (1) They are consistent with Singh et al. (2009) who have concluded that countries in sub-Saharan Africa which promote information sharing by means of ISO are very likely to experience higher levels of private domestic credit as a share of GDP (or financial activity). (2) Our results are also broadly consistent with Galindo and Miller (2001) in the perspective that economies with relatively improved credit registries enjoy less financial restrictions compared to their counterparts with less developed ISO. (3) The comparative conclusions from Love and Mylenko (2003) on the one hand and Triki and Gajigo (2014) on the other hand, are only thinly confirmed. Accordingly, the former has established that availability of PCB is associated with lower financing constraints and higher share of bank financing while the presence of PCR do not exert any significant effect on underlying constraints. Triki and Gajigo (2014) on their part have concluded that financial access is averagely higher in economies with PCB compared to those with PCR or neither institution. Based on our findings, the relative importance of PCB vis-à-vis PCR: (i) cannot be confirmed for financial size; (ii) can be confirmed exclusively at the 0.10<sup>th</sup> quantiles of financial activity (banking and financial system perspectives); (iii) are verifiable only in top distributions of financial system efficiency and (iv) holds water exclusively at the 0.10<sup>th</sup> quantiles of contemporary money supply and liquid liabilities. (4) The results of the study only partially confirm Asongu et al. (2015) who have found a positive ISO-finance nexus exclusively in relation to financial size.

Third, consistent with the post-2015 development agenda, it would be interesting if policy could employ ISO to mitigate information asymmetry not just for ‘financial access’ but also for ‘inclusive financial access’. This recommendation essentially builds on three counts: (i) finance is needed to boost growth (Asongu, 2015); (ii) inclusive finance is essential for quality of growth, which entails poverty and income-inequality reductions (Asongu & De Moor, 2015) and (iii) an April 2015 World Bank report has revealed that poverty has been decreasing in all continents of the world with the exception of Africa (World Bank, 2015), despite the continent having experienced two decades of growth resurgence (Fosu, 2015). Therefore while according

to the World Bank, 45% of countries in sub-Saharan Africa are off-track from achieving the Millennium Development Goal (MDG) extreme poverty target, tailoring ISO for 'inclusive financial access' would go a long way to helping retarded countries catch-up during the post-2015 sustainable development agenda.

## **5. Conclusion, policy implications and future research directions**

The purpose of this study has been to examine conditional financial development from information sharing in African countries using contemporary and non-contemporary quantile regressions. In summary, the following findings have been established. First, for financial depth, while there is a positive threshold effect from private credit registries (PCR) in money supply and liquid liabilities, the effect from public credit bureaus (PCB) is mixed. Second, for financial efficiency, there is a: (i) contemporary positive threshold from PCR and mixed effect from PCB in banking system efficiency and (ii) U-shape and positive threshold from PCR and PCB respectively in financial system efficiency. Third, for financial activity, there are consistent positive thresholds from PCR and PCB in banking system activity and financial system activity. Fourth, there are negative thresholds from PCR and PCB in financial size. Positive thresholds are defined as decreasing negative or increasing positive magnitudes from information sharing offices (ISO) estimates and vice-versa for negative thresholds. Mixed effects are characterised by S-shaped, Kuznets or wave-like patterns.

Four main inferences are note worthy from the results. First, African financial institutions are taking advantage of ISO to improve financial access across the continent. Second, initial conditions in financial development are essential to materialise incremental benefits from PCR and PCB. Third, increasing ISO across the continent could address one of the most important challenges to doing business in Africa: the lack of financial access. Fourth, sampled countries could tailor ISO to mitigate information asymmetry not exclusively for 'financial access' but also for 'inclusive financial access' in accordance with challenges of the post-2015 African development agenda.

The main policy implication from the study is that information sharing increases financial system depth (deposits), financial system activity (credit) as well as financial allocation efficiency or the ability of financial intermediaries to transform underlying mobilised deposits into credit for economic operators. Therefore, ISO can be tailored towards reducing surplus

liquidity issues on the continent by enhancing financial allocation efficiency with more proportionate action on countries with low initial levels of financial development. Accordingly, ISO could benefit from increased synchronisation of information by means of updated information and communication technologies (ICTs) and ‘knowledge economy’ (KE)-driven human resources in order to tackle voluntary and involuntary holding of surplus liquidity by African financial institutions.

First, as concerns, voluntary holding of surplus liquidity, underlying ICT- and KE-orientations would enhance the ability of ISO to: (i) ease constraints of banks in updating their positions in central banks so that they are not required to keep reserves above statutory limits; (ii) overcome transportation issues that oblige bank branches in remote zones to hold excess reserves; and (iii) ease interbank lending, especially for purposes of contingency.

Second, ISO with the underlying instruments could also be tailored towards avoiding involuntary holding of excess liquidity by: (i) dwarfing the inability of financial institutions to lend in scenarios of regulated interest rates; (ii) facilitating investment of banks in bond markets; (iii) increasing lending competition between banks; and (iv) broadening investment opportunities for banks in regional stock markets. Underlying ICT and KE instruments include, *inter alia*: reliable high-speed internet access and state of the art information systems in banks and ISO; regular training of ISO staff; recruitment of more qualified personnel and capitalization on mobile banking for inclusive development benefits.

In order to enhance financial sector development, regional/continental catch-up that is essential for policy harmonization, in the implementation of above suggested policies, more priority should be given to countries with low initial levels of development. This is essentially because we have established for the most part that beneficial effects from ISO increase more proportionately with higher levels of financial development.

Future inquires devoted to improving extant literature in light of the sustainable development agenda could focus on, *inter alia*: assessing mechanisms by which ISO can promote ‘inclusive financial’ access and examining instruments with which the inclusive effects of ISO can be consolidated.

## Appendices

### Appendix 1: Summary Statistics (2004-2011)

	Variables	Mean	S.D	Min.	Max.	Observations
Financial Development	Economic Financial Depth (M2)	34.279	22.294	6.363	112.83	377
	Financial System Depth (Fdgd)	28.262	21.066	2.926	92.325	377
	Banking System Efficiency (BcBd)	68.118	27.725	14.804	171.85	402
	Financial System Efficiency (FcFd)	68.118	27.725	14.804	171.85	402
	Banking System Activity (Pcrb)	72.722	35.884	22.200	252.88	377
	Financial System Activity (Pcrbof)	21.571	24.154	0.010	149.77	379
	Financial Size (Dbacba)	78.073	20.255	4.032	99.949	399
Information Asymmetry	Public Credit Registries (PCR)	2.155	5.812	0	49.8	381
	Private Credit Bureaus (PCB)	4.223	13.734	0	64.8	380
Control Variables	Economic Prosperity (GDPg)	4.996	4.556	-17.66	37.998	404
	Inflation	7.801	4.720	0	43.011	357
	Public Investment	74.778	1241.70	-8.974	24411	387
	Development Assistance	10.396	12.958	0.027	147.05	411
	Trade Openness (Trade)	80.861	32.935	24.968	186.15	392

S.D: Standard Deviation. Min: Minimum. Max: Maximum. M2: Money Supply. Fdgd: Financial deposits(liquid liabilities). BcBd: Bank credit on Bank deposits. FcFd: Financial credit on Financial deposits. Pcrb: Private domestic credit from deposit banks. Pcrbof: Private domestic credit from deposit banks and other financial institutions. Dbacba: Deposit bank assets on central bank assets plus deposit bank assets. GDPg: GDP growth.

## Appendix 2: Correlation Matrix (Uniform sample size: 291)

Financial Development Dynamics							Info. Asymmetry			Other variables				
Financial Depth		Financial Efficiency		Financial Activity		Fin. Size	PCR	PCB	GDPg	Inflation	PubIvt	NODA	Trade	
M2	Fdgdp	BcBd	FcFd	Prcb	Pcrbof	Dbacba								
1.000	0.970	0.094	0.103	0.821	0.629	0.398	0.416	0.147	-0.104	-0.080	0.055	-0.295	0.140	M2
	1.000	0.130	0.220	0.886	0.754	0.452	0.409	0.303	-0.091	-0.063	0.070	-0.320	0.149	Fdgdp
		1.000	0.859	0.490	0.495	0.243	0.154	0.303	-0.016	-0.144	-0.169	-0.133	-0.176	Bcbd
			1.000	0.583	0.743	0.242	0.067	0.510	-0.056	-0.097	-0.149	-0.179	-0.189	FcFd
				1.000	0.922	0.478	0.448	0.439	-0.092	-0.089	-0.055	-0.343	0.093	Pcrb
					1.000	0.413	0.293	0.556	-0.088	-0.073	-0.057	-0.324	0.019	Pcrbof
						1.000	0.249	0.343	-0.061	-0.142	0.198	-0.403	0.210	Dbacba
							1.000	-0.140	-0.026	-0.081	0.068	-0.154	0.207	PCR
								1.000	-0.101	-0.035	-0.047	-0.329	0.084	PCB
									1.000	-0.169	0.129	0.122	0.037	GDPg
										1.000	-0.081	-0.0004	-0.006	Inflation
											1.000	0.059	0.130	PubIvt
												1.000	-0.309	NODA
													1.000	Trade

M2: Money Supply. Fdgdp: Financial deposits(liquid liabilities). BcBd: Bank credit on bank deposits. FcFd: Financial credit on Financial deposits. Pcrb: Private domestic credit from deposit banks. Pcrbof: Private domestic credit from deposit banks and other financial institutions. Dbacba: Deposit bank assets on central bank assets plus deposit bank assets. Info: Information. PCR: Public Credit Registries. PCB: Private Credit Bureaus. GDPg: GDP growth. Popg: Population growth. PubIvt: Public Investment. NODA: Net Official Development Assistance. Info: Information.

### Appendix 3: Variable Definitions

Variables	Signs	Variable Definitions	Sources
Economic Financial Depth	M2	Money Supply (% of GDP)	World Bank (FDSD)
Financial System Depth	Fdgd	Liquid Liabilities (% of GDP)	World Bank (FDSD)
Banking System Efficiency	BcBd	Bank credit on Bank deposits	World Bank (FDSD)
Financial System Efficiency	FcFd	Financial credit on Financial deposits	World Bank (FDSD)
Banking System Activity	PrCb	Private domestic credit from deposit banks (% of GDP)	World Bank (FDSD)
Financial System Activity	PrCbof	Private domestic credit from financial institutions (% of GDP)	World Bank (FDSD)
Financial Size	Dbacba	Deposit bank assets on Central bank assets plus Deposit bank assets	World Bank (FDSD)
Information Asymmetry	PCR	Public credit registry coverage (% of adults)	World Bank (WDI)
	PCB	Private credit bureau coverage (% of adults)	World Bank (WDI)
Economic Prosperity	GDPg	GDP Growth (annual %)	World Bank (WDI)
Inflation	Infl	Consumer Price Index (annual %)	World Bank (WDI)
Public Investment	PubIvt	Gross Public Investment (% of GDP)	World Bank (WDI)
Development Assistance	NODA	Total Net Official Development Assistance (% of GDP)	World Bank (WDI)
Trade openness	Trade	Imports plus Exports in commodities (% of GDP)	World Bank (WDI)

WDI: World Bank Development Indicators. FDSD: Financial Development and Structure Database.

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