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The Synergy of Financial Sector Development and Information Sharing in Financial Access: Propositions and Empirical Evidence

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Abstract

This study assesses the role of information sharing in financialization (or coexistence of financial sub-systems) for financial access. The empirical evidence is based on contemporary and non-contemporary Fixed Effects and Quantile regressions on 53 African countries for the period 2004-2011. The positive complementarity of information sharing offices (ISOs) and financial formalization is an increasing function of financial activity (or access to credit) whereas the negative complementarity of ISOs and financial informalization is a decreasing function of financial activity. In order to leverage on the synergy between ISO and financial formalization for enhanced financial access, some policy measures are proposed.

JEL Classification: G20; G29; L96; O40; O55
Keywords: Information Asymmetry; Financialization; Financial Access

1. Introduction

There are four main motivations for the positioning of the present inquiry. They are: (i) growing need for domestic sources of financial resources for Africa's evolving investment constraints and insufficiencies in the corresponding financial development literature; (ii) high liquidity in African banking institutions; (iii) unexplored concepts of financialization[1] within the framework of financial sector development and (iv) the need to model the complementarity between financialization and instruments of reducing information asymmetry (IA) throughout the conditional distribution of financial development.

First, according to Ndikumana and Blackson (2015), domestic investment is more sensitive to domestic sources of capital in African countries when compared to external flows, (e.g. foreign aid and foreign direct investment). The conclusion of the authors is broadly consistent with African business literature which agrees that the need for alternative sources of finance (after failed privatisation projects) is one of the most important business challenges (see Bartels et al., 2009; Darley, 2012; Rolfe & Woodward, 2004; Tuomi, 2011; Agbloyor et al., 2013).

The above policy syndrome is accounted-for by this study in the perspective that, financial development is conceived and defined in terms of the fundamental role of banking institutions which is to transform mobilised resources into credit for domestic investment purposes. This conception of financial development steers clear of the mainstream financial development literature in Africa which has not conceived financial efficiency within the framework of intermediation efficiency (see Al-Obaidan, 2008; Ataullah et al. 2004; Kiyato, 2009; Batuo & Kupukile, 2010; Kablan, 2010). Some peculiar measurements of financial efficiency have included: Data Envelopment Analysis (DEA) for technical efficiency (Kablan, 2009); cost efficiency (Mensah et al., 2012; Chen, 2009) and profit efficiency (Hauner & Peiris, 2005).

Second, unfortunately the growing need for internal sources of finance starkly contrasts with the substantially documented issues of surplus liquidity in the banking establishments of Africa (Asongu, 2014a; Fouda, 2009; Saxegaard, 2006). Information asymmetry between borrowers and lenders in the banking industry has been documented to be a cause of excess

[1] Financialization should be understood in this study as the coexistence of financial sub-systems (formal semi-formal and informal) that can be complementary with or substitutes for one another.

liquidity (see Asongu et al., 2016a). It is in efforts to reduce information asymmetry that over the past decades, information sharing offices (ISOs) have been introduced in the continent in order to help address concerns of moral hazard (adverse selection) in borrowers (lenders) (Triki & Gajigo, 2014). These information sharing offices include: public credit registries (PCRs) and private credit bureaus (PCBs)[2].

This study involves this dimension by employing information sharing offices as policy variables for the reduction of IA for enhanced financial allocation efficiency. There is also a twofold reason for this involvement. On the one hand, the literature on reducing IA by means of information sharing offices has for the most part been skewed towards developed countries and the emerging economies of Asia and Latin America, with less scholarly focus on Africa (see Barth et al., 2009; love & Mylenko, 2003; Galindo & Miller, 2001). On the other, the scarce scholarly focus on Africa has failed to address the complementarity between information sharing offices and financial sector development in access to finance. To put this point into more perspective, Love and Mylenko (2003) have established that private registries are related to higher levels in financial access while the effect of public credit registries in decreasing financial constraints in not apparent. Singh et al. (2009) suggested that countries in Africa endowed with information sharing offices are linked to less financial constraints. According to Triki and Gajigo (2014) relative to private credit bureaus, public credit registries are less effective in driving financial access. Asongu et al (2016a) found that information sharing offices have been negatively associated with financial access while Asongu et al (2016b) concluded that relative to public credit registries, financial access is less sensitive to private credit bureaus.

The first-two points on the relevance of positioning the inquiry in Africa can be synthesised with the viewpoint that investigating the link between financial access and information sharing in developing nations and specifically in Africa is a timely contribution to the literature because African countries are characterised with poor institutional and legal conditions (Goldberg & Veitch, 2010; Alhassan & Biekpe, 2016). These institutional constraints tend to bolster informational issues in credit markets whether they are non-conventional (informal or semi-formal) or conventional (formal). Hence, overcoming informational issues is a major policy challenge for these countries particularly in terms of access to finance, financial sector development and formalization of the informal financial sector. The concern about

[2]'Information sharing offices' is used interchangeably with 'public credit registries and private credit bureaus'.

financial exclusion is particularly relevant in Africa because whereas in most developing nations less than 50 percent of the population has access to financial services in the formal sector, in most African countries less than 20 percent of households have such access (Beck et al., 2009). Some of the shortcomings of financial exclusion include slow economic growth and persistent income inequality (Beck & Demirguc-Kunt, 2008).

Third, the notion of financialization is a neglected dimension in the financial development literature. As argued by Asongu (2015a) and O'Toole (2014), a substantial bulk of literature in the area has been limited to more specific dimensions like bank participation and bank concentration. We deviate from this stream of the literature by engaging financial sector development in the perspective of fnancialization: the progress of one financial sector to the detriment of competing financial sectors. The engagement of this hitherto unexplored dimension merges two streams of literature by simultaneously contributing to the evolving literature on measuring financial development as well as to the economic development literature on mechanisms by which information sharing offices and financialization influence financial access. The twofold contribution also provides insights into a pragmatic way of disentangling the complementarity between different financial sectors and information sharing offices in financial access.

Fourth, it is important to account for initial levels of financial access in the modelling strategy because blanket policies based on mean values of financial access are not very likely to be efficient unless the modelling exercise accounts for existing levels of financial access such that the investigated relationships show countries with low, intermediate and high initial levels of financial access. The modelling strategy steers clear of recent literature on the IA-finance nexus which are based on mean values of financial access, *inter alia*: Triki and Gajigo (2014) and Asongu et al. (2016a) have respectively employed Probit and Generalized Method of Moments models. In order to account for the concern of initial financial development levels, this study examines the suggested linkages throughout the conditional distributions of financial access using contemporary and non-contemporary quantile regressions.

The theoretical underpinnings on the role of information sharing offices in the coexistence of financial subsystems for financial access are twofold. First, information sharing is linked to constraints in financial access in two main strands of the literature: the first is concerned with the transformation of banks' risk features while the second is oriented towards

channels through which liquidity provision by banks is consolidated (Claus & Grimes, 2003). Both views are consistent with the perspective that the fundamental mission of banks is allocation efficiency or the transformation of mobilised deposits into credit for investment purposes. Second, information sharing offices are in theory expected to be complementary with financial sector development or financialization in boosting financial allocation efficiency because information sharing offices are also designed to (i) boost competition within the financial sector in order to enhance financial access and (ii) discipline borrowers by discouraging them from defaulting on their debts and resorting to the informal financial sector as a viable alternative to the formal sector (Coccorese & Pellecchia, 2010; Coccorese, 2012). It is interesting to note that informal financial circuits are particularly relevant in financing small and medium sized enterprises in Africa (Tchankam et al., 2016).

This paper is not based on the assumption that the degree of 'financial formalization would moderate the effect of information sharing on access to finance' but on the assumption that 'information sharing would moderate the effect of financial formalization on access to finance'. The policy or modifying variables are information sharing offices which can be introduced by governments. Our choice of 'information sharing offices' (instead of financial formalization) as modifying variable builds on the theoretical expectation of information sharing offices which are anticipated to enhance financial sector competition for financial access. Information sharing offices are likely to promote the formal financial sector to the detriment of the informal financial sector because they also play the role of market discipline by educating borrowers on the perils of defaulting on their debts and resorting to the informal financial sector as a viable alternative to the formal financial sector. It is important to note that whereas information sharing offices mitigate bank adverse selection ex-ante of lending by banks, they also play the role of reducing moral hazard in borrowers ex-post of lending.

The remainder of the paper is organised as follows. Section 2 discusses the propositions, data and methodology. Section 3 presents the empirical results and corresponding implications whereas Section 4 concludes with future research directions.

2. Background, Literature Review and Positioning of the Inquiry

Consistent with Mylenko (2008) and Tchamyou and Asongu (2017), before 2008, information sharing offices were predominately established in the Organisation for Economic Cooperation

and Development (OECD) countries. After the 2008 financial crisis, the establishment of information sharing offices became a more important financial policy issue in developing countries. There were few countries with well-established information sharing offices in Sub-Saharan Africa by 2008, with the exception of South Africa. A few nations (e.g. Nigeria, Rwanda and Mozambique) had instituted credit registries with the principal mission of consolidating supervision in the banking sector. Unfortunately, due to lack of relevant logistics and technology, accurate and timely information for the most part was not provided by the credit registries.

Credit reference agencies or information sharing offices are institutions that are established to collect information related to the financial obligations of commercial and individual borrowers toward financial institutions. Such data is obtained from many sources, including: (i) retail lenders; (ii) direct assessments (for businesses) and (iii) public sources, credit card companies (related to individuals) and banks. After cross-checking for a comprehensive report, the gathered data is then consolidated and can be used by present and future creditors. The information from the underlying report pertaining to credit history is for the most part characterised by information of a positive and negative nature, notably: (i) negative data consists of default rate information whereas (ii) positive data entails details on repayment behaviour as well as all closed and open accounts.

Information sharing offices are relevant to enable financial institutions to increase credit availability to households and corporations. Hence, by reducing information asymmetry that constrains the ability of lenders to examine risk profiles, credit agencies play a vital role in economic prosperity. On the one hand, credit history data enables banks to tackle adverse selection because they can more exhaustively assess the reputational collateral of borrowers with information provided by information sharing offices. On the other, information sharing offices also mitigate moral hazard by addressing the issues surrounding the irresponsible behaviour of borrowers as far as debt repayment is concerned by helping to reduce default rates. Ultimately, the corresponding boost in lending is essential for economic sectors with financial constraints in small, micro and medium enterprises (Asongu et al., 2016a).

In accordance with Asongu et al (2016a), a considerable bulk of empirical literature on linkages between information sharing and financial development has focused on the relevance of information sharing between creditors and the effect of creditors' right to better information. The

latter is for the most part concerned with how stronger creditors' rights influence, among other things: risk-taking by banks (Houston et al., 2010; Acharya et al., 2011); bankruptcy (Claessens & Klapper, 2005; Djankov et al., 2007; Brockman & Unlu, 2009) and tax evasion (Beck et al., 2014). The former stream of the literature is focused on investigating how enhanced information sharing: consolidates credit availability (Djankov et al., 2007; Brown et al., 2009; Triki & Gajigo, 2014); mitigates rates of default (Jappelli & Pagano, 2002); reduces credit cost (Brown et al., 2009); influences interventions of the antitrust nature (Coccorese, 2012); affects corrupt-related lending (Barth et al., 2009) and impacts syndicated bank loans (Tanjung et al., 2010; Ivashina, 2009).

From the above literature, the scholarly emphasis has been on developed nations where financial access concerns are not as severe as in developing countries. Conversely, the African continent where financial access issues are most severe has not been given the scholarly attention it deserves. In the narrative that follows, we engage the relevant literature.

Beck et al. (2014) have shown that corporations in nations with enhanced systems of information sharing and more branch penetration are associated with less tax evasion. This incidence is stronger for corporations in smaller towns and cities, small corporations and corporations in the industries that depend on external financing on the one hand and corporations in industries and nations with more potential for growth on the other.

Galindo and Miller (2001) have assessed the underlying issues from a macroeconomic perspective to establish that comparatively developed countries with credit registries are rewarded with fewer restrictions on financial access compared to less developed countries with credit bureaus. More precisely, public credit registries that are well performing contribute considerably more to corporations reducing sensitivity to decisions of investment for 'cash flow availability', which is a characteristic proxy for financial constraint.

A combination of credit registries (public and private) as well as firm-related information from the World Bank Business Environment Survey has been used by Love and Mylenko (2000) to investigate if due to enhanced sharing of financial information from the perception of managers and banks, credit registries are negatively linked to financial access constraints. This finding has demonstrated that private credit bureaus are linked to lower constraints in financial access, whereas there is no significant impact on reducing financial access constraints from public credit registries.

Barth et al. (2009) have assessed the incidence of information sharing and competition between borrowers and lenders on corrupt-lending through information sharing offices to establish two main findings. On the one hand, corrupt-lending is reduced by competition between banks and information sharing plays a positive role in the reducing impact. On the other, the ownership structure of banks and corporations, competition between corporations and the legal environment engender considerable effect on the lending that is influenced by corruption.

Triki and Gajigo (2014) have examined two overarching issues related to information asymmetry in the African banking industry, notably: the incidence of information sharing offices on access to finance by corporations and the effect of public credit registry design on the level of constraint in financial access. Their findings show that financial access is comparatively apparent in countries with private credit bureaus relative to their counterparts with no information sharing offices or public credit registries. Moreover, the authors also articulate that considerable heterogeneity is apparent in financial access and the way information sharing offices are designed.

Asongu et al (2016a) have investigated thresholds of information sharing offices at which financial access is apparent in Africa to establish that both public credit registries and public credit bureaus have negative effects on financial depth, with higher effect from the latter. The effect of public credit registries on banking system efficiency is insignificant whereas private credit bureaus exert a negative incidence. Both information sharing offices have negative impacts on financial activity, with a higher effect from private credit bureaus. Information sharing offices have a positive incidence on financial size, with the effect of having a lower magnitude from private credit bureaus. Consistent with the motivation in the introduction, this inquiry complements the existing literature in four main dimensions.

3. Propositions, Data and Methodology

3.1 Propositions

The propositions of financial sector development provided in Table 1 build on insufficiencies of the financial system definition by the International Financial Statistics (IFS) (IMF, 2008) which has failed to account for the informal financial sector (see Asongu, 2014b). The neglected informal sector has been substantially documented in recent literature to have

positive development externalities in developing countries (see Meagher, 2013; Adeusi et al., 2012; Aryeetey, 2005). In essence, the IFS definition is more relevant to developed countries because financial depth in the perspective of money supply is equal to liquid liabilities because almost every citizen has a bank account. Consequently almost all currency within developed countries circulates within formal banking establishments. Conversely, in developing countries, a great chunk of the monetary base does not circulate within the formal banking sector because a great proportion of population lack bank accounts.

In the light of above narrative, the propositions outlined in Table 1 challenge the existing IFS definition in three main areas, namely by: (i) integrating the informal financial sector into the conception, definition and measurement of the financial system; (ii) dissociating the existing definition into its formal and semi-formal components and (iii) introducing the concept of financialization within the framework of competition in the shares of the money supply between various financial sectors. The underlying propositions have been employed in recent development literature (see Asongu, 2015ab).

While Gross Domestic Product (GDP)-based measurements are provided in Panel A, the propositions in Panel B are related to competition in shares of money supply between various financial sectors. Within the latter framework, an improvement in the shares of money supply in one financial sector is to the detriment of competing sectors. Such improvements can be qualified as financial formalization, informalization, non-formalization and semi-formalization. For instance, financial formalization is the increase of money supply shares of the formal financial sector to the detriment of other financial sectors (semi-formal and informal)

Table 1: Summary of propositions

Propositions	Name(s)	Formula	Elucidation
Panel A: GDP-based financial development indicators			
Proposition 1	Formal financial development	Bank deposits/GDP	Bank deposits[3] here refer to demand, time and savings deposits in deposit money banks.
Proposition 2	Semi-formal financial development	(Financial deposits – Bank deposits)/ GDP	Financial deposits[4] are demand, time and saving deposits in deposit money banks and other financial institutions.
Proposition 3	Informal financial development	(Money Supply – Financial deposits)/GDP	
Proposition 4	Informal and semi-formal financial development	(Money Supply – Bank deposits)/GDP	
Panel B: Measures of financial sector importance			
Proposition 5	Financial intermediary formalization	Bank deposits/ Money Supply (M2)	From 'informal and semi-formal' to *formal* financial development (formalization)[5] .
Proposition 6	Financial intermediary 'semi-formalization'	(Financial deposits - Bank deposits)/ Money Supply	From 'informal and formal' to *semi-formal* financial development (Semi-formalization)[6].
Proposition 7	Financial intermediary 'informalization'	(Money Supply – Financial deposits)/ Money Supply	From 'formal and semi-formal' to *informal* financial development (Informalisation)[7].
Proposition 8	Financial intermediary 'semi-formalization and informalization'	(Money Supply – Bank Deposits)/Money Supply	Formal to '*informal and semi-formal'* financial development: (Semi-formalization and informalization) [8]

N.B: Propositions 5, 6, 7 add up to unity (one) arithmetically spelling-out the underlying assumption of sector importance. Hence, when their time series properties are considered in empirical analysis, the evolution of one sector is to the detriment of other sectors and vice-versa.
Source: Asongu (2015a).

It is important to note that in the measures of financial sector importance in Panel B, the numerator which is money supply captures both the deposit and credit dimensions of financial access. This is fundamentally because money supply denotes the 'monetary base plus demand,

[3] Lines 24 and 25 of the International Financial Statistics (October 2008).
[4] Lines 24, 25 and 45 of the International Financial Statistics (2008).
[5] "*Accordingly, in undeveloped countries money supply is not equal to liquid liabilities or bank deposits. While in undeveloped countries bank deposits as a ratio of money supply is less than one, in developed countries this ratio is almost equal to 1. This indicator appreciates the degree by which money in circulation is absorbed by the banking system. Here we define 'financial formalization' as the propensity of the formal banking system to absorb money in circulation*" (Asongu, 2015a, p. 432).
[6] "*This indicator measures the rate at which the semi-formal financial sector is evolving at the expense of formal and informal sectors*" (Asongu, 2015a, p. 432).
[7] "*This proposition appreciates the degree by which the informal financial sector is developing to the detriment of formal and semi-formal sectors*" (Asongu, 2015a, p. 432).
[8] "*The proposition measures the deterioration of the formal banking sector in the interest of other financial sectors (informal and semi-formal). From common sense, propositions 5 and 8 should be almost perfectly antagonistic, meaning the former (formal financial development at the cost of other financial sectors) and the latter (formal sector deterioration) should almost display a perfectly negative degree of substitution or correlation*" (Asongu, 2015a, p. 432).

saving and time deposits' and all components are converted into credit for economic operators. We cannot build two numerator indicators (one related to credit and the other to deposits) because it is difficult to distinguish between deposits and credit in the money supply. In essence, the money multiplier makes a number of assumptions which we do not engage because it would be out of scope. In essence, competition for shares in money supply from various financial sectors is for both deposits and credit. However, the dependent variables we employ in the empirical exercise clearly make the distinction between deposits and credit. Whereas 'financial system efficiency' appreciates the ability of financial institutions to transform deposits into credit for economic operators, 'financial system activity' appreciates the ability of financial institutions to grant credit to economic operators.

3.2 Data

We examine a panel of 53 African nations with data for the period 2004 to 2011 from the Financial Development and Structure Database (FDSD) and African Development Indicators (ADI) of the World Bank. The periodicity begins from 2004 because data on information sharing offices are only available from this year while it ends in 2011 because it is the latest year in the FDSD. Consistent with recent IA literature (see Triki & Gajigo, 2014), information sharing offices are measured with private credit bureaus (PCB) and public credit registries (PCR).

Two sets of financialization indicators are employed, namely: Proposition 5 (or financial sector formalization) and Proposition 7 (or financial sector informalization). While due to constraints in degrees of freedom, Proposition 6 (or financial sector semi-formalization) is not used, Proposition 7 displays a high degree of substitution with Proposition 8 (or financial sector non-formalization).

Adopted measurements of financial development are in accordance with the discussed policy syndrome of excess liquidity in African financial institutions, namely, financial allocation dynamics of activity and efficiency. On the one hand, financial allocation efficiency is measured as the ability to transform mobilised deposits into credit with (i) banking-system-efficiency ('banking system credit' on 'banking system deposits') and (ii) financial-system-efficiency ('financial system credit' on 'financial system deposits'). On the other, two measurements of financial allocation activity are also employed, namely (i) banking system activity ('private

domestic credit by deposit banks') and (ii) financial system activity ('private domestic credit by deposit banks and other financial institutions').

The study accounts for omitted variable bias with seven control variables, two dummy and five non-dummy variables. First, the dummy variables are income levels and legal origins from Asongu (2014b, p. 364)[9] and La Porta et al (2008, p. 289) respectively. Compared to French civil law countries, English common law countries are theoretically expected to enjoy higher levels of financial development because of advantages in adaptability and political mechanisms (see Beck et al., 2003). The position of Jaffee and Levonian (2001) that high income nations are associated with high levels of financial development has been confirmed by Asongu (2012a) from a within-Africa framework in which middle-income countries are linked with higher financial development levels when compared with their low income counterparts.

Second, the choice of the five non-dummy variables is in accordance with the covariates of financial development in recent literature (Huang, 2005; Osabuohein & Efobi, 2013; Asongu, 2014c; Owosu & Odhiambo, 2014; Nyasha & Odhiambo, 2015a, 2015b). These are: trade openness, public investment, foreign aid, GDP growth and inflation. (1) Foreign aid is theoretically anticipated to reduce the savings-investment gap in less developed countries (Easterly, 2005). However, from a practical angle, the relationship could also be negative for at least two main reasons. On the one hand, a substantial quantity of disbursed funds can be withheld in developed countries for administrative and consultancy purposes. On the other, a substantial portion of the disbursed funds that actually reach destination countries can be siphoned off and deposited in microstates or tax havens that are under the jurisdictions of donor countries. (2) While investment (Huang, 2011) and trade openness (Do & Levchenko, 2004; Huang & Temple, 2005) have been established as positively affecting financial access, the linkage could also be negative contingent respectively on the balance of trade and type of investment. On the one hand, a balance of trade surplus (deficit) is more likely to positively (negatively) influence financial development. On the other, from intuition, private investment is more likely to increase financial development, compared to public investment that is more likely to be associated with corruption in the procurement and implementation of contracts. (3) The negative association between high or chaotic inflation and less efficiency in a financial

[9] There are four main World Bank income groups: (i) high annual income, $12,276 or more; (ii) upper middle income, $3,976-$12,275; (iii) lower middle income, $1,006-$3,975 and (iv) low income, $1,005 or less.

intermediary institution is consistent with the empirical (Boyd et al., 2001) and theoretical (Huybens & Smith, 1999) literature. (4) Many studies support the view that economic prosperity in terms of GDP growth is associated with higher degrees of financial access because of *inter alia* availability of more credit for investment purposes and enhanced competition (Levine, 1997; Jaffee & Levonian 2001). Appendix 1, Appendix 2 and Appendix 3 respectively present the definition of variables, summary statistics and correlation matrix.

3.2 Methodology

We complement the Quantile with Fixed Effects regressions because whereas the former accounts for initial levels of financial development, the latter controls for the unobserved heterogeneity.

The panel Fixed Effects model is presented as in Eq. (1) below:

$$FA_{i,t} = \partial_0 + \partial_1 P_{i,t} + \partial_2 ISO_{i,t} + \partial_3 PISO_{i,t} + \sum_{h=1}^{5} \omega_h W_{h,i,t-\tau} + \eta_i + \varepsilon_{i,t} \quad (1)$$

Where: $FA_{i,t}$ is an indicator of financial access (financial efficiency or financial activity) of country i at period t; ∂ is a constant; P, is a proposition (Proposition 5 or Proposition 7); ISO denotes information sharing offices (public credit registries or private credit bureaus); $PISO$, interaction between propositions (P) and information sharing offices (ISO); W is the vector of control variables (*foreign aid*, *trade*, *GDP growth*, *public investment*, *inflation*); η_i is the country-specific effect and $\varepsilon_{i,t}$ the error term. It important to note that legal origin and income level dummy variables are not included in the Fixed Effects regressions because they are already captured in country-specific effects[10].

In order to account for existing financial access levels, this study employs the quantile regressions (QR) estimation approach. The modelling technique investigates the relationships throughout the conditional distributions of the dependent variable (see Keonker & Hallock, 2001; Billger & Goel, 2009; Okada & Samreth, 2012). The strategy enables the study to show countries with high, intermediate and low initial levels of financial access.

The existing literature on reducing IA has estimated parameters at the conditional mean of financial access (e.g. Asongu et al., 2016a; Triki & Gajigo, 2014). Whereas mean effects are

[10] Moreover, if two dummy variables with perfect multicollinearity entered simultaneously into a specification, one is automatically omitted by the Stata software in the regression output.

relevant, this study complements the highlighted literature with conditional effects because blanket policy recommendations based on mean effects are unlikely to be effective unless they are contingent on existing levels of it and tailored differently across countries with varying levels of financial access. Furthermore, while estimation strategies that are based on mean impacts like Ordinary Least Squares (OLS) are founded on the hypothesis of normally distributed error terms, such assumption of normality is not apparent in the QR technique.

The θ^{th} quantile estimator of financial access is obtained by solving for the optimization problem in Eq. (2), which is provided without subscripts for simplicity and ease of presentation.

$$\min_{\beta \in R^k} \left[\sum_{i \in \{i: y_i \geq x_{i'}\beta\}} \theta \left| y_i - x_{i'}\beta \right| + \sum_{i \in \{i: y_i < x_{i'}\beta\}} (1-\theta) \left| y_i - x_{i'}\beta \right| \right] \quad (2)$$

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

$$Q_y(\theta / x_i) = x_{i'}\beta_\theta \quad (3)$$

where unique slope parameters are modelled for each θ^{th} 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 financial access. For the model in Eq. (3) the dependent variable y_i is a financial development indicator whereas x_i contains a constant term, *information sharing offices*, *Propositions*, *ISO×Propositions*, *foreign aid*, *trade*, *GDP growth*, *public investment*, *inflation*, *middle income* and *Common law*. In accordance with Brambor et al. (2006) on the pitfalls of interactive regressions, estimates from the interactions are considered as marginal and conditional impacts. Furthermore, the net effect or overall impact is computed with unconditional and conditional effects.

4. Empirical Results

4.1 Baseline fixed effect results

Table 2 presents baseline results from panel Fixed Effects. The choice of a Fixed Effects versus a Random Effects model is justified by the outcome of the Hausman test which is

overwhelmingly positive across panels and specifications. Whereas Panel A presents findings on the linkages between 'financial access, financialization and public credit registries', Panel B presents results corresponding to linkages between ''financial access, financialization and private credit bureaus. The purpose of lagging the independent variables in the non-contemporary specifications by one period is to have more bite on endogeneity (see Mlachila et al., 2014, p. 21).

The findings are discussed in terms of net effects which are computed from: (i) the marginal or conditional effect with information sharing offices and (ii) the unconditional impact of financialization. For instance, in Column 2 of Panel A, the unconditional effect of financial formalization (or Prop. 5) is -35.478 while the conditional impact with public credit registries (PCR × Prop. 5) is 7.583. The corresponding net effect is -19.136 ([2.155 ×7.583] + -35.478)[11].

Table 2: Fixed Effects Regressions

	Panel A: Financial Access, Financialization and Public Credit Registries							
	Dependent variables							
	BSE	**FSE**	**BSA**	**FSA**	**BSE**	**FSE**	**BSA**	**FSA**
	Contemporary				**Non-Contemporary**			
Constant	**107.804*** **	**120.421*** **	**23.174*** **	**25.799*** **	**87.086*** **	**101.243*** **	**22.682*** **	**25.750*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
PCR	**-6.668*** **	**-5.481*** **	**0.400*** **	**0.379*** **	**-4.024***	**-5.027** **	**0.426*** **	**0.414*** **
	(0.001)	**(0.003)**	**(0.000)**	**(0.000)**	**(0.069)**	**(0.015)**	**(0.000)**	**(0.001)**
Prop. 5	**-35.478*** **	**-44.753*** **	---	---	-11.197	-21.383	---	---
	(0.027)	**(0.003)**			(0.454)	(0.126)		
Prop.7	---	---	**-18.873*** **	**-26.647*** **	---	---	**-22.196*** **	**-27.716*** **
			(0.001)	**(0.000)**			**(0.000)**	**(0.000)**
PCR×Prop. 5	**7.583*** **	**6.291*** **	---	---	**4.784***	**5.834** **	---	---
	(0.001)	**(0.002)**			**(0.053)**	**(0.012)**		
PCR×Prop.7	---	---	**-1.863*** **	**-1.948** **	---	---	-0.993	-1.011
			(0.009)	**(0.016)**			(0.241)	(0.265)
GDP growth	**0.453** **	**0.346** **	**-0.153** **	**-0.147** **	**0.391** **	**0.425** **	**-0.111***	**-0.126***
	(0.018)	**(0.049)**	**(0.012)**	**(0.033)**	**(0.030)**	**(0.012)**	**(0.068)**	**(0.054)**
Inflation	0.074	-0.024	-0.020	-0.026	-0.329**	-0.204	**-0.123** **	**-0.139** **
	(0.615)	(0.856)	(0.666)	(0.622)	(0.033)	(0.153)	**(0.019)**	**(0.013)**
Public Invt.	**0.578** **	**0.554** **	**0.402*** **	**0.422*** **	0.413	0.392	**0.194** **	**0.184***
	(0.026)	**(0.021)**	**(0.000)**	**(0.000)**	(0.110)	(0.104)	**(0.028)**	**(0.052)**
Foreign Aid	**-0.921*** **	**-0.930*** **	-0.036	0.003	**-0.610*** **	**-0.671*** **	0.034	0.064
	(0.000)	**(0.000)**	(0.621)	(0.965)	**(0.007)**	**(0.002)**	(0.655)	(0.429)
Trade	-0.083	-0.090	-0.007	0.002	-0.036	-0.073	0.027	0.032
	(0.244)	(0.170)	(0.727)	(0.925)	(0.605)	(0.269)	(0.249)	(0.214)
Net effects	-19.136	-31.195	-22.887	-30.844	na	na	na	na
Hausman test	**15.27***	**21.73*** **	**42.10*** **	**36.20*** **	**32.61*** **	**17.70** **	**38.43*** **	**34.91*** **
Within R^2	0.117	0.125	0.278	0.264	0.112	0.124	0.265	0.264
Fisher	**4.02*** **	**4.35*** **	**11.68*** **	**10.88*** **	**3.25*** **	**3.67*** **	**9.31*** **	**9.27*** **
Countries	45	45	45	45	45	45	45	45

[11] 2.155 is the mean value of public credit registries.

Observations	295	295	295	295	259	259	259	259

Panel B: Financial Access, Financialization and Private Credit Bureaus

	Dependent variables							
	BSE	**FSE**	**BSA**	**FSA**	**BSE**	**FSE**	**BSA**	**FSA**
	Contemporary				**Non-Contemporary**			
Constant	**96.918*** **	**110.351*** **	**24.889*** **	**26.957*** **	**80.966*** **	**94.462*** **	**25.072*** **	**27.969*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
PCR	**2.369** **	**1.904** **	0.059	-0.007	1.493	**1.735***	0.024	-0.031
	(0.024)	**(0.046)**	(0.364)	(0.921)	(0.143)	**(0.067)**	(0.717)	(0.661)
Prop. 5	-18.853	**-29.009** **	---	---	-0.285	-10.254	---	---
	(0.221)	**(0.040)**			(0.984)	(0.433)		
Prop.7	---	---	**-23.434*** **	**-27.636*** **	---	---	**-28.235*** **	**-32.215*** **
			(0.000)	**(0.000)**			**(0.000)**	**(0.000)**
PCB×Prop. 5	**-3.215*** **	**-2.766*** **	---	---	**-2.409** **	**-2.648*** **	---	---
	(0.003)	**(0.005)**			**(0.021)**	**(0.006)**		
PCB×Prop.7	---	---	0.052	**-0.699***	---	---	0.326	-0.003
			(0.885)	**(0.086)**			(0.426)	(0.994)
GDP growth	**0.352***	0.254	**-0.157** **	**-0.151** **	**0.305***	**0.329** **	**-0.111***	**-0.124***
	(0.059)	(0.134)	**(0.013)**	**(0.031)**	**(0.075)**	**(0.038)**	**(0.082)**	**(0.066)**
Inflation	0.040	-0.043	-0.042	-0.053	**-0.339** **	**-0.227***	**-0.136** **	**-0.153*** **
	(0.776)	(0.737)	(0.385)	(0.320)	**(0.019)**	**(0.088)**	**(0.012)**	**(0.008)**
Public Invt.	**0.517** **	**0.522** **	**0.367*** **	**0.380*** **	**0.414***	**0.402***	**0.177***	**0.170***
	(0.035)	**(0.020)**	**(0.000)**	**(0.000)**	**(0.082)**	**(0.069)**	**(0.050)**	**(0.076)**
Foreign Aid	**-0.787*** **	**-0.813*** **	-0.011	0.014	**-0.523** **	**-0.584*** **	0.062	0.087
	(0.001)	**(0.000)**	(0.884)	(0.867)	**(0.015)**	**(0.004)**	(0.438)	(0.303)
Trade	-0.053	-0.063	-0.016	-0.005	-0.004	-0.037	0.020	0.024
	(0.442)	(0.322)	(0.494)	(0.828)	(0.950)	(0.554)	(0.415)	(0.361)
Net Effects	na	-40.689	na	-30.587	na	na	na	na
Hausman test	**31.39*** **	**63.74*** **	**14.19***	**31.21*** **	**28.87*** **	**61.83*** **	**14.34***	**36.97*** **
Within R^2	0.153	0.179	0.213	0.225	0.194	0.216	0.174	0.190
Fisher	**5.49*** **	**6.62*** **	**8.23*** **	**8.83*** **	**6.24*** **	**7.14*** **	**5.48*** **	**6.08*** **
Countries	45	45	45	45	45	45	45	45
Observations	296	296	296	296	260	260	260	260

*,**,***: significance levels of 10%, 5% and 1% respectively. GDPg: GDP growth rate. Public Invt: Public Investment. BSE: Banking System Efficiency. FSE: Financial System Efficiency. BSA: Banking System Activity. FSA: Financial System Activity. na: not applicable because at least one component necessary in the computation of the net effect is not statistically significant.

Overall from the findings, whereas net effects from non-contemporary regressions are not apparent, corresponding net impacts from contemporary regressions are negative for the most part. The fact that financial formalization interacts with information sharing offices to have an overall negative effect on the engaged financial access variables (banking system efficiency, financial system efficiency, banking system activity and financial system activity) is not consistent with economic theory. A possible reason for these unexpected findings is the fact that; the investigated relationships are at the mean value of the dependent variables. In the section that follows, the reported findings relax the assumption of modelling at mean values of the dependent variables and assess the linkages throughout the conditional distributions of the dependent variables.

4.2 Main quantile regression results

The results are presented in two main sections: one on public credit registries and the other on private credit bureaus. The first (second) table of each section presents results for financial allocation efficiency (financial activity). The right-hand-side (RHS) shows non-contemporary regressions while the left-hand-side (LHS) of each table presents contemporary regressions. Consistent with the discourse in Table 1, the purpose of lagging the independent variables on the RHS by one period is to have some bite on endogeneity. Hence, the specifications are tailored to have some control on endogeneity by controlling for the unobserved heterogeneity in terms of fixed effects and simultaneity with non-contemporary specifications. For each table, the baseline estimations in Panel A entail interactions between financial formalization and information sharing offices for banking system finance whereas Panel B entails robustness checks on interactions between financial informalization and information sharing offices for financial system finance. Regardless of tables, consistent differences in 'mean estimated effects' (or from OLS) and 'conditional estimated impacts' (or from quintiles) justify the choice of the estimated technique.

4.2.1 Financial access, financialization and private credit registries (PCR)

The findings are engaged in terms of net impacts which are computed from (i) marginal or conditional effect with public credit registries and (ii) the unconditional impact of financialization. In Table 3 on linkages between 'financial allocation efficiency, financialization and public credit registries', the net effects are significant (i) only at the 50^{th} quintile on the RHS of Panel A and (ii) only at the 25^{th} quintiles. For instance, at the 50^{th} quintile on the RHS of Panel A, the unconditional impact of financial formalization (or Prop. 5) is 26.152 while the conditional impact with the public credit registries (PCR × Prop. 5) is -10.43. The corresponding net effect is 3.675 ([2.155 ×-10.43] + 26.152)[12].

[12] 2.155 is the mean value of public credit registries.

Table 3: Financial Allocation Efficiency, Financialization and Public Credit Registries

Panel A: Banking System Efficiency and Formalization (with Prop. 5)
Dependent variable: Banking System Efficiency

	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	**79.995*** **	16.015	**35.703*** **	**79.381*** **	**85.126*** **	**130.07*** **	**73.642*** **	11.198	**27.536** **	**75.623*** **	**98.259*** **	**125.64*** **
	(0.000)	(0.212)	**(0.005)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	(0.333)	**(0.039)**	**(0.000)**	**(0.000)**	**(0.000)**
PCR	4.048	-0.190	**7.207***	3.208	**7.952** **	**-6.649***	5.085	-0.195	7.884	**10.477*** **	**8.855** **	-4.538
	(0.183)	(0.962)	**(0.091)**	(0.205)	**(0.036)**	**(0.094)**	(0.139)	(0.989)	(0.132)	**(0.001)**	**(0.028)**	(0.268)
Prop. 5	**26.975***	**50.657*** **	**58.229*** **	**30.281*** **	36.609	17.623	**27.467** **	**59.015*** **	**62.754*** **	**26.152** **	23.023	20.216
	(0.055)	**(0.000)**	**(0.000)**	**(0.003)**	(0.109)	(0.535)	**(0.027)**	**(0.000)**	**(0.000)**	**(0.019)**	(0.267)	(0.459)
PCR×Prop. 5	3.802	1.353	-6.775	-2.721	**-8.081***	7.025	-4.784	1.443	-7.444	**-10.43*** **	**-9.170** **	4.485
	(0.245)	(0.756)	(0.141)	(0.334)	**(0.055)**	(0.106)	(0.195)	(0.715)	(0.190)	**(0.003)**	**(0.040)**	(0.284)
GDP growth	0.111	0.281	0.324	-0.520	0.339	0.036	0.275	**1.034*** **	**0.836***	-0.082	-0.693	0.135
	(0.790)	(0.519)	(0.474)	(0.117)	(0.610)	(0.960)	(0.485)	**(0.000)**	**(0.072)**	(0.811)	(0.264)	(0.795)
Inflation	**-0.237** **	-0.011	-0.074	**-0.139*** **	-0.025	**-0.092***	**-0.220** **	**-0.275*** **	**-0.390*** **	**-0.131*** **	**-0.195*** **	**-0.177*** **
	(0.028)	(0.769)	(0.132)	**(0.001)**	(0.626)	**(0.092)**	**(0.026)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.004)**
Public Invt.	**-1.139*** **	**-1.021** **	**-1.180** **	**-0.735** **	**-1.166***	**-1.400*** **	**-1.056*** **	**-1.263*** **	**-1.051** **	**-0.801** **	-0.745	**-1.539*** **
	(0.004)	**(0.011)**	**(0.014)**	**(0.017)**	**(0.057)**	**(0.002)**	**(0.007)**	**(0.000)**	**(0.038)**	**(0.019)**	(0.104)	**(0.000)**
Foreign Aid	**-0.290**	0.311	-0.098	-0.254	-0.471	**-0.995***	-0.208	0.498	0.051	-0.219	-0.569	**-0.616** **
	(0.202)	(0.367)	(0.762)	(0.238)	(0.216)	**(0.053)**	(0.320)	(0.139)	(0.876)	(0.330)	(0.118)	**(0.045)**
Trade	**-0.212*** **	**-0.164** **	**-0.208** **	**-0.292*** **	**-0.224*** **	**-0.227** **	**-0.202*** **	**-0.198*** **	**-0.199** **	**-0.229*** **	**-0.232*** **	**-0.277** **
	(0.000)	**(0.024)**	**(0.012)**	**(0.000)**	**(0.007)**	**(0.048)**	**(0.000)**	**(0.008)**	**(0.024)**	**(0.000)**	**(0.003)**	**(0.020)**
Middle Income	3.682	5.260	-5.917	2.356	5.329	**19.119*** **	3.773	5.732	-4.460	1.393	7.661	**24.064*** **
	(0.299)	(0.375)	(0.303)	(0.541)	(0.354)	**(0.007)**	(0.310)	(0.281)	(0.437)	(0.740)	(0.158)	**(0.000)**
Common Law	-4.834	-3.811	-3.731	-4.716	**-13.53*** **	**-23.42*** **	-3.929	-3.088	-2.458	-3.576	**-8.165***	**-26.01*** **
	(0.111)	(0.468)	(0.481)	(0.156)	**(0.006)**	**(0.000)**	(0.216	(0.524)	(0.663)	(0.335)	**(0.076)**	**(0.000)**
Net effects	na	na	na	na	na	na	na	na	na	3.675	na	na
Pseudo R^2/R^2	0.171	0.154	0.136	0.121	0.105	0.177	0.190	0.182	0.147	0.120	0.131	0.214
Fisher	**5.84*** **						**5.53*** **					
Observations	295	295	295	295	295	295	259	259	259	259	259	259

Panel B: Financial System Efficiency and Informalization (with Prop.7)
Dependent variable: Financial System Efficiency

	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	**141.25*** **	**78.945*** **	**82.064*** **	**112.62*** **	**137.04*** **	**241.25*** **	**138.75*** **	**73.251*** **	**96.197*** **	**103.65*** **	**123.26*** **	**241.36*** **
	(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	-0.477	**1.027*** **	0.350	**0.546***	-0.109	0.255	-0.450	**1.217*** **	0.344	0.615	-0.202	0.482
	(0.222)	**(0.000)**	(0.416)	**(0.052)**	(0.831)	(0.783)	(0.310)	**(0.000)**	(0.395)	(0.203)	(0.751)	(0.647)
Prop.7	**-105.2*** **	**-73.45*** **	**-41.62*** **	**-22.87*** **	**-48.405***	**-0.128***	**-106.8*** **	**-59.26*** **	**-75.28*** **	-5.170	-36.371	-128.948
	(0.000)	**(0.000)**	**(0.000)**	**(0.005)**	**(0.055)**	**(0.062)**	**(0.000)**	**(0.000)**	**(0.000)**	(0.685)	(0.201)	(0.104)
PCR×Prop.7	**7.291***	-1.024	**8.005***	1.973	6.591	-13.054	**7.907***	-1.652	**8.025***	3.341	6.813	**-16.571***
	(0.052)	(0.765)	**(0.089)**	(0.383)	(0.111)	(0.136)	**(0.078)**	(0.619)	**(0.057)**	(0.413)	(0.194)	**(0.077)**
GDP growth	-0.065	0.145	0.381	**-0.542** **	**-1.344***	0.480	0.210	**0.497** **	**0.792** **	0.131	-0.279	0.461
	(0.914)	(0.500)	(0.430)	**(0.045)**	**(0.055)**	(0.783)	(0.727)	**(0.029)**	**(0.020)**	(0.743)	(0.723)	(0.820)
Inflation	**-0.169*** **	**-0.096*** **	-0.017	**-0.102*** **	**-0.095***	**-0.201** **	**-0.249** **	**-0.204*** **	**-0.316*** **	**-0.199** **	**-0.127** **	**-0.279** **
	(0.008)	**(0.001)**	(0.714)	**(0.002)**	**(0.084)**	**(0.010)**	**(0.046)**	**(0.000)**	**(0.000)**	**(0.038)**	**(0.017)**	**(0.018)**
Public Invt.	**-1.690*** **	**-1.324*** **	-0.626	**-0.768*** **	**-1.192***	**-1.745*** **	**-1.687*** **	**-1.347*** **	**-1.162*** **	**-1.033*** **	-1.084	**-1.768** **
	(0.002)	**(0.000)**	(0.179)	**(0.002)**	**(0.062)**	**(0.007)**	**(0.003)**	**(0.000)**	**(0.002)**	**(0.009)**	(0.133)	**(0.025)**
Foreign Aid	**-0.496***	0.114	-0.026	**-0.375** **	-0.320	**-2.164** **	-0.449	0.360	-0.127	-0.068	-0.355	**-2.069** **
	(0.098)	(0.646)	(0.933)	**(0.029)**	(0.469)	**(0.042)**	(0.107)	(0.157)	(0.608)	(0.795)	(0.449)	**(0.034)**
Trade	**-0.312*** **	**-0.172*** **	**-0.250*** **	**-0.325*** **	**-0.304*** **	**-0.660*** **	**-0.303*** **	**-0.181*** **	**-0.215*** **	**-0.304*** **	**-0.218** **	**-0.679*** **
	(0.000)	**(0.001)**	**(0.001)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.001)**	**(0.000)**	**(0.02)**	**(0.000)**
Middle Income	3.345	4.377	1.809	2.794	7.150	19.033	3.446	5.848	-6.005	4.456	11.013	18.156
	(0.456)	(0.271)	(0.748)	(0.360)	(0.235)	(0.101)	(0.461)	(0.160)	(0.173)	(0.359)	(0.105)	(0.146)
Common Law	**-9.241** **	**-7.097***	-2.083	**-6.434** **	**-11.569** **	**-30.23*** **	**8.534** **	-5.886	-3.141	**-7.445***	**-14.483** **	**-29.36*** **
	(0.018)	**(0.057)**	(0.693)	**(0.018)**	**(0.022)**	**(0.000)**	**(0.038)**	(0.104)	(0.463)	**(0.083)**	**(0.017)**	**(0.000)**
Net effects	-89.487	na	-24.369	na	na	na	-89.760	na	-57.986	na	na	na
Pseudo R^2/R^2	0.285	0.151	0.118	0.108	0.083	0.247	0.297	0.173	0.122	0.102	0.083	0.270

Fisher	**5.38*** **						**31.721*** **					
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. Mobile: Mobile phone penetration rate. OLS: Ordinary Least Squares. R^2 for OLS and Pseudo R^2 for quantile regression. Lower quantiles (e.g., Q 0.1) signify nations where financial activity is least. na: not applicable because at least one component necessary in the computation of the net effect is not statistically significant.

Table 4: Financial Allocation Activity, Financialization and Public Credit Registries

Panel A: Banking System Activity and Formalization (with Prop.5)
Dependent variable: 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	**-14.47*** **	**-8.876*** **	**-9.027** **	**-13.47*** **	-5.052	4.630	**-14.29*** **	**-9.002*** **	**-7.976** **	**-13.90*** **	-7.279	-0.474
	(0.001)	**(0.000)**	**(0.022)**	**(0.000)**	(0.509)	(0.607)	**(0.003)**	**(0.000)**	**(0.023)**	**(0.001)**	(0.332)	(0.950)
PCR	-3.079	**-4.193*** **	-0.639	**-1.776***	**-3.461***	**-4.295** **	**-3.587***	**-7.392*** **	0.133	-1.624	**-4.686** **	**-6.046*** **
	(0.120)	**(0.000)**	(0.623)	**(0.063)**	**(0.063)**	**(0.023)**	**(0.081)**	**(0.000)**	(0.924)	(0.213)	**(0.010)**	**(0.007)**
Prop.5	**62.338*** **	**26.562*** **	**34.102*** **	**51.195*** **	**60.039*** **	**55.931*** **	**62.678*** **	**29.204*** **	**32.453*** **	**52.136*** **	**64.865*** **	**60.755*** **
	(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×Prop5	**4.673** **	**5.457*** **	2.165	**3.568*** **	**5.143** **	**6.029*** **	**5.420** **	**9.566*** **	1.416	**3.507** **	**6.865*** **	**8.322*** **
	(0.027)	**(0.000)**	(0.124)	**(0.001)**	**(0.013)**	**(0.004)**	**(0.015)**	**(0.000)**	(0.353)	**(0.016)**	**(0.001)**	**(0.001)**
GDP growth	-0.275	**-0.271*** **	**-0.361** **	**-0.270** **	0.048	-0.061	-0.199	**-0.233***	-0.254	-0.132	0.042	-0.060
	(0.158)	**(0.000)**	**(0.043)**	**(0.032)**	(0.813)	(0.809)	(0.342)	**(0.076)**	(0.120)	(0.393)	(0.870)	(0.681)
Inflation	**-0.051** **	**-0.059*** **	-0.021	-0.024	-0.020	**-0.038** **	**-0.081***	**-0.108*** **	**-0.091*** **	-0.019	**-0.043** **	**-0.064*** **
	(0.010)	**(0.000)**	(0.165)	(0.122)	(0.371)	**(0.033)**	**(0.063)**	**(0.000)**	**(0.000)**	(0.170)	**(0.020)**	**(0.000)**
Public Invt.	**-0.679*** **	-0.051	-0.150	**-0.321*** **	**-0.891*** **	**-1.050*** **	**-0.759*** **	-0.087	-0.180	**-0.362** **	**-0.941*** **	**-1.121*** **
	(0.000)	(0.479)	(0.334)	**(0.006)**	**(0.000)**	**(0.000)**	**(0.000)**	(0.458)	(0.337)	**(0.013)**	**(0.000)**	**(0.000)**
Foreign Aid	**-0.300*** **	-0.0001	-0.069	-0.108	**-0.478*** **	**-0.473** **	**-0.322*** **	-0.044	-0.047	-0.152	**-0.551*** **	**-0.454*** **
	(0.001)	(0.997)	(0.499)	(0.188)	**(0.007)**	**(0.019)**	**(0.000)**	(0.411)	(0.598)	(0.122)	**(0.001)**	**(0.004)**
Trade	**-0.070*** **	-0.010	**-0.038***	**-0.063*** **	**-0.072** **	**-0.103*** **	**-0.068*** **	-0.017	**-0.046** **	**-0.069*** **	**-0.058***	**-0.067** **
	(0.003)	(0.262)	**(0.098)**	**(0.001)**	**(0.017)**	**(0.000)**	**(0.007)**	(0.300)	**(0.039)**	**(0.003)**	**(0.054)**	**(0.012)**
Middle Income	**3.699** **	**-1.821** **	-1.409	**3.149** **	**8.667*** **	**15.002*** **	**3.557***	**-2.653*** **	0.432	**3.138***	**5.647** **	**11.896*** **
	(0.027)	**(0.026)**	(0.444)	**(0.032)**	**(0.001)**	**(0.000)**	**(0.050)**	**(0.008)**	(0.792)	**(0.085)**	**(0.020)**	**(0.000)**
Common Law	**-5.691*** **	**-1.435** **	-0.663	**-5.486*** **	**-8.969*** **	**-7.714*** **	**-5.482*** **	-0.219	0.499	**-5.492*** **	**-10.20*** **	**-7.673*** **
	(0.006)	**(0.039)**	(0.694)	**(0.000)**	**(0.000)**	**(0.009)**	**(0.008)**	(0.840)	(0.749)	**(0.001)**	**(0.000)**	**(0.004)**
Net effects	72.408	38.321	na	58.884	71.122	68.923	74.358	49.818	na	59.693	79.659	78.688
Pseudo R^2/R^2	0.586	0.193	0.223	0.324	0.460	0.552	0.600	0.209	0.238	0.332	0.475	0.575
Fisher	**51.31*** **						**36.12*** **					
Observations	295	295	295	295	295	295	259	259	259	259	259	259

Panel B: Financial System Activity and Informalization (with Prop.7)
Dependent variable: 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	**70.158*** **	**16.523*** **	**26.027*** **	**42.245*** **	**66.594*** **	**109.60*** **	**70.827*** **	**17.068*** **	**27.082*** **	**41.365*** **	**67.687*** **	**111.87*** **
	(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	**1.231*** **	**2.081*** **	**1.529*** **	**1.788*** **	**1.509*** **	**1.182***	**1.427*** **	**2.200*** **	**1.636*** **	**1.892*** **	**1.639*** **	**1.415***
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.058)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.092)**
Prop.7	**-110.8*** **	**-9.215*** **	**-34.17*** **	**-59.22*** **	**-83.35*** **	**-111.4*** **	**-112.4*** **	**-22.12*** **	**-33.02*** **	**-59.54*** **	**-80.71*** **	**-122.4*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.001)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.001)**
PCR×Prop.7	-3.284	**-22.56*** **	-2.296	**-3.817*** **	**-5.298*** **	**-9.117** **	-3.977	**-9.733*** **	**-2.748***	**-3.689*** **	**-5.901** **	-11.30
	(0.177)	**(0.000)**	(0.215)	**(0.000)**	**(0.006)**	**(0.047)**	(0.122)	**(0.000)**	**(0.092)**	**(0.003)**	**(0.013)**	(0.122)
GDP growth	-0.293	**-0.266*** **	**-0.392***	**-0.190***	-0.086	0.052	-0.192	-0.214	-0.272	0.127	0.173	-0.259
	(0.331)	**(0.003)**	**(0.078)**	**(0.074)**	(0.732)	(0.913)	(0.558)	(0.162)	(0.120)	(0.322)	(0.535)	(0.790)
Inflation	**-0.104*** **	**-0.059*** **	**-0.033***	**-0.040*** **	-0.060	**-0.139*** **	**-0.141** **	**-0.085*** **	**-0.178*** **	-0.047	**-0.069*** **	**-0.194*** **
	(0.000)	**(0.000)**	**(0.086)**	**(0.002)**	(0.219)	**(0.000)**	**(0.014)**	**(0.000)**	**(0.000)**	(0.110)	**(0.001)**	**(0.000)**
Public Invt.	**-0.978*** **	-0.059	-0.168	**-0.455*** **	**-0.953*** **	**-1.407*** **	**-1.092*** **	-0.083	-0.217	**-0.518*** **	**-1.083*** **	**-1.475*** **
	(0.000)	(0.485)	(0.384)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	(0.540)	(0.181)	**(0.000)**	**(0.000)**	**(0.001)**
Foreign Aid	**-0.470*** **	-0.009	-0.072	**-0.143** **	**-0.408** **	**-1.073** **	**-0.487*** **	-0.049	-0.101	**-0.164** **	**-0.627*** **	**-1.101** **
	(0.001)	(0.864)	(0.577)	**(0.037)**	**(0.021)**	**(0.034)**	**(0.001)**	(0.443)	(0.277)	**(0.047)**	**(0.001)**	**(0.034)**
Trade	**-0.118*** **	-0.018	-0.041	**-0.077*** **	**-0.122*** **	**-0.231*** **	**-0.116*** **	-0.017	**-0.048** **	**-0.074*** **	**-0.104*** **	**-0.167** **

	(0.000)	(0.106)	(0.146)	**(0.000)**	**(0.000)**	**(0.001)**	**(0.001)**	(0.200)	**(0.043)**	**(0.000)**	**(0.001)**	**(0.036)**
Middle Income	2.665	-0.732	-0.849	**3.327*** **	**11.677*** **	**9.976***	2.559	-0.976	-0.573	**3.363** **	**7.746*** **	5.059
	(0.255)	(0.440)	(0.715)	**(0.007)**	**(0.000)**	**(0.072)**	(0.312)	(0.414)	(0.754)	**(0.027)**	**(0.003)**	(0.462)
Common Law	**-8.826*** **	-1.205	-1.226	**-7.139*** **	**-13.11*** **	**-13.18*** **	**-8.667*** **	-0.104	-0.793	**-7.402*** **	**-12.82*** **	**-10.537** **
	(0.000)	(0.149)	(0.566)	**(0.000)**	**(0.000)**	**(0.002)**	**(0.000)**	(0.934)	(0.650)	**(0.000)**	**(0.000)**	**(0.029)**
Net effects	na	-57.831	na	-67.445	-94.767	-131.047	na	-43.094	-38.941	-67.489	-93.426	na
Pseudo R^2/R^2	0.606	0.166	0.185	0.285	0.404	0.502	0.616	0.178	0.201	0.292	0.415	0.521
Fisher	**43.38*** **						**30.70*** **					
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. Mobile: Mobile phone penetration rate. OLS: Ordinary Least Squares. R^2 for OLS and Pseudo R^2 for quantile regression. Lower quantiles (e.g., Q 0.1) signify nations where financial activity is least. na: not applicable because at least one component necessary in the computation of the net effect is not statistically significant.

The following findings can be established from Table 4 on linkages between 'public credit registries, financialization and allocation activity'. In Panel A, with the exception of the 25th quintile, the net effect of public credit registries in financial formalization for allocation activity in the banking system is consistently positive throughout the conditional distributions of banking system activity. The fact that corresponding conditional and unconditional impacts are consistently positive is evidence of 'synergy effects'. In Panel B, with the exception of one quintile on either the LHS or RHS, the net effect of public credit registries in financial informalization for allocation activity in the financial system is consistently negative.

Most of the significant control variables have expected signs. The unanticipated negative impact of Common law countries that runs counter to the law and finance theory of Beck et al (2003) can be elicited by recent law-finance literature in Africa. Asongu (2012b) has established that while Common law countries dominate in terms of financial depth and size in Africa, French civil law countries dominate in financial allocation efficiency because with their memberships in currency unions, they have opted for monetary stability and dependence instead of monetary independence. The channel by which membership in a monetary union leads to allocation efficiency is a relative certainty in inflation.

4.2.2 Financial access, financialization and private credit bureaus

The following findings can be established from Table 5 on linkages between 'private credit bureaus, financialization and allocation efficiency'. In Panel A, with the exception of the 10th quintile where the net effect of private credit bureaus in financial formalization for allocation efficiency in the banking system is positive, the net effects are not overwhelmingly significant. In Panel B, the net effects of private credit bureaus in financial informalization for

allocation efficiency in the financial system are conflicting in terms of signs and 'significance of quintiles' in both the RHS and LHS

Table 5: Financial Allocation Efficiency, Financialization and Private Credit Bureaus

Panel A: Banking System Efficiency and Formalisation (with Prop.5)
Dependent variable: Banking System Efficiency

	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	**100.40*** **	**22.881** **	**63.839*** **	**114.68*** **	**120.39*** **	**149.03*** **	**96.178*** **	**24.777***	**48.068*** **	**117.32*** **	**112.75*** **	**151.27*** **
	(0.000)	**(0.022)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.074)**	**(0.002)**	**(0.000)**	**(0.000)**	**(0.000)**
PCB	-0.741	**-1.213** **	-1.096	-0.874	0.069	**1.323** **	-0.799	-1.021	-0.922	**-1.408** **	0.254	**1.107** **
	(0.151)	**(0.020)**	(0.186)	(0.209)	(0.917)	**(0.013)**	(0.120)	(0.128)	(0.322)	**(0.017)**	(0.599)	**(0.029)**
Prop.5	-13.914	**33.925*** **	23.188	-19.271	**-32.29***	-20.292	-9.727	**47.634*** **	**38.143***	**-27.141***	-13.85	**-33.11***
	(0.381)	**(0.002)**	(0.208)	(0.257)	**(0.097)**	(0.362)	(0.482)	**(0.009)**	**(0.080)**	**(0.086)**	(0.330)	**(0.056)**
PCB×Prop.5	**1.311*** **	**1.461*** **	**1.439***	**1.396** **	0.774	-0.558	**1.287*** **	**1.162***	1.312	**1.822*** **	0.460	-0.363
	(0.003)	**(0.001)**	**(0.059)**	**(0.031)**	(0.221)	(0.270)	**(0.003)**	**(0.052)**	(0.128)	**(0.001)**	(0.301)	(0.417)
GDP growth	0.267	0.521	0.407	0.079	-0.009	0.374	0.403	**0.973*** **	**1.058** **	0.135	0.201	0.203
	(0.421)	(0.144)	(0.410)	(0.859)	(0.982)	(0.415)	(0.217)	**(0.006)**	**(0.046)**	(0.746)	(0.505)	(0.560)
Inflation	**-0.101***	-0.007	-0.063	**-0.108***	-0.035	-0.026	**-0.201** **	**-0.193** **	**-0.595*** **	**-0.192** **	**-0.141*** **	**-0.154*** **
	(0.084)	(0.837)	(0.252)	**(0.064)**	(0.420)	(0.451)	**(0.048)**	**(0.017)**	**(0.000)**	**(0.048)**	**(0.000)**	**(0.000)**
Public Invt.	**-1.013** **	**-0.738** **	**-1.205** **	-0.604	-0.299	**-1.036*** **	**-0.981** **	**-1.172** **	**-1.128***	-0.533	**-0.671** **	**-1.213*** **
	(0.010)	**(0.030)**	**(0.023)**	(0.157)	(0.411)	**(0.001)**	**(0.012)**	**(0.018)**	**(0.056)**	(0.173)	**(0.032)**	**(0.000)**
Foreign Aid	-0.065	0.425	-0.260	-0.281	-0.216	-0.477	-0.030	0.142	0.147	-0.198	-0.269	-0.333
	(0.776)	(0.165)	(0.453)	(0.351)	(0.494)	(0.197)	(0.894)	(0.755)	(0.713)	(0.460)	(0.270)	(0.214)
Trade	**-0.154*** **	**-0.132** **	**-0.189** **	**-0.246*** **	-0.100	**-0.345*** **	**-0.144*** **	**-0.159***	-0.162	**-0.241*** **	**-0.130*** **	**-0.308*** **
	(0.002)	**(0.033)**	**(0.029)**	**(0.000)**	(0.122)	**(0.000)**	**(0.006)**	**(0.059)**	(0.113)	**(0.000)**	**(0.009)**	**(0.000)**
Middle Income	4.643	4.194	-3.462	1.085	3.532	**29.919*** **	4.703	-1.096	-5.435	5.258	6.612	**30.566*** **
	(0.189)	(0.364)	(0.557)	(0.840)	(0.509)	**(0.000)**	(0.203)	(0.884)	(0.415)	(0.288)	(0.115)	**(0.000)**
Common Law	**-9.986*** **	-4.199	-8.249	**-11.97*** **	**-9.472** **	**-24.33*** **	**-9.113*** **	-5.552	-9.995	**-10.066** **	**-13.66*** **	**-17.38*** **
	(0.000)	(0.293)	(0.133)	**(0.009)**	**(0.035)**	**(0.000)**	**(0.002)**	(0.342)	(0.118)	**(0.019)**	**(0.000)**	**(0.000)**
Net effects	na	40.094	na	na	na	na	na	52.541	na	-19.446	na	na
Pseudo R^2/R^2	0.232	0.156	0.138	0.136	0.172	0.257	0.229	0.164	0.140	0.141	0.176	0.282
Fisher	**37.87*** **						**35.13*** **					
Observations	296	296	296	296	296	296	260	260	260	260	260	260

Panel B: Financial System Efficiency and Informalization (with Prop.7)
Dependent variable: Financial System Efficiency

	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	**88.502*** **	**73.586*** **	**85.160*** **	**90.505*** **	**95.840*** **	**125.70*** **	**88.001*** **	**71.543*** **	**81.356*** **	**92.205** **	**98.090*** **	**122.23*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
PCB	**0.824*** **	**0.325** **	**0.498*** **	**1.124*** **	**1.219*** **	**1.163*** **	**0.739*** **	**0.245***	**0.476***	**0.794*** **	**1.063*** **	**1.009*** **
	(0.000)	**(0.011)**	**(0.004)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.056)**	**(0.076)**	**(0.000)**	**(0.000)**	**(0.000)**
Prop. 7	15.326	**-58.24*** **	-13.589	**26.448***	**30.088***	**28.572** **	12.194	**-50.12*** **	-20.415	**22.230***	10.002	25.011
	(0.342)	**(0.000)**	(0.426)	**(0.063)**	**(0.066)**	**(0.043)**	(0.412)	**(0.000)**	(0.405)	**(0.068)**	(0.466)	(0.111)
PCB×Prop.7	**-6.333*** **	**-5.804*** **	**-6.265*** **	**-5.596*** **	**-5.704*** **	**-5.449*** **	**-6.167*** **	**-5.820*** **	**-5.715*** **	**-6.279*** **	**-5.521*** **	**-5.316*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
GDP growth	0.211	0.315	0.368	0.129	0.087	-0.118	0.426	**0.727***	0.970	0.081	0.318	0.029
	(0.530)	(0.161)	(0.449)	(0.740)	(0.801)	(0.653)	(0.189)	**(0.055)**	(0.102)	(0.794)	(0.245)	(0.932)
Inflation	-0.066	**-0.133*** **	-0.016	-0.042	0.009	-0.006	-0.144	**-0.266*** **	**-0.344*** **	**-0.128***	**-0.074*** **	**-0.088*** **
	(0.244)	**(0.000)**	(0.744)	(0.395)	(0.802)	(0.795)	(0.170)	**(0.000)**	**(0.003)**	**(0.087)**	**(0.008)**	**(0.003)**
Public Invt.	**-1.133*** **	**-1.215*** **	**-1.036** **	**-0.647***	-0.568	**-1.079** **	**-1.091** **	**-1.428*** **	-0.885	**-0.529***	-0.432	**-1.181*** **
	(0.008)	**(0.000)**	**(0.030)**	**(0.074)**	(0.184)	**(0.018)**	**(0.010)**	**(0.000)**	(0.184)	**(0.086)**	(0.238)	**(0.000)**
Foreign Aid	0.014	0.150	-0.285	-0.014	-0.113	**-0.393***	0.019	0.383	0.017	0.016	-0.093	-0.148
	(0.955)	(0.591)	(0.375)	(0.954)	(0.693)	**(0.088)**	(0.935)	(0.253)	(0.969)	(0.937)	(0.685)	(0.443)
Trade	**-0.184*** **	**-0.162*** **	**-0.191** **	**-0.276*** **	**-0.175*** **	**-0.333*** **	**-0.178*** **	**-0.183*** **	**-0.210***	**-0.280*** **	**-0.172*** **	**-0.324*** **
	(0.000)	**(0.004)**	**(0.012)**	**(0.000)**	**(0.001)**	**(0.000)**	**(0.001)**	**(0.005)**	**(0.053)**	**(0.000)**	**(0.000)**	**(0.000)**
Middle Income	**6.597***	5.207	-2.498	5.803	2.695	**30.998*** **	**6.617***	**9.198***	-1.222	**7.024***	5.581	**32.730*** **
	(0.065)	(0.269)	(0.649)	(0.197)	(0.551)	**(0.000)**	**(0.071)**	**(0.056)**	(0.873)	**(0.064)**	(0.134)	**(0.000)**
Common Law	**-11.51*** **	**-7.748** **	**-11.104** **	**-11.34*** **	**-14.01*** **	**-24.98*** **	**-10.44*** **	**-8.545** **	-6.935	**-11.70*** **	**-14.26*** **	**-22.41*** **
	(0.000)	**(0.043)**	**(0.028)**	**(0.004)**	**(0.000)**	**(0.000)**	**(0.001)**	**(0.033)**	(0.329)	**(0.000)**	**(0.000)**	**(0.000)**
Net effects	na	-82.750	na	2.816	17.408	5.560	na	-74.697	na	-4.286	na	na

Pseudo R^2/R^2	0.608	0.213	0.201	0.252	0.348	0.524	0.620	0224	0.200	0.255	0.352	0.545
Fisher	**58.60*** **						**49.25*** **					
Observations	296	296	296	296	296	296	260	260	260	260	260	260

*,**,***: significance levels of 10%, 5% and 1% respectively. GDPg: GDP growth rate. Public Invt: Public Investment. Mobile: Mobile phone penetration rate. OLS: Ordinary Least Squares. R^2 for OLS and Pseudo R^2 for quantile regression. Lower quantiles (e.g., Q 0.1) signify nations where financial activity is least. na: not applicable because at least one component necessary in the computation of the net effect is not statistically significant.

Table 6: Financial Allocation Activity, Financialization and Private Credit Bureaus

Panel A: Banking System Activity and Formalization (with Prop. 5)
Dependent variable: 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	**-18.14*** **	**-8.882*** **	-3.587	**-5.659***	**-11.424***	-3.846	**-18.43*** **	**-8.617*** **	-3.002	**-6.431***	**-13.379***	-8.615
	(0.001)	**(0.000)**	(0.147)	**(0.060)**	**(0.050)**	(0.625)	**(0.001)**	**(0.000)**	(0.239)	**(0.062)**	**(0.077)**	(0.576)
PCB	-0.329	**-0.901*** **	**-1.044*** **	**-0.723*** **	-0.131	**-0.890*** **	-0.350	**-0.738*** **	**-0.988*** **	**-0.697*** **	0.003	-0.733
	(0.201)	**(0.000)**	**(0.000)**	**(0.000)**	(0.609)	**(0.000)**	(0.174)	**(0.000)**	**(0.000)**	**(0.000)**	(0.991)	(0.177)
Prop.5	**62.138*** **	**26.805*** **	**23.929*** **	**36.648*** **	**61.417*** **	**42.802*** **	**63.038*** **	**26.503*** **	**23.697*** **	**39.86*** **	**68.708*** **	**56.801*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.001)**
PCB×Prop.5	**0.391***	**1.176*** **	**1.312*** **	**0.952*** **	0.260	**0.656*** **	**0.394***	**1.029*** **	**1.278*** **	**0.915*** **	0.120	0.442
	(0.082)	**(0.000)**	**(0.000)**	**(0.000)**	(0.278)	**(0.005)**	**(0.077)**	**(0.000)**	**(0.000)**	**(0.000)**	(0.689)	(0.328)
GDP growth	-0.263	**-0.188*** **	**-0.240** **	-0.047	-0.013	**-0.435*** **	-0.185	-0.146	-0.039	0.012	0.009	-0.228
	(0.196)	**(0.003)**	**(0.040)**	(0.673)	(0.923)	**(0.001)**	(0.397)	(0.205)	(0.274)	(0.908)	(0.957)	(0.300)
Inflation	**-0.055** **	**-0.068*** **	-0.013	-0.013	-0.018	**-0.054*** **	**-0.091***	**-0.102*** **	**-0.141*** **	-0.015	**-0.040** **	**-0.070** **
	(0.026)	**(0.000)**	(0.214)	(0.347)	(0.264)	**(0.001)**	**(0.092)**	**(0.000)**	**(0.000)**	(0.168)	**(0.027)**	**(0.035)**
Public Invt.	**-0.677*** **	-0.031	0.070	-0.132	**-0.674*** **	**-0.267***	**-0.745*** **	-0.050	-0.082	**-0.218***	**-0.975*** **	**-0.676** **
	(0.000)	(0.617)	(0.602)	(0.203)	**(0.000)**	**(0.063)**	**(0.000)**	(0.667)	(0.515)	**(0.060)**	**(0.000)**	**(0.014)**
Foreign Aid	**-0.247** **	-0.009	-0.099	**-0.123***	**-0.461*** **	**-0.378** **	**-0.276** **	0.006	-0.057	**-0.185** **	**-0.462*** **	-0.376
	(0.032)	(0.809)	(0.155)	**(0.085)**	**(0.000)**	**(0.042)**	**(0.018)**	(0.926)	(0.393)	**(0.018)**	**(0.002)**	(0.200)
Trade	-0.014	**-0.014** **	**-0.031***	**-0.043*** **	**-0.012**	**0.087*** **	-0.010	-0.009	**-0.026***	**-0.038** **	-0.003	0.043
	(0.640)	**(0.027)**	**(0.060)**	**(0.008)**	**(0.582)**	**(0.001)**	(0.759)	(0.425)	**(0.085)**	**(0.033)**	(0.894)	(0.374)
Middle Income	**4.652*** **	**-1.942*** **	-1.614	0.181	**7.531*** **	**26.069*** **	**4.566** **	**-2.156** **	-1.846	-0.246	**5.747** **	**25.603*** **
	(0.007)	**(0.004)**	(0.196)	(0.888)	**(0.000)**	**(0.000)**	**(0.016)**	**(0.021)**	(0.119)	(0.865)	**(0.019)**	**(0.000)**
Common Law	**-6.437*** **	**-1.944*** **	-1.035	**-6.083*** **	**-10.22*** **	**-5.599*** **	**-6.145** **	-1.262	-1.091	**-6.687*** **	**-12.55*** **	**-6.610***
	(0.006)	**(0.000)**	(0.333)	**(0.000)**	**(0.000)**	**(0.009)**	**(0.014)**	(0.186)	(0.303)	**(0.000)**	**(0.000)**	**(0.094)**
Net effects	63.007	31.771	39.564	40.668	na	45.572	64.701	30.848	29.093	43.724	na	na
Pseudo R^2/R^2	0.453	0.288	0.264	0.272	0.356	0.460	0.458	0.295	0.275	0.274	0.363	0.479
Fisher	**79.18*** **						**70.50*** **					
Observations	296	296	296	296	296	296	260	260	260	260	260	260

Panel B: Financial System Activity and Informalization (with Prop. 7)
Dependent variable: 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	**46.445*** **	**16.230*** **	**19.938*** **	**35.420*** **	**55.419*** **	**48.007*** **	**46.700*** **	**15.739*** **	**21.242*** **	**37.945*** **	**59.485*** **	**52.372*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
PCB	**0.172** **	**0.373*** **	**0.420*** **	**0.385*** **	**0.210*** **	-0.129	**0.149***	**0.424*** **	**0.432*** **	**0.358*** **	**0.153** **	-0.155
	(0.034)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.003)**	(0.396)	**(0.089)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.044)**	(0.369)
Prop.7	**-66.55*** **	**-21.84*** **	**-22.75*** **	**-41.35*** **	**-69.38*** **	**-54.57*** **	**-66.99*** **	**-21.52*** **	**-25.60*** **	**-43.77*** **	**-75.85*** **	**-66.58*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.008)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.003)**
PCB×Prop. 7	**-3.268*** **	**-4.096*** **	**-4.098*** **	**-3.631*** **	**-3.228*** **	**-3.876*** **	**-3.232*** **	**-3.726*** **	**-3.796*** **	**-3.686*** **	**-2.989*** **	**-3.685*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
GDP growth	-0.203	**-0.160** **	-0.166	0.028	0.068	-0.239	-0.121	-0.033	-0.060	0.027	0.025	-0.105
	(0.333)	**(0.033)**	(0.226)	(0.874)	(0.671)	(0.401)	(0.591)	(0.794)	(0.543)	(0.846)	(0.882)	(0.772)
Inflation	**-0.072*** **	**-0.064*** **	**-0.058*** **	-0.022	**-0.035** **	**-0.059***	**-0.110** **	**-0.110*** **	**-0.152*** **	**-0.133*** **	**-0.069*** **	**-0.078***
	(0.004)	**(0.000)**	**(0.000)**	(0.312)	**(0.048)**	**(0.090)**	**(0.043)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.062)**
Public Invt.	**-0.753*** **	-0.081	-0.054	**-0.326** **	**-0.855*** **	**-0.604** **	**-0.803*** **	-0.054	-0.086	**-0.374*** **	**-1.022*** **	**-0.755** **
	(0.000)	(0.230)	(0.643)	**(0.027)**	**(0.000)**	**(0.049)**	**(0.000)**	(0.636)	(0.438)	**(0.004)**	**(0.000)**	**(0.039)**
Foreign Aid	**-0.266** **	-0.030	-0.021	-0.145	**-0.485*** **	-0.361	**-0.291** **	-0.003	-0.018	**-0.183***	**-0.527*** **	-0.346
	(0.026)	(0.428)	(0.793)	(0.211)	**(0.000)**	(0.310)	**(0.014)**	(0.962)	(0.757)	**(0.056)**	**(0.000)**	(0.355)

Trade	-0.023	**-0.016****	**-0.033***	**-0.055****	-0.025	0.026	-0.019	-0.009	**-0.022***	**-0.059****	-0.0005	0.022
	(0.441)	**(0.014)**	**(0.070)**	**(0.033)**	(0.283)	(0.612)	(0.546)	(0.416)	**(0.079)**	**(0.011)**	(0.983)	(0.692)
Middle Income	**5.351*****	-0.591	-0.192	1.049	**7.366*****	**26.399*****	**5.222*****	-1.211	**-2.005***	0.492	**4.513****	**24.517*****
	(0.003)	(0.334)	(0.896)	(0.610)	**(0.000)**	**(0.000)**	**(0.008)**	(0.191)	**(0.057)**	(0.782)	**(0.035)**	**(0.000)**
Common Law	**-7.790*****	**-1.498*****	**-2.264***	**-8.694*****	**-13.57*****	**-8.321***	**-7.343*****	-1.000	**-2.012****	**-8.039*****	**-14.63*****	**-10.661****
	(0.002)	**(0.005)**	**(0.071)**	**(0.000)**	**(0.000)**	**(0.056)**	**(0.005)**	(0.302)	**(0.032)**	**(0.000)**	**(0.000)**	**(0.038)**
Net effects	-80.350	-39.137	-40.055	-56.683	-83.011	-70.938	-80.638	-37.254	-41.630	-59.335	-88.472	-82.141
Pseudo R^2/R^2	0.700	0.331	0.320	0.356	0.465	0.591	0.708	0.336	0.330	0.362	0.474	0.609
Fisher	**129.71*****						**100.18*****					
Observations	296	296	296	296	296	296	260	260	260	260	260	260

*,**,***: significance levels of 10%, 5% and 1% respectively. GDPg: GDP growth rate. Public Invt: Public Investment. Mobile: Mobile phone penetration rate. OLS: Ordinary Least Squares. R^2 for OLS and Pseudo R^2 for quantile regression. Lower quantiles (e.g., Q 0.1) signify nations where financial activity is least. na: not applicable because at least one component necessary in the computation of the net effect is not statistically significant.

The following findings can be established from Table 6 on linkages between 'private credit bureaus, financial informalization and financial activity'. In Panel A, the net effect of private credit bureaus in financial formalization for financial activity in the banking system is (i) consistently positive with a positive threshold from the (i) 10^{th} to the 90^{th} quantiles, for the most part on the LHS and (ii) consistently positive from the 10^{th} to the 50^{th} quintile on the RHS. For both the LHS and RHS, the fact that corresponding conditional and unconditional effects are consistently positive is evidence of 'synergy effects'. In Panel B, the net effect of 'private credit bureaus in financial informalization for financial activity in the financial system' is negative with consistent negative thresholds from the 25^{th} to the 75^{th} quintiles. Most of the significant control variables display expected signs.

Positive thresholds are established when net impacts consistently display increasing positive magnitude and/or decreasing negative magnitudes throughout the conditional distributions of financial access. Conversely, negative thresholds are represented by consistent decreasing positive and/or increasing negative net effects. Therefore, evidence of a threshold tendency confirms the motivation of modelling based on initial levels of financial access, with the view that financial access rewards from financialization and information sharing offices may consistently decrease or increase simultaneously with increasing initial levels of financial development.

4.3 Leveraging on the synergy between information sharing offices and financial formalization

Comparing the findings of Tables 3-6 leads to one major conclusion: the positive complementarity of information sharing offices and financial formalization is an increasing

function of financial activity whereas the negative complementarity of information sharing offices and financial informalization is a decreasing function of financial activity. In what follows, we offer some propositions on how to leverage the synergy between information sharing offices and financial formalization for enhanced financial access. A policy relevant avenue is to enhance the nexus with new information and communication technologies (ICT) because of two main reasons. On the one hand, ICTs are natural instruments by which information sharing offices can enhance their fundamental role of information sharing. On the other, ICT-banking has been recently documented to be positively (negatively) associated with the informal (formal) financial sector in Africa (Asongu, 2013). Therefore, the directions for policy we propose are four measures that can be employed to enhance the formalisation of ICT-banking in order to boost financial access.

First and foremost, information sharing offices can leverage ICT in boosting financial access and interbank competition for two main reasons, (1) information sharing offices boost competition in order to consolidate access to finance and (2) information sharing offices also play the role of disciplining devices by not encouraging borrowers to default on their debts on the premise that they want to resort to the informal financial sector as a viable alternative to the formal financial sector.

Second, mobile finance can be encouraged by tailoring policy along two main mobile banking angles. (i) information sharing offices can leverage on the evidence that ICT enable users to store currency. In essence, information sharing offices should promote 'mobile banking' activities that are related to real bank accounts in the formal financial sector, compared to pseudo bank accounts in the informal financial sector and (ii) information sharing offices should encourage users in rural/remote localities to use ICT-banking formally in cashing-out and/or cashing-in. The motivation for this recommendation builds on the fact that if ICT-banking is formal banks can easily utilise the mobilised deposits to increase financial access.

Third, in situations where informal financial services are indispensible, information sharing offices should encourage 'partially integrated-ICT savings compared to basic informal savings which do not earn any interest. An example of a basic saving is the mobile transfer M-PESA system that is used to store money in Kenya. Accordingly, by encouraging 'partially integrated' savings, corresponding mobilised deposits can be used to boost financial access.

Fourth, in a nutshell information sharing offices should encourage formalised ICT-banking by leveraging on the following mechanisms for the proposed formalisation. (i) ICT can be tailored toward increasing the store of value in the formal financial sector because the subscriber identity module (SIM) is similar to a smartcard (or virtual bank card), (ii) ICT-banking can also be used for instant access to bank accounts (used for transactions) given that it is also acts as an automated teller machine (ATM) and (iii) ICT-banking also serves as a point of sale (POS) terminal because it enables transactions and communications with formal banking institutions.

5. Conclusions and further research directions

This study has assessed the role of information sharing in financialization (or coexistence of financial sub-systems) for financial access. The empirical evidence is based on contemporary and non-contemporary Fixed Effects and Quantile regressions in 53 African countries for the period 2004-2011. The relevance of the estimation strategy is motivated by the intuition that blanket policy recommendations from mean values of financial access are likely to be ineffective unless they are based on initial levels of financial access tailored differently across countries with high, intermediate and low levels of financial access.

The following findings are established. First, the net effect of information sharing offices in financial formalization for allocation efficiency in the banking system is selectively positive across the conditional distributions. Second, the net effect of information sharing offices in financial informalization for allocation efficiency in the financial system is sparingly negative, with a few positive effects in private credit bureaus-oriented contemporary regressions. Third, the net effect of information sharing offices in financial formalization for financial activity in the banking system is positive for the most part with synergy effects. Synergy effects are derived from the fact that the corresponding conditional and unconditional impacts are consistently positive. Fourth, the net effect of information sharing offices in financial informalization for financial activity in the financial system is negative with some evidence of consistent negative thresholds, especially in private credit bureaus-oriented regressions.

Positive thresholds are established when net impacts consistently display increasing positive magnitude and/or decreasing negative magnitude throughout the conditional distributions of financial access. Conversely, negative thresholds are represented by consistently

decreasing positive and/or increasing negative net effects. Therefore, evidence of a threshold tendency confirms the motivation of modelling based on initial levels of financial access, with the view that financial access rewards from financialization and information sharing offices may consistently decrease or increase simultaneously with increasing initial levels of financial development. Therefore, the positive complementarity of information sharing offices and financial formalization is an increasing function of financial activity whereas the negative complementarity of information sharing offices and financial informalization is a decreasing function of financial activity. In order to leverage on the synergy between information sharing offices and financial formalization for enhanced financial access, some policy measures have been proposed.

The engagement of hitherto unexplored dimensions of financialization merges two streams of literature by simultaneously contributing to the evolving studies on measuring financial development as well as to the economic development literature on mechanisms by which information sharing offices and financialization influence financial access. This twofold contribution also provides insights into a pragmatic way of disentangling the complementarity between different financial sectors and information sharing offices for financial access. Future inquiries can improve the established nexuses by examining the role of information and communication technology like mobile phones and internet penetration in the effectiveness of information sharing offices in enhancing financial access.

Appendices

Appendix 1: Definitions of variables

Variables	Signs	Definitions of variables	Sources
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)
Information Asymmetry	PCR	Public credit registry coverage (% of adults)	World Bank (WDI)
	PCB	Private credit bureau coverage (% of adults)	World Bank (WDI)
Financial Sector Development	Prop. 5	Financial Sector Formalization	Asongu (2014a, 2015ab)
	Prop. 7	Financial Sector Informalization	
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)
Middle Income	Middle I	Middle and Upper Income Countries ($1,006 or more)	Asongu (2014b)
Low Income	Low I	Low Income Countries ($1,005 or less)	
Common Law	Common L	English Common Law Countries	La Porta et al. (2008)
Civil Law	Civil L	Civil Law Countries	

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

Appendix 2: Summary Statistics (2004-2011)

	Variables	Mean	S.D	Min.	Max.	Observations
	Financial System Depth (Fdgdp)	28.262	21.066	2.926	92.325	377
Financial	Banking System Efficiency (BcBd)	68.118	27.725	14.804	171.85	402
Access	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
Fin. Sector	Financial Formalization (Prop. 5)	0.773	0.168	0.235	1.469	377
Development	Financial Informalization (Prop. 7)	0.219	0.168	-0.469	0.764	377
Information	Public Credit registries (PCR)	2.155	5.812	0	49.8	381
Asymmetry	Private Credit Bureaus (PCB)	4.223	13.734	0	64.8	380
	Economic Prosperity (GDPg)	4.996	4.556	-17.66	37.998	404
Control	Inflation	7.801	4.720	0	43.011	357
Variables	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
Income	Low Income Countries	0.509	0.500	0.000	1.000	424
Levels and	Middle Income Countries	0.490	0.500	0.000	1.000	424
Legal	English Common Law	0.415	0.493	0.000	1.000	424
Origins	Civil Law	0.584	0.493	0.000	1.000	424

S.D: Standard Deviation. Min: Minimum. Max: Maximum. 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. GDPg: GDP growth.

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Appendix 3: Correlation Analysis (Uniform sample size : 291)

Financial Access				Info. Asymmetry		FS Development		Control Variables					Fixed Effects				
Fin. Efficiency		Fin. Activity											Income Levels		Legal Origins		
BcBd	FcFd	Prcb	Pcrbof	PCR	PCB	Prop.5	Prop.7	GDPg	Inflation	PubIvt	NODA	Trade	Middle I.	Low I.	Common L.	Civil L.	
1.000	0.859	0.490	0.495	0.154	0.303	0.119	-0.097	-0.016	-0.144	-0.169	-0.133	-0.176	0.073	-0.073	-0.047	0.047	Bcbd
	1.000	0.583	0.743	0.067	0.510	0.384	-0.365	-0.056	-0.097	-0.149	-0.179	-0.189	0.132	-0.132	0.071	-0.071	FcFd
		1.000	0.922	0.448	0.439	0.591	-0.580	-0.092	-0.089	-0.055	-0.343	0.093	0.401	-0.401	0.136	-0.136	Pcrb
			1.000	0.293	0.556	0.685	-0.676	-0.088	-0.073	-0.057	-0.324	0.019	0.356	-0.356	0.191	-0.191	Pcrbof
				1.000	-0.140	0.094	-0.083	-0.026	-0.081	0.068	-0.154	0.207	0.218	-0.218	-0.121	0.121	PCR
					1.000	0.613	-0.598	-0.101	-0.035	-0.047	-0.329	0.084	0.328	-0.328	0.433	-0.433	PCB
						1.000	-0.983	-0.004	0.008	0.128	-0.246	0.119	0.398	-0.398	0.435	-0.435	Prop.5
							1.000	0.018	-0.061	-0.125	0.224	-0.105	-0.363	0.363	-0.462	0.462	Prop.7
								1.000	-0.169	0.129	0.122	0.037	-0.022	0.022	0.009	-0.009	GDPg
									1.000	-0.081	-0.0004	-0.006	-0.116	0.116	0.152	-0.152	Inflation
										1.000	0.059	0.130	0.079	-0.079	-0.169	0.169	PubIvt
											1.000	-0.309	-0.603	0.603	-0.068	0.068	NODA
												1.000	0.502	-0.502	0.068	-0.068	Trade
													1.000	-1.000	0.087	-0.087	Middle I.
														1.000	-0.087	0.087	Low I.
															1.000	-1.000	Common L.
															-1.000	1.000	Civil L.

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. Info: Information. PCR: Public Credit Registries. PCB: Private Credit Bureaus. Prop.5: Financial Sector Formalization. Prop. 7: Financial Sector Informalization. GDPg: GDP growth. Popg: Population growth. PubIvt: Public Investment. NODA: Net Official Development Assistance. Middle I: Middle Income. Low. I: Low Income. Common L: Common Law: Civil L.: Civil Law. Info: Information. Fin: Financial. FS Development: Financial Sector Development.

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