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Asongu, Simplice and Nwachukwu, Jacinta

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Simplice A. Asongu
African Governance and Development Institute,
P.O. Box 8413 Yaoundé, Cameroon.
E-mail: asongusimplice@yahoo.com / asongus@afridev.org

Jacinta C. Nwachukwu
School of Economics, Finance and Accounting,
Faculty of Business and Law,
Coventry University Priory Street, Coventry, CV1 5FB, UK
Email: jacinta.nwachukwu@coventry.ac.uk

Research Department

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Abstract

Purpose- The purpose of this study is to examine the role of reducing information asymmetry (IA) on conditional financial sector development in 53 African countries for the period 2004-2011.

Design/methodology/approach- The empirical evidence is based on contemporary and non-contemporary quantile regressions. Instruments for reducing IA include pubic credit registries (PCRs) and private credit bureaus (PCBs). Hitherto unexplored dimensions of financial sector development are employed, namely: financial sector dynamics of formalization, informalization, semi-formalization and non-formalization.

Findings- The following findings are established. *First*, the positive (negative) effect of information sharing offices (ISO) on formal (informal) financial development is consistent with theory. *Second*, ISOs consistently increase: (i) formal financial development, with the incidence of PCRs higher in terms of magnitude and (ii) financial sector formalization, with the impact of PCBs higher for the most part. *Third,* only PCBs significantly decrease informal financial development and both ISOs decrease financial sector informalization. Policy implications are discussed.

Originality/value- The study assesses the effect of reducing information asymmetry on financial development when existing levels of it matter because current studies based on mean values of financial development provide blanket policy implications which are unlikely to be effective unless they are contingent on prevailing levels of financial development and tailored differently across countries with high, intermediate and low initial levels of financial development.

JEL Classification: G20; G29; L96; O40; O55
Keywords: Information sharing; Banking development; Africa

1. Introduction

Three main factors motivate this inquiry. They are: (i) shortcomings in the literature on information asymmetry, (ii) employment of hitherto unexplored concepts of financial sector development in the literature and (iii) recommendations for more scholarly inquiries into the relevance of reducing information asymmetry in the African financial industry (Singh et al., 2009, p. 13), partly because of excess liquidity issues.

There is a consensus in the literature that African financial institutions are characterised by substantial surplus liquidity concerns (Fouda, 2009; Asongu et al., 2016a; Saxegaard, 2006). Attempts have been made to address this policy syndrome by introducing information sharing offices (ISOs)[1] in the continent over the past decade (Triki & Gajigo, 2014). Accordingly, the principal objective of ISOs within the frameworks of public credit registries (PCRs) and private credit bureaus (PCBs) has been to increase financial allocation efficiency by mitigating the prevailing asymmetry of information between lenders and borrowers. The reduction of information asymmetry (IA) is centred on factors that constrain access to finance like: physical access, eligibility to bank lending and affordability (see Batuo & Kupukile, 2010; Allen et al., 2011).

In the light of the above, the role played by ISOs in the financial industry is similar to that of brokers between borrowers and lenders. They help in the: reduction of credit constraints, improving the efficient allocation of capital and enhancement of financial sector importance in the banking industry (Jappelli & Pagano, 2002). This inquiry is concerned with the third advantage, notably the role of reducing information asymmetry in financial sector development. It is partially motivated by recent African literature on information sharing which has concluded that ISOs may not be improving financial access through enhanced financial sector importance within the industry (Asongu et al., 2016b). The narrative further maintains that it is very likely that ISOs are being employed by powerful banks in the continent to enjoy a 'quiet life'[2].

[1] Throughout this inquiry, 'PCB and PCR' are employed interchangeably with ISO.

[2] According to Coccorese and Pellecchia (2010), 'quiet life' is derived from the 'Quiet Life Hypothesis' (QLH). It is based on the assumption that powerful banks would abuse their power by using their privileged positions to increase their profit margins instead of pursuing the goal of increasing financial access and financial intermediation efficiency (Also see Banya & Biekpe, 2017). For example, Banya and Biekpe (2017) have recently shown that bank size is negatively associated with banking sector efficiency, partly owing to low competition in the banking sector which decreases financial intermediation efficiency (Biekpe, 2011).

To the best of our knowledge, the information asymmetry literature has failed to directly and critically involve the dimension of financial sector importance in financial development (see Tanjung et al., 2010; Houston et al., 2010; Ivashina, 2009). The reason for this neglected dimension may be traceable to the fact that data on ISOs is only available from 2004. Furthermore, the substantial bulk of the literature has viewed interbank development in the perspective of bank participation and bank concentration (O'Toole, 2014; Asongu, 2015a). This study steers clear of this strand of literature by conceiving financial sector development in the light of financialization. Whereas a bulk of the literature has assessed the link between financial access and reforms in the financial sector (Arestis et al., 2002; Batuo & Kupukile, 2010), the present investigation complements the strand of literature on financial reforms by introducing (i) a previously missing aspect of the informal financial sector into the financial system definition and (ii) the concept of financialization.

The introduction of the notion of financialization unites two strands of research in two key ways. (i) It responds to a growing field of economic development by including microfinance and other forms of informal finance and (ii) It contributes to the stream of studies on the measurement of financial development. In addition, the paper suggests a pragmatic means of disentangling the effect of decreasing IA on various components of the financial sector. Thus, the study looks at hitherto unexplored financial sector concepts, namely: formalization, semi-formalization, informalization and non-formalization.

Despite severe issues of financial access in African financial institutions, previous studies on IA have not given the continent its diserved attention (see Asongu et al., 2016a). The scholarly emphasis on the region has been limited to selected countries and the scope of financial sector development. Barth et al. (2009) focused on nine African countries, Love and Mylenko (2003) investigated four while Galindo and Miller (2001) assessed none. In more contemporary literature, 42 countries have been investigated by Triki and Gajigo (2014) for the period 2006-2009 whereas Asongu et al. (2016a, 2016b) have examined 53 countries for the period 2004-2011. The positioning of this inquiry more closely aligns it with the last-three studies in terms of sample and periodicity. However, this study steers clear of the highlighted stream (which has focused on financial access) by investigating the relationship between reducing IA and financial sector development. The investigation also accounts for initial levels of financial sector development.

The study accounts for existing financial sector development levels by arguing that blanket policies on the role of ISOs on financial sector development may be ineffective unless they are contingent on initial levels of financial sector development and tailored differently across countries with low, intermediate and high levels of financial sector development. This entails the use of the quantile regressions in the analysis of the relationship between ISO and financial development. The connection is assessed throughout the conditional distributions of financial sector development. This approach substantially steers clear of the highlighted literature which is based on mean values of financial development, notably Asongu et al. (2016b) and Triki and Gajigo (2014) who have respectively employed Generalized Method of Moments (GMM) and Probit models.

The remainder of the study is organised in the following manner. Section 2 covers the theoretical underpinnings, proposes measurements of financial sector development and reviews the relevant IA literature. The data and methodology are described in Section 3. The empirical results and policy implications are presented in Section 4. Section 5 concludes with future research directions.

2. Theoretical Underpinnings, Propositions and Related Literature

2.1 Theoretical underpinnings and Propositions

According to Claus and Grimes (2003), two main perspectives dominate the theoretical foundations of the relationship between reducing IA and financial development. The first view is oriented towards the transformation of risk characteristics of bank assets while the second focuses on channels through which financial access can be enhanced. Moreover, the two viewpoints accord with the fundamental role of banks in intermediation efficiency which is to convert mobilised deposits into credit for economic agents. The perception also broadly aligns with foremost theoretical literature on the relevance of information sharing in financial access, namely, on: financial institutions' communication of potential borrowers to investors (Leland & Pyle, 1977), ex-post and ex-ante IA (Diamond & Dybyig, 1983), financial intermediary diversification (Diamond, 1984) and models of credit rationing (Williamson, 1986; Stiglitz & Weiss, 1981; Jaffee & Russell, 1976).

Recent African IA literature that builds on the engaged theoretical underpinnings has failed to either include the informal financial sector and/or financial sector development (Singh

et al., 2009; Triki & Gajigo, 2014; Asongu et al., 2016a, 2016b). We complement the literature here by also addressing a missing element in the definition of the financial system by the International Monetary Fund (IMF)'s International Financial Statistics (IFS, 2008) where the definition has failed to incorporate the informal financial sector. This neglect starkly contrasts with the substantially documented importance of the informal sector in development outcomes in developing countries (see Aryeetey, 2005; Adeusi et al., 2012; Meagher, 2013).

The propositions in Table 1 which rethink the IMF financial system definition (i) incorporate the informal financial sector and (ii) articulate measures of financial sector importance that have not been substantially included in the financial development literature (Asongu, 2014a, 2015ab). While Panel A discloses measures of financial sector importance in relation to Gross Domestic Product (GDP), indicators in Panel B are oriented towards competition for shares in the money supply (M2) within the financial sector.

The articulation of competition within the financial sector is founded on the concepts of formalization, semi-formalization, informalization and non-formalization. For instance, whereas financial formalization discloses the growth of the formal financial sector in money supply, such progress is simultaneously to the detriment of competing financial sectors, namely semi-formal and informal financial sectors. The suggested measures of financial sector development improve the mainstream narrative in three principal dimensions, notably in: (i) providing a definition of the financial system that includes the informal financial sector, (ii) disentangling the existing IMF definition into its formal and semi-formal components and (iii) introducing the notion of financial sector importance based on its share in money supply.

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 saving 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).

[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).

2.2 Related literature

In line with recent IA literature (Asongu et al., 2016a), two main strands have dominated inquiries into the outcomes of reducing IA: the effect of IA among creditors and how enhanced channels of reducing IA are affected by creditors' rights. One aspect is oriented towards assessing how information sharing affects antitrust intervention (Coccorese, 2012), influences corruption-motivated lending (Barth et al., 2009), mitigates credit cost (Brown et al., 2009), affects syndicated bank loans (Ivashina, 2009; Tanjung et al., 2010), reduces default rates (Jappelli & Pagano, 2002) and increases access to finance (Djankov et al., 2007; Brown et al., 2009; Triki & Gajigo, 2014; Asongu et al., 2015). The other strand focuses on the importance of enhanced creditors' rights in bankruptcy on the one hand (Claessens & Klapper, 2005; Djankov et al., 2007; Brockman & Unlu, 2009) and the ability to take risk by financial institutions on the other (Houston et al., 2010; Acharya et al., 2011).

A substantial bulk of the literature has been devoted to regions where concerns about surplus liquidity in financial institutions are comparatively less severe. Most of these previous studies focused on developing countries in Latin America and Asia on the one hand and countries in the Organisation of Economic Cooperation and Development (OECD) on the other. Noticeably, Africa which is an area with more acute constraints in financial access has not been given the much needed scholarly attention (Asongu et al., 2016a).

Galindo and Miller (2001) considered the difficulties surrounding the reduction of IA in financial access. They established that relative to developed countries, developing nations with ISOs enjoy fewer restrictions on access to finance. According to the authors, performing PCRs substantially limits the responsiveness of institutions to financial controls (proxied with decisions on 'cash flow' investment'). Love and Mylenko (2000) have used corporate-related information from the World Bank Business Environment Survey (WBES) and a combination of public and private credit offices to examine whether a negative connection between credit registries and limitations in financial access is allied with a perception of a decreasing IA by bank managers. They concluded that while PCRs do not considerably reduce constraints in finance, PCBs are associated with higher levels of access to finance. Barth et al. (2009) examined how ISOs reduce IA and the influence of lending competition on 'corrupt lending' to establish two main findings. (i) lending linked to corruption is decreased by competition in the banking industry and (ii) decreasing IA plays a core role in the negative relationship. 'Corrupt

lending' is considerably influenced by the ownership structure of firms and banks, competition in firms and the legal environment.

More recently, Triki and Gajigo (2014) examined the nexus between reducing IA and financial access. Two main issues are investigated. (i) The effect of ISOs on financial access by firms and (ii) the impact of PCR design on financial access constraints. Their results show that (i) financial access is higher in nations with PCBs compared to those without ISOs or with PCRs and (ii) substantial cross-country variations exist in the design of PCRs and access to finance. Asongu et al. (2015) assessed reducing IA thresholds in financial development dynamics of size, activity, efficiency and depth. They found negative effects from ISOs. Asongu et al. (2016a) subsequently investigated the impacts of ISOs by accounting for countries with low, intermediate and high levels of financial development. It was reported that initial levels of access to finance are relevant for incremental effects of ISOs on financial development.

3. Data and Methodology

3.1 Data

We assess a sample of 53 African nations with data from African Development Indicators (ADI) and the Financial Development and Structure Database (FDSD) of the World Bank for the period 2004-2011. Data from the FDSD is available until 2011 while data on ISOs from ADI is only available from 2004. The scope of the inquiry on Africa is in accordance with the stylized facts and the literature review discussed in the preceding sections; especially a startling contrast between acute constraints in access to finance in the continent and little scholarly attention devoted to examining the financial development outcomes of reducing IA.

The propositions in Table 1 are computed from the FDSD. Two financial sector development indicators are employed.(i) formal financial development (Propositions 1 and 5) and (ii) informal financial development (Propositions 3 and 7). Semi-formal financial development (Propositions 2 and 6) is not used because of constraints on degrees of freedom, while non-formal financial development (Propositions 4 and 8) display a high degree of substitution with informal financial development. Consistent with African literature on reducing IA (Triki & Gajigo, 2014; Asongu et al., 2016a, 2016b), ISOs are measured with private credit bureaus (PCBs) and public credit registries (PCRs).

Seven control variables are used to account for biases in omitted variables: two dummy variables and five non-dummy variables. The non-dummy variables include: public investment, inflation, GDP growth, foreign aid and trade openness. The choice of the variables is consistent with correlates of financial development (Huang, 2005; Osabuohein & Efobi, 2013; Asongu, 2014b; Owosu & Odhiambo, 2014; Nyasha & Odhiambo, 2015a, 2015b; Adjasi & Biekpe, 2006; Gossel & Biekpe, 2014). The dummy variables are income levels and legal origins. We discuss the expected signs.

First, investment has been documented as positively affecting financial development (Huang, 2011). *Second*, Do and Levchenko (2004) and Huang and Temple (2005) are in accordance with the proposition that trade openness is positively related to financial development. *Third*, both theoretical and empirical literature accord with the view that very high inflation is not conducive for activity and efficiency in the financial sector (see Huybens & Smith, 1999; Boyd et al., 2001). *Fourth,* financial development is positively linked to economic growth because of *inter alia*, increased availability of productive investments and development in the banking industry (Greenwood & Jovanovic, 1990; Saint-Paul, 1992; Levine, 1997; Jaffee & Levonian, 2001). *Fifth*, from a theoretical standpoint, foreign aid is expected to augment financial development because it is anticipated that it will narrow the saving-investment gap that countries in less developed countries are confronted (Easterly, 2005). From a practical perspective however, the incidence of development assistance is strongly contingent on the fraction of disbursed aid that finally reaches the country of destination. This is essentially because part of the aid may be spent in donor countries and/or siphoned off by authorities in recipient countries and ultimately deposited in tax havens that are within the jurisdictions of developed countries. *Sixth*, from both theoretical and empirical viewpoints, countries with English Common Law traditions are more likely to be associated with higher levels of financial development compared to their French Civil Law counterparts because of political and adaptability mechanisms (Beck et al., 2003). The classification in legal origins is with the help of La Porta et al. (2008, p. 289). *Seventh*, higher income countries in Africa enjoy higher levels of financial development, compared to lower income countries (Asongu, 2012). The evidence is in agreement with Jaffee and Levonian (2001) who have shown that high income countries enjoy more efficient banking system structures. Stratification of countries into income categories is in

accordance with Asongu (2014c, p. 364)[9]. It is relevant to note that these indicators in the conditioning information set could have different effects on informal and formal financial sectors.

The definition of variables, summary statistics and correlation matrix are provided in Appendix 1, Appendix 2 and Appendix 3 respectively. From Appendix 1, it is apparent from values that the variables are comparable. Moreover, from corresponding variations or standard deviations we can be confident that reasonably estimated relationships would emerge. The objective of the correlation matrix is to reduce multicollinearity issues. While the issue is apparent between variables of financial sector development, fortunately it is not of major concern because they are employed exclusively as dependent variables.

3.2 Estimation technique

Consistent in the motivation of this study, in order to control for existing levels of financial development in the assessment of the linkage between reducing IA and financial sector development, we employ quantile regressions (QR). This estimation technique enables the examination of determinants of financial sector development throughout the conditional distributions of financial sector development (Keonker & Hallock, 2001; Billger & Goel, 2009; Okada & Samreth, 2012). In other words, specific emphasis is laid on countries with low, intermediate and high levels of financial sector development.

Existing literature on reducing IA has investigated the linkage between ISOs and financial development by reporting estimated parameters at the conditional mean of financial development (see Triki & Gajigo, 2014; Asongu et al., 2016b). Whereas mean impacts are relevant, the present inquiry complements the underlying strand of the literature by employing a QR estimation strategy that accounts for existing levels of financial development. In addition, while with the Ordinary Least Squares (OLS) method, estimations are based on the hypothesis of normally distributed error terms, the assumption of such normality is not consistent with the QR strategy.

With the QR estimation strategy, regressors are estimated at various points of the conditional distribution of financial sector development. Therefore, the technique is in

[9] There are four main World Bank income groups: (i) high 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.

accordance with the motivation of accounting for low-, intermediate- and high-levels of financial sector development. The policy relevance of the approach is founded on the assumption that "one size fits all" policies on the role of reducing IA in financial sector development may not be ineffective unless they are based on existing levels of financial sector development and hence tailored differently across countries with differing initial levels of development in the financial sector.

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

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

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 10^{th} or 90^{th} deciles (with θ=0.10 or 0.90 respectively) are calculated by approximately weighing the residuals. The conditional quantile of financial development or y_i given x_i is:

$$Q_y(\theta / x_i) = x_{i'}\beta_\theta \qquad (2)$$

where unique slope parameters are modelled for each θ^{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*, *inflation, middle income* and *Common law*. The specifications are tailored to control for the unobserved heterogeneity in terms of fixed effects and simultaneity with non-contemporary specifications.

4. Empirical Results

4.1 Presentation results

Table 2 and Table 3 respectively present results corresponding to formal financial development and informal financial development. Whereas the left-hand-side (LHS) of tables discloses contemporary estimations, the right-hand-side (RHS) shows non-contemporary regressions. The purpose of lagging the independent variables on the RHS by one year so as to correct for endogeneity (see Mlachila et al., 2014, p. 21). We observe consistent variations in estimated coefficients of ISO between OLS and QR estimates. These differences which are in terms of signs, significance and magnitude of estimated coefficients, justify the choice of modelling at various points in the conditional distribution of the dependent variables.

In Table 2, Panel A presents findings of formal financial sector development whereas Panel B discloses results of financial sector formalization. The following findings can be established. *First,* with the exception of PCBs in the 90^{th} decile for which the effect is negative, ISOs consistently increase formal financial development, with the incidence of PCRs higher in terms of magnitude. *Second*, ISO consistently increase financial sector formalization with the impact of PCBs higher for the most part. *Third*, most of the significant control variables have the expected signs.

The following findings can be recognised from Table 3 on linkages between ISOs and informal finance. *First*, only PCBs significantly lessen informal financial development. Second, both ISO measurements decrease financial sector informalization. Third, the control variables are significant with expected signs. It is important to note that, it is normal that the results in Table 2 contradict those in Table 3. This is essentially because the former deals with formal whereas the latter deals with informal financial development. As discussed in the propositions in Table 1, both financial sectors are in competition for money supply. Hence, the increase in money supply in one sector is to the detriment of the other sector.

Table 2: Formal Financial Development and Information Asymmetry

Formal Financial Development

Panel A: Formal Financial Sector Development (Prop.1)

	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	**21.851*** **	**7.337** **	**10.644*** **	**7.582*** **	**18.992*** **	**38.727*** **	**22.793*** **	**6.841** **	**12.341*** **	**8.385*** **	**19.502*** **	**38.911*** **
	(0.000)	**(0.013)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.026)**	**(0.001)**	**(0.000)**	**(0.000)**	**(0.000)**
PCR	**1.343*** **	**0.437*** **	**1.607*** **	**1.380*** **	**1.794*** **	**0.494*** **	**1.434*** **	**1.146*** **	**1.573*** **	**1.818*** **	**1.693*** **	**0.757*** **
	(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	**0.343*** **	**0.400*** **	**0.453*** **	**0.400*** **	**0.506*** **	**-0.207** **	-0.229	**0.434*** **	**0.450*** **	**0.492*** **	**0.484*** **	**-0.213** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.012)**	(0.280)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.024)**
GDP growth	-0.289	-0.079	-0.101	**-0.482*** **	**-0.530*** **	-0.256	-0.029	-0.043	-0.165	**-0.537*** **	**-0.485** **	-0.161
	(0.134)	(0.608)	(0.449)	**(0.000)**	**(0.001)**	(0.254)	(0.170)	(0.786)	(0.463)	**(0.000)**	**(0.014)**	(0.311)
Inflation	-0.010	**0.024** **	0.019	-0.012	-0.031	**-0.063*** **	0.227	**0.022** **	0.013	**-0.032** **	**-0.053** **	**-0.091*** **
	(0.484)	**(0.018)**	(0.121)	(0.373)	(0.111)	**(0.005)**	(0.405)	**(0.049)**	(0.552)	**(0.016)**	**(0.014)**	**(0.000)**
Public Invt.	0.244	0.161	-0.016	**0.774*** **	**1.174*** **	**0.713*** **	-0.175	0.040	-0.065	**0.693*** **	**1.004*** **	**0.593*** **
	(0.316)	(0.488)	(0.882)	**(0.000)**	**(0.000)**	**(0.000)**	(0.195)	(0.719)	(0.796)	**(0.000)**	**(0.000)**	**(0.000)**
Foreign Aid	-0.105	0.077	**0.218** **	0.097	-0.242	**-0.593*** **	-0.062	0.051	0.145	0.067	-0.249	**-0.620*** **
	(0.429)	(0.490)	**(0.015)**	(0.174)	(0.103)	**(0.003)**	(0.100)	(0.644)	(0.319)	(0.471)	(0.170)	**(0.000)**
Trade	**-0.068***	**-0.048***	**0.053** **	**0.049*** **	-0.001	**-0.061***	**9.907*** **	-0.029	-0.043	**0.063*** **	0.019	-0.031
	(0.058)	**(0.086)**	**(0.011)**	**(0.003)**	(0.964)	**(0.065)**	**(0.000)**	(0.299)	(0.239)	**(0.005)**	(0.563)	(0.364)
Middle Income	**10.266*** **	2.225	**3.830** **	1.909	2.923	**37.291*** **	2.742	1.864	2.756	0.202	2.808	**34.505*** **
	(0.000)	(0.214)	**(0.010)**	(0.125)	(0.195)	**(0.000)**	(0.260)	(0.273)	(0.286)	(0.904)	(0.317)	**(0.000)**
Common Law	2.003	**3.368** **	1.698	**3.580*** **	2.718	2.031	**22.793*** **	**4.416*** **	2.174	**5.012*** **	3.129	3.275
	(0.376)	**(0.013)**	(0.152)	**(0.001)**	(0.162)	(0.483)	**(0.000)**	**(0.002)**	(0.298)	**(0.000)**	(0.212)	(0.259)
Pseudo R^2/R^2	0.362	0.180	0.166	0.234	0.305	0.400	0.361	0.185	0.171	0.243	0.299	0.394
Fisher	**30.21*** **						**26.83*** **					
Observations	293	293	293	293	293	293	257	257	257	257	257	257

Panel B: Financial Sector Formalization (Prop.5)

	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	**0.629*** **	**0.409*** **	**0.550*** **	**0.639*** **	**0.712*** **	**0.770*** **	**0.635*** **	**0.393*** **	**0.573*** **	**0.656*** **	**0.712*** **	**0.754*** **
	(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	**0.004*** **	**0.006*** **	**0.003***	**0.002*** **	**0.002** **	**0.001*** **	**0.004*** **	**0.006*** **	0.004	**0.002** **	0.001	**0.001** **
	(0.000)	**(0.000)**	**(0.053)**	**(0.002)**	**(0.016)**	**(0.007)**	**(0.000)**	**(0.000)**	(0.162)	**(0.019)**	(0.121)	**(0.013)**
PCB	**0.005*** **	**0.005*** **	**0.004*** **	**0.002*** **	**0.006*** **	**0..009*** **	**0.005*** **	**0.004*** **	**0.003*** **	**0.002*** **	**0.007*** **	**0.009*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.006)**	**(0.000)**	**(0.000)**	**(0.000)**
GDP growth	0.001	-0.0004	0.002	**0.004*** **	0.002	**0.002*** **	0.001	-0.0003	0.004	**0.004*** **	**0.002** **	0.0003
	(0.611)	(0.857)	(0.529)	**(0.000)**	(0.151)	**(0.000)**	(0.600)	(0.904)	(0.288)	**(0.001)**	**(0.041)**	(0.581)
Inflation	**0.0003** **	**0.0009*** **	**0.0004** **	0.0001	-0.00003	**-0.0001** **	0.0003	**0.001*** **	0.0002	0.0001	-0.00008	**0.001*** **
	(0.014)	**(0.000)**	**(0.026)**	(0.328)	(0.772)	**(0.036)**	(0.140)	**(0.000)**	(0.323)	(0.484)	(0.722)	**(0.000)**
Public Invt.	**0.006*** **	**0.005*** **	**0.007** **	**0.003*** **	**0.004*** **	**0.006*** **	**0.006*** **	**0.007*** **	**0.006***	**0.003*** **	**0.007*** **	**0.008*** **
	(0.000)	**(0.004)**	**(0.015)**	**(0.001)**	**(0.001)**	**(0.000)**	**(0.000)**	**(0.003)**	**(0.061)**	**(0.007)**	**(0.000)**	**(0.000)**
Foreign Aid	0.001	**0.004*** **	0.001	0.0005	0.0008	-0.0001	0.001	**0.005** **	-0.0008	0.0001	0.0006	-0.0007
	(0.221)	**(0.007)**	(0.594)	(0.510)	(0.452)	(0.901)	(0.286)	**(0.016)**	(0.718)	(0.905)	(0.547)	(0.398)
Trade	**-0.0005** **	**-0.0007***	-0.00008	-0.00001	-0.0001	**0.006*** **	**-0.0005***	-0.0007	-0.0001	0.00003	-0.00009	0.00004
	(0.014)	**(0.064)**	(0.856)	(0.926)	(0.552)	**(0.000)**	**(0.060)**	(0.176)	(0.771)	(0.870)	(0.642)	(0.738)
Middle Income	**0.089*** **	**0.184*** **	0.058	**0.069*** **	**0.062*** **	-0.0001	**0.087*** **	**0.198*** **	0.050	**0.066*** **	**0.057*** **	0.019
	(0.000)	**(0.000)**	(0.114)	**(0.000)**	**(0.001)**	(0.901)	**(0.000)**	**(0.000)**	(0.239)	**(0.000)**	**(0.001)**	(0.134)
Common Law	**0.089*** **	**0.069*** **	**0.078*** **	**0.088*** **	**0.067*** **	-0.00009	**0.090*** **	**0.059** **	**0.112*** **	**0.083*** **	**0.061*** **	**0.056*** **
	(0.000)	**(0.003)**	**(0.009)**	**(0.000)**	**(0.000)**	(0.557)	**(0.000)**	**(0.045)**	**(0.001)**	**(0.000)**	**(0.000)**	**(0.000)**
Pseudo R^2/R^2	0.525	0.314	0.245	0.278	0.328	0.471	0.525	0.317	0.237	0.278	0.333	0.478
Fisher	**21.03*** **						**17.01*** **					
Observations	293	293	293	293	293	293	257	257	257	257	257	257

*,**,***: significance levels of 10%, 5% and 1% respectively. PCR: Public Credit Registries. PCB: Private Credit Bureaus. GDP: Gross Domestic Product. Invt: Investment. 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 sector development is least.

Table 3: Informal Financial Development and Information Asymmetry

Informal Financial Development

Panel A: Informal Financial Sector Development (Prop. 3)

	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	**9.450*** **	**4.536*** **	**5.708*** **	**9.107*** **	**12.388*** **	**16.472*** **	**9.463*** **	1.438	**5.805*** **	**9.362*** **	**11.989*** **	**17.248*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	(0.116)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
PCR	0.009	0.062	**0.059***	0.028	0.002	**-0.071****	0.012	0.089	0.084	0.031	0.015	-0.043
	(0.731)	(0.129)	**(0.068)**	(0.126)	(0.960)	**(0.049)**	(0.665)	(0.149)	(0.188)	(0.157)	(0.550)	(0.305)
PCB	**-0.180*** **	**-0.340*** **	**-0.227*** **	**-0.093*** **	**-0.093*** **	**-0.153*** **	**-0.186*** **	**-0.343*** **	**-0.252*** **	**-0.098*** **	**-0.084*** **	**-0.136*** **
	(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	**-0.156*** **	**-0.030**	**-0.145*** **	**-0.072*** **	**-0.145*** **	**-0.203*** **	**-0.127****	-0.121	**-0.147***	**-0.078*** **	**-0.145*** **	**-0.175*** **
	(0.004)	**(0.659)**	**(0.001)**	**(0.004)**	**(0.008)**	**(0.001)**	**(0.031)**	(0.165)	**(0.064)**	**(0.005)**	**(0.000)**	**(0.006)**
Inflation	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	0.0003* **	**0.0001*** **	**0.0002*** **	**0.0002*** **	**0.0002*** **	**0.0004*** **	**0.0002*** **	**0.0001*** **	**0.0002*** **	**0.0002*** **	**0.0002*** **	**0.0003*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.002)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Public Invt.	**-0.140*** **	**-0.235*** **	**-0.086****	**-0.100*** **	-0.042	**-0.113***	**-0.169*** **	**-0.106***	**-0.128****	**-0.167*** **	**-0.070***	**-0.148****
	(0.003)	**(0.000)**	**(0.037)**	**(0.000)**	(0.372)	**(0.053)**	**(0.001)**	**(0.091)**	**(0.047)**	**(0.000)**	**(0.054)**	**(0.019)**
Foreign Aid	**-0.076*** **	-0.038	-0.031	**-0.052*** **	**-0.108*** **	**-0.173*** **	**-0.076*** **	0.028	-0.027	**-0.051*** **	**-0.081*** **	**-0.161*** **
	(0.006)	(0.334)	(0.270)	**(0.004)**	**(0.007)**	**(0.000)**	**(0.006)**	(0.588)	(0.550)	**(0.007)**	**(0.003)**	**(0.000)**
Trade	0.004	0.012	**0.013****	**-0.007****	**-0.016***	**-0.026*** **	0.004	**0.025***	**0.018***	-0.005	**-0.014****	**-0.043*** **
	(0.565)	(0.256)	**(0.027)**	**(0.048)**	**(0.063)**	**(0.006)**	(0.613)	**(0.051)**	**(0.074)**	(0.229)	**(0.036)**	**(0.000)**
Middle Income	0.459	-0.963	**-1.415*** **	**0.982*** **	0.477	**1.966****	0.513	-0.035	**-1.653****	**1.060*** **	0.317	**2.225****
	(0.385)	(0.176)	**(0.003)**	**(0.001)**	(0.483)	**(0.032)**	(0.378)	(0.967)	**(0.030)**	**(0.002)**	(0.523)	**(0.023)**
Common Law	**-2.650*** **	**-0.963****	**-1.089*** **	**-3.082*** **	**-3.693*** **	**-3.240*** **	**-2.934*** **	-1.055	**-1.484****	**-3.143*** **	**-3.600*** **	**-3.667*** **
	(0.000)	**(0.015)**	**(0.008)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	(0.131)	**(0.025)**	**(0.000)**	**(0.000)**	**(0.000)**
Pseudo R^2/R^2	0.403	0.377	0.217	0.250	0.243	0.232	0.427	0.376	0.225	0.262	0.262	0.267
Fisher	**28.75*** **						**26.95*** **					
Observations	308	308	308	308	308	308	274	274	274	274	274	274

Panel B: Financial Sector Informalization (Prop. 7)

	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	**0.365*** **	**0.201*** **	**0.270*** **	**0.359*** **	**0.468*** **	**0.643*** **	**0.358*** **	**0.202*** **	**0.260*** **	**0.344*** **	**0.446*** **	**0.626*** **
	(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	**-0.004*** **	**-0.002****	**-0.003*** **	**-0.003*** **	**-0.003***	**-0.005**	**-0.004*** **	**-0.002***	**-0.002*** **	**-0.004*** **	**-0.004***	**-0.006*** **
	(0.000)	**(0.037)**	**(0.000)**	**(0.003)**	**(0.093)**	**(0.106)**	**(0.000)**	**(0.077)**	**(0.000)**	**(0.002)**	**(0.069)**	**(0.000)**
PCB	**-0.005*** **	**-0.008*** **	**-0.006*** **	**-0.002*** **	**-0.003*** **	**-0.004*** **	**-0.005*** **	**-0.008*** **	**-0.006*** **	**-0.002*** **	**-0.003*** **	**-0.004*** **
	(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	-0.0007	-0.001	-0.001	**-0.004*** **	0.0004	0.0006	-0.0007	0.00007	**-0.002*** **	**-0.004*** **	0.0005	0.0004
	(0.752)	(0.152)	(0.188)	**(0.009)**	(0.906)	(0.864)	(0.777)	(0.948)	**(0.000)**	**(0.007)**	(0.874)	(0.908)
Inflation	**-**	-0.0001	**-0.0002****	**-0.0005****	**-0.0006****	**-0.001*** **	**-**	**-0.001*** **	**-**	**-**	**-0.0005****	**-0.001*** **
	0.0006* **						**0.0006*** **		**0.0002*** **	**0.0004*** **		
	(0.000)	(0.277)	**(0.021)**	**(0.011)**	**(0.019)**	**(0.000)**	**(0.007)**	**(0.000)**	**(0.001)**	**(0.001)**	**(0.029)**	**(0.000)**
Public Invt.	**-0.006*** **	**-0.007*** **	**-0.004*** **	**-0.003*** **	**-0.008*** **	**-0.008*** **	**-0.006*** **	**-0.008*** **	**-0.007*** **	**-0.003****	**-0.007****	**-0.007****
	(0.000)	**(0.000)**	**(0.000)**	**(0.005)**	**(0.006)**	**(0.003)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.014)**	**(0.025)**	**(0.011)**
Foreign Aid	-0.001	0.001	-0.0001	-0.001	-0.002	**-0.006****	-0.001	0.001	0.0007	-0.00005	-0.002	**-0.006****
	(0.193)	(0.233)	(0.884)	(0.149)	(0.281)	**(0.015)**	(0.251)	(0.287)	(0.153)	(0.960)	(0.174)	**(0.028)**
Trade	**0.0005****	0.0001	0.0001	-0.00009	-0.00005	0.0003	**0.0005***	0.0001	**0.0001***	-0.0001	-0.00003	0.0006
	(0.041)	(0.478)	(0.395)	(0.670)	(0.891)	(0.561)	**(0.059)**	(0.500)	**(0.086)**	(0.615)	(0.926)	(0.347)
Middle Income	**-0.081*** **	-0.007	**-0.048*** **	**-0.055*** **	-0.054	**-0.153*** **	**-0.080*** **	-0.007	**-0.039*** **	**-0.057*** **	-0.040	**-0.179*** **
	(0.000)	(0.659)	**(0.002)**	**(0.002)**	(0.120)	**(0.002)**	**(0.000)**	(0.740)	**(0.000)**	**(0.004)**	(0.232)	**(0.001)**
Common Law	**-0.100*** **	**-0.054*** **	**-0.071*** **	**-0.078*** **	**-0.122*** **	**-0.118*** **	**-0.101*** **	**-0.052*** **	**-0.069*** **	**-0.081*** **	**-0.125*** **	**-0.082****
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.001)**	**(0.000)**	**(0.032)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.024)**
Pseudo R^2/R^2	0.516	0.439	0.309	0.271	0.263	0.317	0.517	0.444	0.316	0.270	0.257	0.314
Fisher	**20.07*** **						**16.18*** **					
Observations	293	293	293	293	293	293	257	257	257	257	257	257

*,**,***: significance levels of 10%, 5% and 1% respectively. PCR: Public Credit Registries. PCB: Private Credit Bureaus. GDP: Gross Domestic Product. Invt: Investment. OLS: Ordinary Least Squares. R^2 for OLS and Pseudo R^2 for quantile regression. Lower quantiles (e.g., Q 0.1) signify nations financial sector development is least.

4.2 Further discussion of the results and policy implications

The results are further discussed in four main strands, namely: alignment of the findings with theoretical underpinnings and the 'quiet life' hypothesis (QLH); comparative effects of ISOs; quasi-theoretical contributions and nexus with existing literature.

First, it is important to note that the signs of estimated coefficients are consistent with the theoretical underpinnings for the most part. Accordingly, ISOs are expected to stimulate development within the financial sector in order to enhance lending. Such development is boosted by (i) rendering credit markets contestable and (ii) reducing informational rents. The consistent positive (negative) effect of ISOs on formal (informal) financial development is in line with theory. The expected signs are traceable to the fact that, in addition to sharing information, ISOs also play the role of a disciplining device by discouraging borrowers from resorting to the informal financial sector as a viable alternative to the formal financial sector. It is important to note that the positive correlation between ISO and formal financial development is not a sufficient condition for financial allocation efficiency because formal financial development may also be the result of increasing financial system deposits or liquid liabilities. As a policy implication, it is important to consolidate the positive link between formal financial development and ISOs with appropriate mechanisms by which financial access and financial intermediary efficiency can be improved. These complementary measures are needed to mitigate the substantially documented excess liquidity concerns in African financial institutions (Saxegaard, 2006; Fouda, 2009).

From the alignment of the findings with theoretical underpinnings, we may indirectly argue for conditions for the non-acceptance of the QLH[10]. The articulation of 'conditions for non-acceptance' is consistent with the narrative of the previous paragraph, notably that this inquiry is not positioned on directly investigating the QLH. At least for now, we can firmly establish that the introduction of ISOs in Africa as a means of addressing a significant challenge to doing business on the continent is having promising and encouraging effects because of positive benefits towards formal financial development. It is important to note that the African business literature is consistent with the view that the lack of internal sources of finance is a major constraint in doing business on the continent (see Darley, 2012; Kolstad & Wiig, 2011; Tuomi, 2011; Bartels et al., 2009).

[10] The QLH has been defined and discussed in the introduction.

Second, on the comparative dimension of the findings, it is important to note that the effect of PCRs is not significant in reducing informal financial development. This is not the case with PCBs which consistently display the expected signs across panels and distributions of dependent variables. The importance of PCBs may be traceable to its six distinctive features. The comprise purpose, coverage, status, ownership, data sources used and terms of access. (1) While PCRs consist of public institutions that are created with the fundamental role of supervising the banking sector, PCBs arise because of demand for, and need of market information by borrowers. (2) Whereas the coverage of PCRs is substantially provided by large enterprises and restricted with regards to the nature of data, PCBs go beyond big enterprises to include data from small and medium enterprises (SMEs) that is rich with longer histories. (3) PCRs are not for profit whereas PCBs are essentially profit-making. (4) PCRs belong to central banks and governments while the propriety of PCBs include lending associations and other independent parties. (5) While information employed by PCRs is obtained from both non-bank and bank activities, that employed by PCBs includes sources of PCRs, tax authorities and courts. (6) PCBs (PCRs) access is open to all lender types (limited to information providers). It is apparent from the above clarifications that the superiority of PCBs have in reducing informal financial development may be linked to, *inter alia,* performance incentives and sources of data.

Third, the quasi-theoretical contribution of the study to the existing literature is apparent from the effect of PCRs in informal financial development compared to the corresponding impact on financial informalization. Whereas PCRs decrease financial informalization, it has no effect on informal financial development. A direct implication is that PCRs have some influence in reducing the money supply share of the informal financial sector, but have no significant influence in negatively affecting the GDP share of the informal financial sector. As an implication, non-monetary informal factors in the economic sector are not influenced by PCRs. The inference articulates the theoretical contribution of hitherto unexplored financial sector development indicators which this study has employed. It also substantiates the relevance of using unfamiliar indicators by this study to unite two streams of research[11].

Fourth, we compare the findings with the engaged literature in Section 2 (1) The findings are in line with those of Singh et al. (2009) who reported that African countries with ISOs have

[11] For brevity and the purpose of avoiding repetition, we invite the interested reader to consult the introductory and concluding sections for insights into how this contribution unites these two streams of development research.

high levels of formal financial development. Our findings also accord with Galindo and Miller (2001) from the insight that nations with comparatively enhanced ISOs are associated with fewer restrictions in financial access or more formal financial development. (2) While the findings do not confirm the results of Asongu et al (2016b) who found that the positive ISO-finance nexus is exclusively apparent when financial development is measured with financial size (deposit bank assets on total assets), they align with Asongu et al. (2016a) in financial development dynamics of depth, efficiency, activity and size. (3) Love and Mylenko (2003) reported that PCBs are linked to lower constraints in access to finance whereas PCRs do not exert any significant effect. While our findings confirm the superiority of PCBs in reducing informal financial development, the role of PCRs is not confirmed because they increase formal financial development and financial development formalization. Moreover, PCRs also decrease financial informalization and there is a higher positive magnitude from PCRs in formal financial development. (4) The comparative narrative of the findings with respect to the results of Love and Mylenko (2003) also applies to the findings Triki and Gajigo (2014) who have concluded that access to finance is on average terms higher in countries with PCBs, relative to those with PCRs or no ISOs.

5. Conclusion and future research directions

The purpose of this study has been to examine the role of reducing information asymmetry (IA) on conditional financial sector development in 53 African countries for the period 2004-2011. The empirical evidence is based on contemporary and non-contemporary quantile regressions. The policy relevance of this approach is founded on the assumption that blanket policies on the role of reducing IA on financial sector development may be ineffective unless they are based on existing levels of financial sector development and tailored differently across countries with differing initial levels of financial sector development. Instruments of reducing IA include credit registries (PCRs) and private credit bureaus (PCBs). Hitherto unexplored dimensions of financial sector development are engaged, namely: financial sector dynamics of formalization, informalization, semi-formalization and non-formalization.

The following findings are established. *First*, with the exception of PCBs in the 90^{th} decile for which the effect is negative, information sharing offices (ISOs) consistently increase formal financial development, with the incidence of PCRs higher in terms of magnitude. *Second*, ISOs consistently increase financial sector formalization, with the impact of PCBs higher for the

most part. *Third*, only PCBs significantly decrease informal financial development and both ISOs decrease financial sector informalization. Policy implications have been discussed.

The introduction of the notion of financialization unites two strands of research by (i) responding to a growing field of economic development on microfinance and informal finance and (ii) contributing to the stream of studies on the measurement of financial development. In addition, the paper suggests a pragmatic means of disentangling the effect of decreasing information asymmetry on various components of the financial sector. Thus, the study engages hitherto unexplored financial sector concepts, namely: formalization, semi-formalization, informalization and non-formalization. Policy implications have been discussed.

There is evidently room for complementing these findings by investigating information and communication technology (ICT) mechanisms by which the established linkages can be enhanced or weakened. This recommendation for future research is based on the intuition that the quality of information sharing mechanisms is relevant for the effectiveness of ISOs in their role of reducing IA. Moreover the positive connection between ISOs and formal financial development is not a sufficient condition for financial allocation efficiency because formal financial development may be the result of increasing financial system deposits or liquid liabilities. Clarifying this concern is also an interesting future research direction.

Appendices

Appendix 1: Summary Statistics (2004-2011)

	Variables	Mean	S.D	Min.	Max.	Obs.
Financial Sector Development	Formal Financial Development (Prop.1)	28.037	20.970	2.926	92.325	377
	Semi-formal Financial Development (Prop. 2)	0.199	0.715	0.000	4.478	424
	Informal Financial Development (Prop. 3)	5.350	5.106	-18.89	25.674	424
	Non-formal Financial Development (Prop. 4)	5.550	5.171	-18.89	25.674	424
	Financial Formalization (Prop. 5)	0.773	0.168	0.235	1.469	377
	Financial Semi-formalization (Prop. 6)	0.007	0.029	0.000	0.244	377
	Financial Informalization (Prop. 7)	0.219	0.168	-0.469	0.764	377
	Financia Non-formalization (Prop. 8)	0.226	0.168	-0.469	0.764	377
Information Asymmetry	Public Credit registries (PCR)	2.155	5.812	0.000	49.8	381
	Private Credit Bureaus (PCB)	4.223	13.734	0.000	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.. GDPg: GDP growth. Obs: Observations.

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Appendix 2: Correlation Analysis (Uniform sample size : 293)

Financial Sector Development								Info. Asymmetry		Control Variables					
Prop.1	Prop.2	Prop.3	Prop.4	Prop.5	Prop.6	Prop.7	Prop.8	PCR	PCB	GDPg	Inflation	PubIvt	NODA	Trade	
1.000	0.110	0.127	0.142	0.565	-0.052	-0.556	-0.565	0.411	0.310	-0.094	-0.071	0.058	-0.311	0.141	Prop.1
	1.000	-0.013	0.130	-0.031	0.872	-0.128	0.031	-0.023	-0.100	-0.060	0.260	-0.040	0.007	-0.086	Prop.2
		1.000	0.989	-0.604	-0.068	0.617	0.604	0.127	-0.569	-0.083	-0.082	-0.054	0.033	-0.006	Prop.3
			1.000	-0.604	0.057	0.593	0.604	0.123	-0.579	-0.091	-0.044	-0.059	0.034	-0.018	Prop.4
				1.000	-0.092	-0.983	-1.000	0.094	0.613	-0.004	0.008	0.128	-0.246	0.119	Prop.5
					1.000	-0.091	0.092	-0.059	-0.084	-0.077	0.289	-0.012	0.123	-0.074	Prop.6
						1.000	0.983	-0.083	-0.598	0.018	-0.061	-0.125	0.224	-0.105	Prop.7
							1.000	-0.094	-0.613	0.004	-0.008	-0.128	0.246	-0.119	Prop.8
								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

Info: Information. Prop.1: Formal Financial Sector Development. Prop.2: Semi-Formal Financial Sector Development. Prop.3: Informal Financial Sector Development. Prop. 4: Non-Formal Financial Development. Prop.5: Financial Sector Formalization. Prop.6: Financial Sector Semi-Formalization. Prop.7: Financial Sector Informalization. Prop.8: Financial Sector Non-Formalization. PCR: Public Credit Registries. PCB: Private Credit Bureaus. GDPg: GDP growth. Popg: Population growth. PubIvt: Public Investment. NODA: Net Official Development Assistance. I

Appendix 3: Definitions of variables

Variables	Signs	Definitions of Variables	Sources
Formal Financial Development	Prop.1	Bank deposits/GDP. Bank deposits here refer to demand, time and saving deposits in deposit money banks (Lines 24 and 25 of International Financial Statistics (IFS); October 2008).	
Semi-formal financial development	Prop.3	(Financial deposits – Bank deposits)/ GDP. Financial deposits are demand, time and saving deposits in deposit money banks and other financial institutions. (Lines 24, 25 and 45 of IFS, October, 2008).	
Informal financial development	Prop.3	(Money Supply – Financial deposits)/GDP	Asongu (2014a, 2015ab)
Informal and semi-formal financial development	Prop.4	(Money Supply – Bank deposits)/GDP	
Financial intermediary formalization	Prop.5	Bank deposits/ Money Supply (M2). From 'informal and semi-formal' to *formal* financial development (formalization)	
Financial intermediary 'semi-formalization'	Prop.6	(Financial deposits - Bank deposits)/ Money Supply. From 'informal and formal' to *semi-formal* financial development (Semi-formalization)	
Financial intermediary 'informalization'	Prop.7	(Money Supply – Financial deposits)/ Money Supply. From 'formal and semi-formal' to *informal* financial development (Informalisation).	
Financial intermediary 'semi-formalization and informalization'	Prop.8	(Money Supply – Bank Deposits)/Money Supply. Formal to '*informal and semi-formal'* financial development: (Semi-formalization and informalization).	
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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