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Information Asymmetry and Insurance in Africa

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Simplice A. Asongu
Department of Economics, University of South Africa,
Pretoria, South Africa.
E-mail: asongusimplice@yahoo.com

Nicholas M. Odhiambo
Department of Economics, University of South Africa,
Pretoria, South Africa.
E-mail: odhianm@unisa.ac.za

Research Department

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Simplice A. Asongu & Nicholas M. Odhiambo

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Abstract

In this study, we assess the relevance of decreasing information asymmetry on life and non-life insurance consumption, by using data from 48 African countries during the period 2004-2014. Reduced information asymmetry is proxied by information sharing offices, namely: public credit registries and private credit bureaus. The empirical evidence is based on the Generalised Method of Moments. The findings show that information sharing offices increase insurance consumption with a comparatively higher magnitude in life insurance penetration, relative to non-life insurance penetration. Practical and theoretical implications are discussed.

JEL Classification: I30; G20; G22; O16; O55
Keywords: Insurance; Information Asymmetry

1. Introduction

This study is motivated by two main factors, notably: (i) low insurance penetration in Africa and (ii) gaps in the information asymmetry and insurance literature. The points are substantiated in chronological order.

First, as recently documented by Kyerematen (2015), insurance penetration in Africa is low compared to other regions of the world. According to the author, with the exception of South Africa, approximately 5% of Africa has access to insurance services. Moreover, the discourse maintains that two main factors can elucidate the underlying feeble penetration, namely: demand- and supply-side considerations and structural characteristics. These factors entail information sharing offices (i.e. public credit registries and private credit bureaus) that have been established across the continent in order to reduce information asymmetry in the banking and insurance industry (Kusi *et al*., 2017; Kusi & Opoku-Mensah, 2018). Unfortunately, the extant literature on information asymmetry and insurance in Africa has failed to assess how the former has influenced the latter.

Second, the literature on insurance has largely been oriented along two main strands, namely: linkages between insurance penetration and development outcomes (Ioncică *et al*., 2012; Akinlo, 2015; Alhassan & Biekpe, 2015, 2016a) and drivers of insurance consumption (Zerriaa *et al*., 2017; Guerineau & Sawadogo, 2015; Alhassan & Biekpe, 2016b). This research extends the latter strand of the literature by assessing the relevance of information sharing in driving insurance. Accordingly, the extant literature on information asymmetry in Africa has fundamentally focused on credit risk (Kusi *et al*., 2017), cost of funding (Kusi & Opoku-Mensah, 2018), financial access (Triki & Gajigo, 2014; Muaza & Alagidede, 2017) and market power (Asongu *et al*., 2018; Boateng *et al*., 2018; Asongu & Odhiambo, 2019a).

In the light of the attendant Africa-centric literature, Kusi *et al*. (2017) establish that information sharing offices mitigate bank risk. As an extension of the findings, Kusi and Opoku-Mensah (2018) find that the credit registries also reduce funding costs. According to Triki and Gajigo (2014), information sharing offices enhance access to finance, with a greater positive response from private credit bureaus. Asongu *et al*. (2016) extend Triki and Gajigo (2014) to conclude that information sharing offices do not enhance financial access. Differences in the findings are traceable to periodicity and methodological differences. Muaza and Alagidede (2017) conclude that information sharing offices increase financial access and countries with English common law heritage benefit more from the institution of these information sharing mechanisms, compared to their counterparts with French civil law heritage. Motivated by previous findings that the absence of a positive link between

information sharing offices and credit access may be due to the abuse of market power or Quiet Life Hypothesis (QLH) by large financial institutions: (i)Asongu and Odhiambo (2019a) have tested the QLH in the African banking industry to confirm evidence of the hypothesis; (ii) Boateng *et al*. (2018) have established that information sharing offices do not significantly reduce market power and (iii) Asongu *et al*. (2018) have concluded that information technology reduces the unfavourable effect of market power on financial access.

In the light of the above, this study complements the extant literature by assessing the relationship between information sharing offices and insurance consumption. Hence, the research question this study aims to answer is the following: how does information asymmetry affect life and non-life insurance consumption in Africa?

The intuition for the linkage between information sharing offices and insurance is based on the fact that the sharing of information by information sharing offices can reduce information asymmetry associated with insurance premiums. For instance, the premium on a life insurance subscription can decrease if the associated adverse selection is reduced when the financial institution has more information on the credit history of the client making the insurance subscription. Hence, it follows that information asymmetry (sharing) related to a specific insurance subscription is positively (negatively) associated with the insurance premium. The intuition on the nexus between information asymmetry and insurance premiums is consistent with the theoretical and empirical underpinnings motivating the information asymmetry and financial access literature highlighted above and critically engaged in Section 2.

The positioning of the study is also motivated by the need to extend a recent stream of research in international business and finance, focusing on *inter alia*: the effectiveness of credit reporting systems on loan delinquency in banking systems (Ghosh, 2019); the relevance of dependence modelling of risks associated with non-life insurance on capital requirements (Mejdoub & Arab, 2018); nexuses between information and communication technology, information sharing and market power (Asongu & Biekpe, 2018); linkages between insurance, shadow banking and financial sector stability (Diallo & Al-Mansour, 2017) and connections between foreign direct investment firms, information asymmetry and accounting quality (Wang, 2017).

The rest of the study is organised as follows. Section 2 discusses information asymmetry, credit market and insurance. The data and methodology are covered in Section 3 while Section 4 presents the empirical results. Section 5 concludes with implications and future research directions.

2. Information asymmetry, credit markets and insurance

2.1 Information asymmetry

Different measures of information asymmetry exist in the literature. Dierkens (1991) employed four proxies to measure the level of information asymmetry between the market and firm managers, within the framework of equity markets. Dai *et al*. (2013), Tchamyou and Asongu (2017a) and Tchamyou *et al*. (2018) have built on Dierkens (1991) to measure information asymmetry as the standard deviation of idiosyncratic risks of returns in the mutual fund industry.

Some authors have substantially relied on index construction. This is the case in financial markets where price formation can be affected by traders who are better informed (Bharath *et al*., 2009, p. 3215). Accordingly, given that it is intuitive to predict that market players (i.e. analysts, suppliers, traders and employees) who are closer to a firm's business would make more informed market decisions, market microstructure analysts have estimated information asymmetry about a specific corporation from observable market data, *inter alia*: bid-ask spreads, trades, quotes and transaction prices.

Information asymmetry can also be seen in the light of "ownership" because it is an important mechanism through which information sharing can be appreciated (Ivashina, 2009, p. 300). Hence, for a given project, a party's share of ownership informs other parties about how much information the underlying party has on the project under consideration, *ceteris paribus*. Participation in a syndicated bank loan is an example of this type of information asymmetry. In accordance with theoretical estimates, the share of the lead bank (in relation to participating banks) in the collective loan is indicative of how much information the lead bank has on the borrower's solvency and hence, information asymmetry in a loan is observable from the perspective of a loan spread (Tanjung *et al*., 2010, p. 2). In summary, if the share of the lead bank is low, it is associated with adverse selection ex-ante of syndication and moral hazard ex-post of syndication. These dynamics of information asymmetry build on the fact that, as an agent in the lending syndication, the lead bank collects and processes borrower information.

The measurement of information asymmetry that best fits the context of the present study is the use of information sharing offices (ISO) in the perspective of public credit registries and private credit bureaus. While the previous three sets of measurements are more consistent with microeconomic or financial market data, public credit registries and private credit bureaus are more in line with macroeconomic indicators from the World Bank.

Moreover, our choice of this information sharing mechanism is in accordance with recent information asymmetry literature (Asongu *et al*., 2019; Mauza & Alagidede, 2017; Tchamyou & Asongu, 2017b).

2.2 Information sharing and banking/insurance market

Over the past decades, credit market failures have been considerably associated with information asymmetry in the banking industry (Besanko & Thakor, 1987; Stiglitz & Weiss, 1981; Claus & Grimes, 2003; Dell'Ariccia & Marquez, 2006; Boateng *et al*., 2018; Asongu & Odhiambo, 2019b). The empirical literature is also broadly consistent on the position that such information asymmetry between lenders and borrowers can be alleviated through the establishment of information sharing offices that readily and timeously collect and exchange information on borrowers' characteristics in order to reduce adverse selection experienced by banks on the one hand and moral hazard from borrowers on the other (Brown *et al*., 2009; Djankov *et al*., 2007; Boateng *et al*., 2018). The studies broadly support the perspective that ISO enhances credit expansion as well as constitutes a relevant determinant of profitability and competition in the banking and insurance industry (Pagano & Jappelli, 1993; Padilla & Pagano, 2000; Brown & Zehnder, 2010; Karapetyan & Stacescu, 2014a, 2014b). However, there is another strand of the literature which posits that ISO may not engender the postulated theoretical appeals. We substantiate the contending strands in chronological order.

In the first strand, it has been argued and substantiated that the sharing of information mitigates moral hazard, reduces adverse selection, increases discipline on the part of borrowers and promotes competition within the banking and insurance sector. The perspective has been maintained by a number of scholars who argue that ISO eliminates barriers to information across banks/insurers, therefore, enabling banks/insurers to increase lending to borrowers and reduce default rates from borrowers (Padilla & Pagano, 1997, 2000; Jappelli & Pagano, 2002, 2006; Bennardo *et al*., 2015). The fact that the repayment ability of borrowers is increased with the help of ISO has been substantiated by Karapetyan and Stacescu (2014a) and Klein (1992). According to the narrative, borrowers are encouraged to repay their debts upon the threats of outright exclusion or higher interest rates in future borrowing operations.

In the second strand, whereas there is a broad consensus on the beneficial impact of ISO, there is a contrasting position in the literature which maintains that there is also a negative side to the sharing of information. The perspective that when information is shared, some advantages are lost by incumbent banks in relation to their competitors is maintained by

Karapetyan and Stacescu (2014a) who support the argument that, when these advantages are lost, financial institutions can still fight to acquire information of a different nature in order to gain some competitive advantage from more strategic information that is not shared with information sharing offices. Some authors also posit that in spite of purported advantages from information sharing, such as a reduction in the probability of default on the part of borrowers, access to credit by riskier borrowers can also increase (Jappelli & Pagano, 2006; Brown *et al*., 2009). According to Brown *et al*. (2009) and Jappelli and Pagano (2006), the pool of borrowers can be disproportionately altered by a higher entrance of riskier borrowers, hence, resulting in aggregately higher levels of default. Dell'Ariccia and Marquez (2006) establish that the sharing of information on credit contributes to banking crises. Scholars in this strand are consistent on the view that the introduction of information sharing offices can also substantially reduce the willingness of banks and insurers to collect and share information on borrowers' characteristics.

The underlying borrowers' characteristics can be used to determine insurance premiums for both life insurance (e.g. permanent and term life policies) and non-life insurance. Examples of non-life insurance include: auto insurance, property insurance, health insurance, accident insurance, travel insurance, disaster insurance, credit insurance and mortgage insurance. Accordingly, borrowers' history of credit worthiness and payment characteristics collected and shared by information sharing offices can determine the amount of insurance premium requested by an insurance firm in relation to cars, property, health, accidents, travel, disasters, credit and mortgage. From logic and intuition, if a borrower has a poor credit and repayment history, the insurer is likely to increase the attendant insurance premium in order to hedge against the potential risk of irresponsible behaviour.

2.3 Insurance in Africa

As highlighted in the introduction, the sparse literature on insurance in Africa has focused on two main strands, notably: drivers of life insurance subscriptions (Guerineau & Sawadogo, 2015; Zerriaa *et al*., 2017; Alhassan & Biekpe, 2016b) and nexuses between insurance subscription and macroeconomic outcomes (Ioncică *et al*., 2012; Akinlo, 2015; Alhassan & Biekpe, 2015, 2016a). The two dimensions are expanded in the paragraphs that follow.

With regard to the first strand on drivers of insurance, Guerineau and Sawadogo (2015) have examined the determinants of life insurance in sub-Saharan Africa (SSA), focusing on a sample of 20 countries during the period 1996-2011. The authors control for

potential concerns of endogeneity by means of an instrumental variable approach to conclude on a positive nexus between life insurance premiums and income per capita. According to the authors, life insurance represents a luxury commodity in the sub-region. Furthermore, the development of life insurance is negatively associated with life expectancy and young dependency ratios while the old dependency ratios, property rights protection and government stability engender positive outcomes.

The determinants of demand for life insurance have been examined by Zerriaa*et al*. (2017) within the framework of Tunisia with data of annual periodicity for the period 1990-2014. From the findings, it is apparent that pension expenditures decrease the demand for life insurance, interest and inflation rates have opposite incidences whereas the following factors have the opposite impact: income, financial development, dependency, urbanization and life expectancy. Alhassan and Biekpe (2016b) have investigated factors that influence life insurance using a sample of 31 countries in Africa over the period 1996-2010. From the findings of the authors, demographic factors have a higher explanatory power on life insurance, when compared with financial drivers. Moreover, the study shows that the consumption of life insurance is reduced by inflation, life expectancy and dependency whereas the following factors engender a positive influence, namely: health expenditure, insurance consumption, financial development and the quality of institutions.

In the second strand pertaining to nexuses between insurance consumption and economic development, Alhassan and Biekpe (2015) have examined the relationships between productivity, efficiency and economies of scale in the non-life insurance market in South Africa for the period 2007-2012. By employing data envelopment analysis, bootstrapped and logistic estimations, the findings reveal that about one-fifth of insurers carry out their operations optimally while non-life insurers are characterized by an inefficiency of approximately 50%. The results show that ameliorations in productivity are determined by technological changes as well as evidence of a non-linear effect of size on efficiency and constant returns to scale. Moreover, the results also reveal that product line diversification, reinsurance and leverage have significant relationships with efficiency and constant returns to scale.

Akinlo (2015) examined the causal nexus between economic growth and insurance in a sample of 30 SSA countries by employing a panel heterogeneous causality estimation approach for the period 1995-2011. The research results show bidirectional causality between economic prosperity and insurance. Moreover, the main characteristic of the causality is that it is homogenous across sampled countries. In another study, Alhassan and Biekpe (2016a)

investigate the linkage between insurance development and economic growth in eight countries in Africa over the period 1990-2010. The sampled countries are: Algeria, Gabon, Kenya, Madagascar, Mauritius, Morocco, Nigeria and South Africa. The empirical evidence is based on an autoregressive distributed lag (ARDL) approach. From the results, there a long-run relationship between the insurance market and economic growth in Kenya, Mauritius, Morocco, Nigeria and South Africa. According to findings, from the vector error correction model (VECM) framework, bidirectional causality is apparent in Morocco while a unidirectional causality is established for Algeria and Madagascar. Furthermore, mixed causality is evident in Gabon.

3. Data and methodology

3.1. Data

This research focuses on a panel of 48 countries in Africa for the period 2004-2014[1]. The geographical and temporal scopes are limited by data availability constraints. The data are from three main sources of the World Bank, namely, the: Financial Development and Structure Database (FDSD); World Bank Development Indicators (WDI) and World Bank Governance Indicators (WGI) (World Bank, 2018a, 2018b, 2018c).

Consistent with the engaged literature on information asymmetry, information sharing (or reducing information asymmetry) is measured with public credit registries and private credit bureaus (Muazu & Alagidede, 2017; Asongu & Nwachukwu, 2018; Boateng *et al.*, 2018), while the insurance variables employed are the only two indicators provided by the FDSD, notably: life insurance and non-life insurance premiums.

In the light of the discussed insurance literature in Section 2, two main control variables are adopted for the study, namely: remittances and political stability. The choice of these control variables is informed by contemporary insurance penetration literature in Africa, notably: Asongu and Odhiambo (2020a) have recently established that remittances and political stability are favorable determinants of insurance penetration in Africa. Only two control variables are selected because from a preliminary assessment, engaging more than two control variables influences the estimations unfavorably owing to instrument proliferation (even when instruments are collapsed in the process). Accordingly, the corresponding over-

[1]The 48 countries include: Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Congo Democratic Republic, Congo Republic, Côte d'Ivoire, Djibouti, Egypt, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome & Principe, Senegal, Seychelles, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda and Zambia.

identification leads to estimations failing to pass post-estimation diagnostics tests. The adopted variables in the conditioning information set are anticipated to have positive effects on the demand for insurance consumption. On the one hand, remittances should positively affect insurance subscriptions because they are mostly sent to the wealthy income strata of countries in Africa (Anyanwu, 2011; Meniago & Asongu, 2018). These wealthier segments of the population are then more likely to take insurance premiums owing to the established positive nexus between income levels and insurance consumption in the continent (Guerineau & Sawadogo, 2015; Zerriaa *et al*., 2017). On the other hand, political stability provides enabling conditions for macroeconomic outcomes, including the development of the insurance industry.

Appendix 1 provides the definitions and sources of the variables while Appendix 2 discloses the summary statistics. Appendix 3 provides the correlation matrix. From the summary statistics, it can be observed from mean values that the variables are comparable. Moreover, the corresponding standard deviations displayed are an indication that reasonable linkages can emerge from the estimations. The purpose of the correlation matrix is to avoid issues of multicollinearity which can bias estimated coefficients due to high degrees of substitution between variables in the conditioning information set.

3.2 Methodology

3.2.1 Specification

In accordance with recent empirical literature employing the GMM estimation approach (Tchamyou, 2019a, 2019b, 2020), at least four main factors motivate the selection of the estimation strategy. The factors are discussed as follows in no order of importance. First, there are forty-eight countries and eleven years for each country. Hence, the N>T condition relevant for the adoption of the GMM technique is in line with the data behaviour because 48>11(i.e. 2004 to 2014). Second, the indicators of insurance are persistent because the correlations between the indicators with their first lags are higher than the threshold of 0.800 which is needed for the establishment of persistence (Tchamyou *et al*., 2019a, 2019b). Accordingly: (i) the correlation between life insurance and its first lag is 0.992 whereas (ii) the correlation between non-life insurance and its first lag is 0.975.Third, given that the adopted estimation approach is consistent with a panel data structure cross-country differences are taken into account during the regressions. Fourth, the research takes account of endogeneity by controlling for simultaneity in the explanatory variables by means of a process

of instrumentation. Moreover, the use of time-invariant omitted variables also accounts for the unobserved heterogeneity dimension of endogeneity.

In accordance with the empirical literature on the benefits of limiting instrument proliferation (Arellano & Bover, 1995; Blundell & Bond, 1998; Bond *et al*., 2001; Tchamyou & Asongu, 2017b; Boateng *et al*., 2018), restricting over-identification and controlling for cross-sectional dependence, the Roodman (2009a, 2009b) extension of Arellano and Bover (1995) is adopted in this study. A *two-step* approach is adopted instead of a *one-step* procedure because it accounts for heterogeneity. It is relevant to note that the *one-step* procedure is consistent with homoscedasticity.

The following equations in level (1) and first difference (2) summarise the standard *system* GMM estimation procedure.

$$I_{i,t} = \sigma_0 + \sigma_1 I_{i,t-\tau} + \sigma_2 AS_{i,t} + \sigma_3 ASAS_{i,t} + \sum_{h=1}^{2} \delta_h W_{h,i,t-\tau} + \eta_i + \xi_t + \varepsilon_{i,t} \qquad (1)$$

$$\begin{aligned} I_{i,t} - I_{i,t-\tau} = {} & \sigma_1 (I_{i,t-\tau} - I_{i,t-2\tau}) + \sigma_2 (AS_{i,t} - AS_{i,t-\tau}) + \sigma_3 (ASAS_{i,t} - ASAS_{i,t-\tau}) \\ & + \sum_{h=1}^{2} \delta_h (W_{h,i,t-\tau} - W_{h,i,t-2\tau}) + (\xi_t - \xi_{t-\tau}) + (\varepsilon_{i,t} - \varepsilon_{i,t-\tau}) \end{aligned} \qquad (2)$$

where, $I_{i,t}$ is either life insurance or non-life insurance subscriptions in country *i* in period *t*, σ_0 is a constant, AS represents an information sharing office (a public credit registry or a private credit bureau), $ASAS$ denote quadratic interactions between information sharing offices ("public credit registries × public credit registries" or "private credit bureaus × private credit bureaus"), W is the vector of control variables (remittances and political stability), τ represents the coefficient of auto-regression which is one within the framework of this study because a year lag is enough to capture past information, ξ_t is the time-specific constant, η_i is the country-specific effect and $\varepsilon_{i,t}$ is the error term.

3.2.2Identification and exclusion restrictions

It is relevant to articulate identification and exclusion restrictions which are relevant in a sound GMM estimation. In accordance with the corresponding literature, all explanatory variables are acknowledged as predetermined or suspected endogenous whereas only years are considered to be strictly exogenous (Asongu & Nwachukwu, 2016a; Tchamyou, 2019b; Boateng *et al*., 2018). This analytical strategy is in accordance with insights into identification

documented by Roodman (2009b), who has argued that it is not feasible for time invariant variables to be endogenous after a first difference[2].

Given the above, the time indicators affect the insurance variables exclusively via the predetermined indicators. Moreover, the statistical validity of the exclusion restriction is investigated with the Difference in Hansen Test (DHT) which is employed to assess the importance of the exclusion restrictions assumption. In essence, in order for this exclusion assumption to be valid, the alternative hypothesis of the DHT should be rejected. Therefore, in the findings that are disclosed in Section 4, the assumption of exclusion restriction is valid if the null hypothesis of the DHT related to instrumental variables (IV) (year, eq(diff)) is not rejected[3]. The identification procedure and mode of validating the assumptions underlying the exclusion restrictions is in accordance with the standard instrumental variable procedure. In this standard procedure, the rejection of the null hypothesis of the Sargan Overidentifying Restrictions (OIR) test is an indication that the strictly exogenous variables affect insurance indicators exclusively through the suggested endogenous channels (Beck *et al*., 2003; Asongu & Nwachukwu, 2016b).

4. Empirical results

This section presents the empirical findings. While Table 1 focuses on non-quadratic specifications, Table 2 is concerned with quadratic specifications. Accordingly, the former table articulates the direct effect of information sharing offices on insurance consumption whereas the latter is concerned with how enhancing information sharing offices affect insurance subscriptions. For all tables, four information criteria are employed to assess the validity of the GMM model with forward orthogonal deviations[4]. Based on the information criteria, the models are overwhelmingly valid with a few exceptions, notably: (i) the presence of auto-correlation in the second specification of life insurance in Table 1 and the last specification of life insurance in Table 2 and (ii) the instruments are not valid in the second column or first specification of Table 2.

[2] Hence, the procedure for treating *ivstyle* (years) is 'iv (years, eq(diff))' whereas the *gmmstyle* is employed for predetermined variables.

[3] "eq(diff)" stands for equation in difference.

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

The following findings can be established from Table 1. Both information sharing offices positively affect insurance consumption. The significant control variables have the expected positive signs. In Table 2, net effects on insurance subscriptions cannot be feasibly computed because at least one estimated coefficient needed for their computation is not significant. Accordingly, in a quadratic specification, net effects should be computed as the sum of the unconditional effect and the marginal effect (Asongu, 2018). The significant control variables also have the expected signs.

Table 1: Information Sharing and Insurance

	Dependent variable: Insurance					
	Life Insurance			**Non Life Insurance**		
Constant	0.036	0.001	**0.063***	**0.099****	**0.098****	**0.092****
	(0.533)	(0.965)	**(0.088)**	**(0.035)**	**(0.022)**	**(0.012)**
Life Insurance (-1)	**0.892*****	**0.869*****	**0.847*****	---	---	---
	(0.000)	**(0.000)**	**(0.000)**			
Non Life Insurance (-1)	---	---	---	**0.889*****	**0.861*****	**0.871*****
				(0.000)	**(0.000)**	**(0.000)**
Public Credit Registries	**0.005*****	---	**0.009*****	0.0005	---	**0.001****
	(0.000)		**(0.000)**	(0.387)		**(0.045)**
Private Credit Bureaus	---	**0.007*****	**0.008*****	---	**0.001***	**0.001***
		(0.000)	**(0.000)**		**(0.081)**	**(0.051)**
Political Stability	**0.068***	**0.031***	**0.061*****	**0.055****	**0.052****	**0.056*****
	(0.081)	**(0.061)**	**(0.007)**	**(0.015)**	**(0.010)**	**(0.002)**
Remittances	0.002	**0.007*****	0.002	**0.005*****	**0.007*****	**0.006*****
	(0.171)	**(0.000)**	(0.246)	**(0.000)**	**(0.001)**	**(0.000)**
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes
AR(1)	**(0.159)**	**(0.168)**	**(0.172)**	(0.000)	(0.000)	(0.001)
AR(2)	**(0.491)**	**(0.477)**	**(0.481)**	**(0.108)**	(0.092)	**(0.104)**
Sargan OIR	(0.002)	(0.001)	(0.000)	**(0.103)**	(0.000)	(0.000)
Hansen OIR	**(0.632)**	**(0.556)**	**(0.512)**	**(0.399)**	**(0.606)**	**(0.394)**
DHT for instruments						
(a)Instruments in levels						
H excluding group	**(0.858)**	**(0.803)**	**(0.822)**	**(0.295)**	**(0.228)**	**(0.341)**
Dif(null, H=exogenous)	**(0.409)**	**(0.355)**	**(0.299)**	**(0.452)**	**(0.791)**	**(0.418)**
(b) IV (years, eq(diff))						
H excluding group	**(0.864)**	**(0.164)**	**(0.353)**	**(0.523)**	**(0.950)**	**(0.469)**
Dif(null, H=exogenous)	**(0.541)**	**(0.657)**	**(0.557)**	**(0.344)**	**(0.511)**	**(0.338)**
Fisher	**1843.58*****	**2019.84*****	**3111.05*****	**591.94*****	**133.29*****	**650.59*****
Instruments	24	24	28	24	24	28
Countries	40	40	40	41	41	41
Observations	315	315	315	335	335	335

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

Table 2: Enhancing Information Sharing and Insurance

	Life Insurance		Non Life Insurance	
Constant	**0.168*** **	**0.054* **	**0.120** **	**0.117*** **
	(0.000)	**(0.067)**	**(0.014)**	**(0.001)**
Life Insurance (-1)	**0.893*** **	**0.908*** **	---	---
	(0.000)	**(0.000)**		
Non Life Insurance (-1)	---	---	**0.870*** **	**0.844*** **
			(0.000)	**(0.000)**
Public Credit Registries (PCR)	-0.001	---	0.001	---
	(0.382)		(0.435)	
Private Credit Bureaus (PCB)	---	0.0005	---	**0.003* **
		(0.676)		**(0.064)**
PCR×PCR	**0.0001*** **	---	-0.000	---
	(0.000)		(0.713)	
PCB×PCB	---	**0.00009*** **	---	-0.00004
		(0.001)		(0.143)
Political Stability	**0.108*** **	**0.038* **	**0.051** **	**0.040** **
	(0.000)	**(0.054)**	**(0.015)**	**(0.019)**
Remittances	**0.005*** **	**0.004*** **	**0.005*** **	**0.008*** **
	(0.002)	**(0.007)**	**(0.000)**	**(0.000)**
Time Effects	Yes	Yes	Yes	Yes
Net Effects	nsa	na	na	nsa
AR(1)	**(0.163)**	**(0.170)**	(0.001)	(0.001)
AR(2)	**(0.520)**	**(0.495)**	**(0.116)**	(0.094)
Sargan OIR	(0.001)	(0.001)	**(0.192)**	(0.003)
Hansen OIR	(0.014)	**(0.168)**	**(0.471)**	**(0.683)**
DHT for instruments				
(a)Instruments in levels				
H excluding group	**(0.698)**	**(0.502)**	**(0.370)**	**(0.234)**
Dif(null, H=exogenous)	(0.004)	**(0.109)**	**(0.491)**	**(0.870)**
(b) IV (years, eq(diff))				
H excluding group	**(0.271)**	**(0.297)**	**(0.329)**	**(0.774)**
Dif(null, H=exogenous)	**(0.011)**	**(0.171)**	**(0.525)**	**(0.500)**
Fisher	**9453.86*** **	**61540.85*** **	**5628.95*** **	**2363.74*** **
Instruments	28	28	28	28
Countries	40	40	41	41
Observations	315	315	315	315

***,**,*: significance levels at 1%, 5% and 10% respectively. DHT: Difference in Hansen Test for Exogeneity of Instruments Subsets. Dif: Difference. OIR: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients and the Fisher statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the AR(1) & AR(2) tests and; b) the validity of the instruments in the Sargan and Hansen OIR tests. na: not applicable because at least one of the estimated coefficients needed for the computation is net effects is not significant. nsa: not specifically applicable because the estimated model does not pass post-estimation diagnostic tests.

The findings are broadly consistent with the literature on the favorable macroeconomic outcomes of information sharing offices, notably: the positive relevance of information sharing offices in, *inter alia*: enhancing financial access (Triki & Gajigo, 2014; Muaza & Alagidede, 2017), reducing market power (Asongu *et al*., 2018), mitigating funding cost (Kusi & Opoku-Mensah, 2018) and diminishing credit risks (Kusi *et al*., 2017).

The results seem to support the idea of enhancing information sharing to improve insurance consumption in the case of consumption of life insurance, but the idea is rejected in the case of non-life insurance (i.e. Table 2). Moreover, in terms of magnitude of significance, information sharing is more favourable for life insurance penetration than it is for non-life insurance penetration (i.e. Table 1). The difference can be explained by the fact that information sharing offices are largely used by the rich for life insurance purposes, while they are used less by the poor for non-life insurance purposes. This explanation is also traceable to established evidence that life insurance promotes income inequality when compared with non-life insurance in Africa (Asongu & Odhiambo, 2020b).

In the light of the above, the findings can be elicited with the notion of informal finance in accordance with the extant literature on the subject (Ligon et al., 2002; Dupas & Robinson, 2013; De Magalhaes & Santaeulalia 2018; De Magalhaes et al., 2019). In essence, clarifying a principal distinction between other insurance schemes (e.g. non-life insurance) and life insurance is worthwhile in understanding why information sharing offices are more likely to be used by the rich to increase life insurance compared to the poor. It has been established that life insurance for the most part, is useful as savings and is a mechanism by which the rich increase their assets (De Magalhaes & Santaeulalia 2018; Dupas & Robinson, 2013). The corresponding literature maintains that in the light of apparent saving constraints, life insurance can be a means of weakening saving constraints in order to increase wealth accumulation by the rich. The explanation is consistent with the perspective that the poor elements of society rely for the most part on non-life insurance schemes and hence, need to rely less on information sharing offices compared to the rich elements of society who use both life and non-life insurance services. Accordingly, the poor depend more on non-life insurance schemes because they help smoothen consumption through the life cycle (De Magalhaes et al., 2019). Moreover, this perspective on non-life insurance is worthwhile in clarifying the findings because informal insurance and savings characterise most of the sampled countries which are comparatively poor nations (Carroll, 1997; Ligon et al., 2002; Kaplan & Violante, 2010).

5. Concluding implications and future research directions

This study has assessed the role of decreasing information asymmetry in life and non-life insurance consumption in 48 African countries for the period 2004-2014. Reduced information asymmetry is proxied with information sharing offices, namely: public credit registries and private credit bureaus. The empirical evidence is based on the Generalised

Method of Moments. The findings show that information sharing offices increase insurance consumption with a comparatively higher magnitude in life insurance penetration, relative to non-life insurance penetration.

The main policy implication of this study is that information sharing offices should be promoted on the continent in order to enhance the consumption of life and non-life insurance commodities which are essential in reducing insecurity and risks. Accordingly, there are many benefits of insurance in economic development. Some include: savings, capital formation, encouragement of financial stability and decrease of anxiety, reduction of the government's burden and promotion of trade.

First, insurance services mobilise savings to support long term investments and economic growth. This is essentially because insurance companies also substantially provide coverage to business corporations as well as large factions of the population. Second, insurance companies improve capital formation in a country by augmenting the capital stock of a nation through channels of communication, transport facilities, equipment, and machinery, *inter alia*. Third, by insuring losses and risk of corporations, organizations and individuals, insurers contribute towards financial stability. Moreover, the associated stability and modulation of associated negative externalities relieve anxiety and tensions in the country. Fourth, insurers also reduce the financial burden on the government by providing a variety of services that enhance social security and hence, decrease the burden of the government in the provision of these services. Fifth, insurance companies promote commerce and trade by facilitating the role of banks in granting loans to economic operators involved in international trade.

Beyond the practical considerations above, the main theoretical contribution of this study is that by facilitating the connection between buyers and sellers of insurance premiums, insurance companies also act as financial intermediaries between lenders and borrowers by facilitating the services in the banking industry because financial transactions have an insurance dimension. Hence, insurance companies complement financial intermediary institutions by promoting the productive and efficient allocation of capital resources which ultimately improve economic productivity. This complementarity is by means of: (i) reducing transaction costs because insurers mobilize funds from policyholders and invest them in multiple projects across countries; (ii) creating liability since policyholders in the event of loss are guaranteed a certain compensation in liquidity and (iii) facilitating investment and scale economies because insurers enable the financing of large economic projects which are associated with economies of scale. In summary, the theoretical underpinnings motivating the

relevance of information sharing offices in facilitating financial intermediation efficiency can be extended to the relevance of information sharing offices in facilitating insurance services.

Future studies can focus on assessing the importance of information sharing offices in other macroeconomic outcomes. This is essentially because; these credit registries have only been recently instituted across the African continent. Hence, the literature on their relevance in macroeconomic outcomes is still relatively scanty, compared to other more advanced regions of the world where credit registries have been operational for decades. Moreover, future research can also be focused on assessing whether the established findings in this study merit empirical scrutiny in other developing regions of the world such as Latin America and Asia.

Appendices

Appendix 1: Definitions of Variables

Variables	Signs	Definitions of variables (Measurements)	Sources
Insurance	LifeIns	Life Insurance Premium Volume to GDP (%)	FDSD
	NonLifeIns	Non-life Insurance Premium Volume to GDP (%)	FDSD
Credit Registries	PCR	Public Credit Registries (% of adults)	WDI
Credit Bureaus	PCB	Private Credit Bureaus (% of adults)	WDI
Political Stability	PolS	"Political stability/no violence (estimate): measured as the perceptions of the likelihood that the government will be destabilised or overthrown by unconstitutional and violent means, including domestic violence and terrorism"	WGI
Remittances	Remit	Remittance inflows to GDP (%)	WDI

WDI: World Bank Development Indicators of the World Bank. FDSD: Financial Development and Structure Database of the World Bank. WGI: World Governance Indicators.

Appendix 2: Summary statistics (2004-2014)

	Mean	SD	Minimum	Maximum	Observations
Life Insurance	0.881	2.126	0.0006	12.220	346
Non Life Insurance	0.798	0.536	0.005	2.774	367
Public Credit Registries	2.750	8.268	0.000	71.900	518
Private Credit Bureaus	4.937	14.445	0.000	66.200	518
Political Stability	-0.471	0.905	-2.687	1.182	462
Remittances	4.313	6.817	0.00003	50.818	416

S.D: Standard Deviation.

Appendix 3:Correlation matrix

Information Sharing		Control variables		Insurance		
PCR	PCB	PolS	Remit	LifeIns	NonLifeIns	
1.000	-0.112	0.236	0.019	0.080	0.238	PCR
	1.000	0.306	-0.105	0.205	0.141	PCB
		1.000	0.040	0.221	0.333	PolS
			1.000	-0.012	0.161	Remit
				1.000	0.748	LifeIns
					1.000	NonLifeIns

PCR: Public Credit Registries. PCB : Private Credit Bureaus. PolS: Political Stability. Remit: Remittances. LifeIns: Life Insurance. NonLifeIns: Non Life Insurance.

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