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Information Asymmetry and Financial Dollarization in Sub-Saharan Africa

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Abstract

Financial dollarization in Sub-Saharan Africa is the most persistent compared to other regions of the world. This study complements the existing scant literature on dollarization in Africa by assessing the role of information sharing offices (public credit registries and private credit bureaus) on financial dollarization in 26 countries of SSA for the period 2001-2012. The empirical evidence is based on Ordinary Least Squares (OLS) and Generalised Method of Moments (GMM). The findings show that information sharing offices (which are designed to reduce information asymmetry) in the banking industry are a deterrent to dollarization. Policy implications are discussed.

JEL Classification: E31; E41; G20; O16;O55
Keywords: Dollarization; Openness; Information Asymmetry; Africa

1. Introduction

The motivation for investigating the effect of reducing information asymmetry on financial dollarization in Sub-Saharan Africa (SSA) is threefold, notably: dollarization as a policy syndrome; the uniqueness of SSA and gaps in the literature.

First, financial dollarization[1] is a policy syndrome for a multitude of reasons. In particular, dollarization can represent a substantial challenge to policy makers because it, *inter alia*: restricts liquidity management; constraints the capacity of monetary authorities to lend in last resort and drives financial sector instability because it could increase the effect of exchange rate variations on the balance sheet of financial institutions, thereby boosting the incidence of bank failures and economic contractions. Accordingly, the implementation of

[1]Dollarization is a characteristic of financial development under macroeconomic instability which entails the use of foreign currencies as a unit of account, store of value and medium of exchange.

economic policies can be complicated by dollarization through a multitude of mechanisms, namely: (i) the exposure of balance sheets (of households, the public sector and private corporations) to exchange rate risks in situations of mismatch in assets and liabilities that are denominated in foreign currency; (ii) reduction of the capacity of authorities to employ monetary policy, especially the central bank's ability to stabilize the financial system as a lender of last resort; (iii) slackening structural fiscal flexibility and fiscal balance by reducing opportunities of seigniorage and (iv) diminishing the capabilities of governments to issue debts in the domestic currency for the medium and long terms, which would further increase vulnerabilities to shocks and hence accelerate economic fluctuations (IMF, 2015). It is important to balance the above narrative with the position that dollarization is also appealing in specific circumstances. For instance, economies with chaotic inflation which permit deposits in foreign currency discourage residence from depositing abroad, there-by encouraging transactions through the domestic banking system.

Second, compared to other regions in the world, dollarization is most persistent in SSA[2]. In essence, dollarization is prominently in SSA where it represents over 30% of bank loans and deposits. Accordingly, the uniqueness of SSA draws from the fact that since independence the sub-region has experienced tumultuous development. The policy syndromes have included; political instability (which is hedged by macroeconomic players through dollarization); limited financial deepening (with overly reliance on the financial intermediary sector vis-à-vis stock markets which naturally invites more hedging) and low development of the private sector (which is reflected in low demand for local currency). It is important to note that such syndromes contributed to the poor post-independence growth of Africa. Fosu (2013) has defined 'policy syndromes' as characteristics that are detrimental to development, namely: 'state breakdown', 'administered redistribution', 'state controls' and 'suboptimal inter temporal resource allocation'. Owing to the above politico-economic shortcomings, many countries in SSA experienced short economic booms that were characterised by frequent reversals owing to external shock like adverse variations to terms of trade and political unrests/civil conflicts that hindered economic take-offs. Moreover, with limited monetization, a small private export sector, appropriate restrictions to foreign exchange and substantial informal economic sectors, foreign exchanges took hold, principally in the form of capital flight.

[2] According to the IMF (2015), dollarization is most persistent in SSA. This claim is confirmed in our data because the correlation between the financial dollarization index and its first lagged value is greater than the rule thumb of threshold of 0.800 needed to ascertain persistent a given variable.

Third, both the 'information asymmetry'- and 'dollarization'- specific literatures have failed to engage the relationship between reducing information asymmetry and financial dollarization. On the one hand, studies on information asymmetry have fundamentally focused on financial access (see Galindo & Miller, 2001; Love & Mylenko, 2003; Barth et al., 2009; Singh et al., 2009; Asongu et al., 2016ab; Tchamyou & Asongu, 2016). On the other hand, studies on dollarization have either been country-specific (see Kessy, 2011) or panel-based with a focus on determinants of dollarization (Olalekan, 2009; Raheem & Asongu, 2016; IMF, 2015).

This study complements existing literature by assessing the role of reducing information asymmetry on dollarization in SSA. Understanding the role of information sharing offices (e.g. public credit registries and private credit bureaus) in influencing dollarization in SSA could better inform policy makers on potential vulnerabilities and risks associated with the excessive use of foreign currency. It is relevant to articulate the link between information sharing offices and financial crises which is a determinant of dollarization. In essence, policy syndromes as discussed above are associated with high rates of dollarization which are fundamentally caused by crises, such as: capital flight, withdrawal of banking savings and growth of the informal sector. Information sharing offices are theoretically designed to mitigate these characteristics that portray a negative investment climate. Moreover, after the 2008 global financial crises, more information sharing offices were introduced across the sub region (see Tchamyou & Asongu, 2016) and the impact of globalisation and negative consequences of macroeconomic instability invite an inquiry on how reducing information asymmetry can affect dollarization. In a nutshell, the use of foreign currencies in an economy could be due to low access of domestic currency to finance investments because of information asymmetry between lenders and borrowers in the banking industry. Information sharing offices are theoretically designed to limit such information asymmetry, notably: the adverse selection of banks, ex-ante of the lending process and the moral hazard of borrowers, ex-post of the lending process.

The rest of the study is structured as follows. Section 2 discusses the stylized facts, theoretical underpinnings and related literature. The data and methodology are covered in Section 3 while Section 4 presents the empirical results. We conclude in Section 5 with implications and future research directions.

2. Stylized facts, theoretical underpinnings and related literature

2. 1 Stylized facts

In this section on the stylized facts, we engage the progress of financial dollarization and access to foreign exchange in SSA (Raheem & Asongu, 2016). This background information is engaged in two strands, namely: (i) statistics on financial dollarization from country-specific, global and regional cases and (ii) an overview of various foreign exchange sources.

As shown in Table 1, it can be observed that both the ratio of foreign currency in bank deposits (deposit dollarization) and the ratio of foreign currency in bank loans (loan dollarization) are highest in SSA. A reason for the leading role of SSA is dollarization in the world could be traceable to lack of financial access, which may be due to excess liquidity in financial institutions owing to information asymmetry or an overall lack of capital to finance long term investment[3]. Accordingly, the resulting finance gap is very likely to be financed with foreign currency. The second group of countries with the highest rate of dollarization is in Latin America. The high rate of dollarization in this sub-region can be traceable to some countries that have given-up their domestic currencies for the USD, namely: Peru, Ecuador, El-Salvador, Bolivia and Argentina. Moreover, it is important to note that Latin America was the first region to adopt a dollarization policy to hedge against macroeconomic disequilibriums. Third in the rankings is the 'East & South Asia and the Pacific' region which is substantially dominated by China and India because of their comparatively higher levels of foreign direct investments in the region.

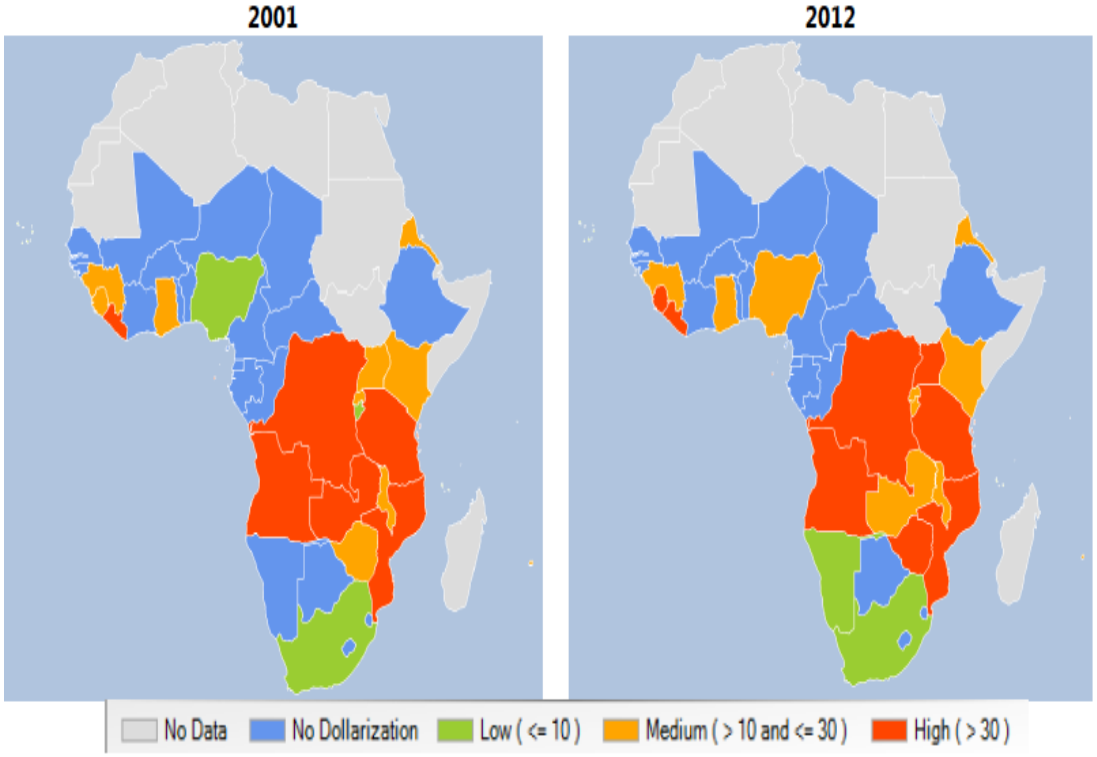
Table 1: Global trends of Financial Dollarization

Regions	Deposit dollarization	Loan dollarization
SSA	29.6	30.5
Latin America and Caribbean	28.2	25.1
East & South Asia and the Pacific	19.5	18.95
Middle East and North Africa	15.6	12.3
Average	**29.1**	**27**

Authors' computation with underlying data from IFS and IMF (2015)

[3] The narrative is consistent with recent African business literature (Bartels et al., 2009; Tuomi, 2011; Darley, 2012).

Figure 1: Pictorial Analysis of Dollarization in SSA



Source: IMF (2015)

A pictorial perspective of dollarization in SSA is shown in Figure 1 which is presented in two-sub diagrams: one for the year 2001 and other for the year 2012. Table 2 presents a tabular trend of dollarization in four sub-categories, namely: 2001-2004; 2005-2008; 2009-2012 and 2001-2012. It is apparent from the table that the three most dollarized countries in SSA are Angola, Liberia and the Democratic Republic of Congo (DRC) (also see Raheem & Asongu, 2016). According to the IMF (2015), the following countries can equally be acknowledged as highly dollarized, namely: Ghana, Zambia, Mozambique, Tanzania and Sierra Leone. In line with the same narrative, moderately dollarized countries are Malawi, Kenya, Eritrea and Uganda. The remaining nations fall under the category of low dollarized economies. Note should be taken of the fact that during the period 2009-2012, SSA experienced a decline in the use of foreign currency, with the exceptions of Kenya, Djibouti, Sierra Leone and the DRC. The only significant event which occurred between 2007/2008 that could elucidate this average dwindle in the use of foreign currency in the sub-region is the 2007/2008 global financial crisis.

Table 2: Country-Specific Background of Financial Dollarization in SSA

Countries	2001-2004	2005-2008	2009-2012	2001-2012
Angola	76.67	66	55.5	66.06
Botswana	23.15	17.14	25.92	22.07
Burundi	7.5	12.63	14.56	11.56
Cape Verde	6.2	6.74	6.43	6.46
Comoros	2.23	1	1	1.41
Congo, DR	80.23	84.73	85.27	83.41
Djibouti	58.45	54.73	57.13	56.77
Eritrea	18.38	18.98	15.99	17.78
Ghana	30.58	29.26	28.5	29.45
Guinea	25.17	30.22	21.45	25.61
Kenya	15.87	15.03	16.24	15.71
Liberia	76.8	83.03	82.6	80.81
Malawi	19.52	17.88	16.52	17.97
Mauritius	14.98	19.92	15.34	16.75
Mozambique	49.5	42.25	34.75	42.17
Namibia	1.73	1.21	0.84	1.26
Nigeria	8.94	10.32	13.83	11.03
Rwanda	30.01	24.03	22.13	25.39
Sao Tome	48.66	60.42	56.5	55.19
Seychelles	4.34	15.73	27.76	15.94
Sierra Leone	27.35	30.01	34.87	30.74
South Africa	1.45	1.25	1	1.23
Tanzania	40.5	38.25	34.51	37.75
Uganda	30.87	26.18	26.45	27.83
Zambia	49.37	41.26	38.25	42.96

Source: Authors' Computation

A principal driver of dollarization is the mismatch in macroeconomic fundamentals. Some of these macroeconomic fundamentals include: interest rates, inflation and exchange rate volatility. In the light of the three most dollarized economies in SSA identified above, statistics show comparatively high inflation rates in the corresponding countries (see Raheem & Asongu, 2016). For example between 2001 and 2012, the average inflation rate for Congo and Angola were respectively 42% and 43%. Moreover, the DRC and Angola experienced inflation rates of 247% and 21% respectively. The relevance of macroeconomic stability in less dollarization is confirmed when the analysis is extended to the low dollarized economies in the sample.

2. 2 Theoretical underpinnings and related literature

2.2.1 Theoretical highlights

Two dominant theoretical narratives exist on the relationship between information sharing and financial development which for the most part reflect the use of domestic currency (see Claus & Grimes, 2003; Tchamyou & Asongu, 2016). While the first is concerned with the transformation of risk characteristics in bank assets, the second is oriented toward channels via which liquidity from banks can be consolidated. Moreover, the two theoretical perspectives are consistent with view that the principal mission of financial institutions is to boost intermediation efficiency by channelling mobilised deposits from lenders into credit for investment purposes.

In the light of the above theoretical insights, the connection between information sharing offices and dollarization is apparent because the use of foreign currency in an economy could be due to low access in domestic currency needed to finance investments owing to information asymmetry between lenders and borrowers. This is essentially because information sharing offices are theoretically designed to limit such information asymmetry, notably: the adverse selection of banks, ex-ante of the lending process and the moral hazard of borrowers, ex-post of the lending process. Moreover, given that crises and macroeconomic instability are determinants of dollarization, it is important to note that the policy syndromes engaged in the introduction are linked to higher rates of dollarization which are fundamentally caused by crises which result in *inter alia*: withdrawal of banking savings, growth of the informal sector and capital flight.

We have also observed from the stylized facts that the use of dollarization on average in SSA decreased in a periodic interval (2009-2012) during which the recent global financial crises occurred. Coincidentally, the sub-region also experienced an upsurge in the establishment of information sharing offices across the continent during the same époque. The perspective that more information sharing offices were instituted across Africa during the financial crises is aptly documented by Mylenko (2008). According to the author, prior to 2008, public credit registries and private credit bureaus were predominantly in a few countries in the Organisation for Economic Cooperation and Development (OECD) and the emerging economies of Latin America and Asia. In SSA for instance, prior to the crisis, with the exception of South Africa, very few African countries had well functioning credit reporting bureaus. Some countries (e.g. Mozambique, Rwanda and Nigeria) had instituted credit bureaus with the primary objective of boosting banking sector supervision. It is important to note that because of the absence of good technology and adequate incentives, most credit

registries did not report timely and accurate information. Accordingly, some years before 2008, a number of initiatives were undertaken across Africa at the request of information by supervisory bodies, with the prime purpose of instituting information sharing offices. Financial supervisors needed the information or data to consolidate risk management practices on the one hand and banking institutions on the other hand. Some of the countries that initiated credit information offices are: Ghana, Nigeria, Tanzania and Uganda.

2.2.2. Information asymmetry, dollarization and financial development

This section is discussed in three main strands, notably: (i) the relationship between information asymmetry and financial development; (ii) the linkage between dollarization and financial development and (iii) determinants of dollarization. First, on the nexus between information asymmetry and financial development, in accordance with recent African literature on information sharing (see Asongu et al., 2016a), empirical inquires on the phenomenon have for the most part focused on two principal axes, namely: the effects of information sharing among creditors on the one hand and the incidence of creditors' rights on enhanced channels of information sharing on the other hand. According to the narrative, one strand of the literature is focused on the importance of stronger creditors' rights in: banks' ability to take more risks (Houston et al., 2010; Acharya et al., 2011) and bankruptcy (Claessens & Klapper, 2005; Djankov et al., 2007; Brockman & Unlu, 2009). The other strand is oriented toward assessing how information sharing could *inter alia*: consolidate access to finance (Djankov et al., 2007; Brown et al., 2009; Triki & Gajigo, 2014); reduce default rates (Jappelli & Pagano, 2002); affect syndicated bank loans (Tanjung et al., 2010; Ivashina, 2009); diminish credit costs (Brown et al., 2009); impact lending that is influenced by corruption (Barth et al., 2009) and influence antitrust intervention (Coccorese, 2012).

Apparently, the engaged literature for the most part has been oriented toward the emerging economies outside Africa and developed nations where issues of excess liquidity in financial institutions are not so serious. Accordingly, whereas most studies have focused on the developing economies of Latin America and Asia on the one hand and countries of the Organisation for Economic Cooperation and Development on the other hand, not much scholarship has been devoted to the African continent which paradoxically is experiencing the most severe financial access constraints, owing information asymmetry (Asongu et al., 2016b). Moreover, the scant literature on the relationship between information asymmetry and financial development has not focused on financial dollarization but been limited to financial

access (see Love & Mylenko, 2000; Galindo &Miller, 2001; Barth et al., 2009; Triki & Gajigo, 2014).

Second, there is a plethora of ways via which the financial sector is connected to dollarization. A notable connection is the misallocation impact: a tendency in which financial institutions could want to hedge against risks and hence, match assets to liabilities. In the same vein, the level of financial sector development depends on the ability of the sector to absorb exogenous shocks that originate from increasing activities that are 'foreign currency'-related (De Nicolo et al., 2003; Levy-Yeyati, 2006). Honohan and Shi (2002) have shown that high dollarization levels increase the deepening of the financial sector: findings that have been confirmed by De Nicolo et al. (2003) within the framework of inflationary economies. There is a positive link between private credit and loan dollarization (Asel, 2010). Moreover, financial development has an inverse relationship with the level of dollarization. This confirms the intuition for this study, notably: information sharing offices which are destined to promote domestic financial development should decrease financial dollarization.

Third, on the determinants of dollarization, with the exceptions of Olalekan (2009), Raheem and Asongu (2016) and the IMF (2015) inquires have failed to engage the concern of dollarization within the context of Africa. Olalekan (2009) has investigated the impact of macroeconomic variations on deposit dollarization in eighteen countries in SSA for the period 1980 to 2004 in order to articulate how deposit dollarization is explained by capital account restrictions and variations in exchange rate expectations. Kessy (2011) has argued that the most apparent impact from the liberalization of the financial sector in Tanzania has been an upsurge in the use of the US Dollar as a legal tender by residents. According to the IMF (2015), compared to the rest of the world, dollarization has been most persistent in SSA, with very few episodes of de-dollarization. Moreover, of the five most dollarized countries (São Tomé and Príncipe, Angola, the DRC, Liberia and Zambia), with the exception of Angola, the remaining countries have not experienced a downward trend in loan and deposit dollarization. In contrast, an upward tendency has been recorded over the past decade in SãoTomé and Príncipe, Liberia and the DRC. Raheem and Asongu (2016) have extended the literature on the determinants of dollarization in SSA for the period 2001-2012 by assessing the role played by three sources of foreign currency earnings, namely: trade openness, financial integration and natural resource rent. The results show that with the exception of natural resource rent, the other two variables are significant drivers of dollarization. More specifically, it is established that financial liberalization and trade openness are positive drivers of dollarization whereas natural resource rents have the opposite effects.

3. Data and methodology

3.1 Data

This study investigates a panel of 26 countries in SSA for the period 2001-2012 with data from World Governance Indicators (WGI) and the International Financial Statistics of the IMF. The choice of the sample and periodicity are based on data availability constraints while the focus on SSA is consistent with the motivation of the study.

The dependent variable is the financial dollarization index whereas information sharing offices which are the independent variables of interest are proxied with public credit registries and private credit bureaus. Both the choice of the dependent and independent variables are consistent with recent dollarization (see Raheem & Asongu, 2016) and information asymmetry (Triki& Gajigo, 2014) literature.

Consistent with the engaged literature, five main control variables are adopted, namely: inflation, exchange rate volatility, institutions, financial development and economic prosperity in term of GDP per capita growth. We discuss the expected signs chronologically. First, inflation has been established to positively affect dollarization (see Ize & Levy-Yeyati, 2003; De-Nicole, 2005; Yinusa, 2009; Vieri et al., 2012). The intuition for the expected sign builds on the fact that the value of money decreases with inflation owing to diminishing purchasing power. Moreover, higher inflation levels motivate reallocation of assets within a portfolio in order to hedge risks associated with the denominated currency under inflation, notably: by selling assets denominated in domestic currency and buying assets in foreign currency. This is broadly consistent with Canzoneri and Diba (1992) on the position that dollarization should be a stabilizing instrument in periods of high inflation.

Second, exchange rate volatility is also anticipated to increase financial dollarization because investors are less likely to hold domestic currency if it suffers from high exchange rate fluctuations. The narrative is consistent with both non-contemporary (Arango & Nadiri, 1981) and contemporary literature in the perspective that investors have been documented to prefer engaging with economic environments that are less ambiguous (Kelsey & le Roux, 2016; Le Roux & Kelsey, 2016).

Third, from intuition, the quality of institutions should have a negative effect on dollarization because it reassures investors of the credibility of government policies, especially those related to the enforcement of contracts and assurance of objectivity of monetary authorities. This intuition is in accordance with the dollarization literature (see Ize & Parrado, 2002; Aizenman et al., 2005 ; De Nicolo et al., 2005 ; Honig, 2005, 2009 ; Levy-Yeyati, 2006; Doblas-Madrid, 2009).

Fourth, financial development is a deterrent to dollarization. This anticipation which is consistent with Raheem and Asongu (2016) has been justified by the IMF (2015) with the argument that innovations in financial sector commodities would boost investments in domestic currency.

Fifth, GDP per capita growth is expected to reduce financial dollarization (see Yinusa, 2009; IMF, 2015). As argued by Yinusa (2009), an economy that is growing and active with a strong base of production is supported by domestic currency. However, this expected sign should be treated with caution because if the fruits of economic prosperity are not evenly distribution, dollarization may increase because compared to citizens in the low income strata, the elite is more likely to engage with projects/investments that require foreign currency. This may be the case in SSA because over the past decade, poverty has been increasing the sub-region in spite of its growth resurgence (Asongu et al., 2015). Table 1 presents the data and the corresponding summary statistics whereas the correlation matrix is disclosed in Table 2.

Table 3: Definition of variables and Summary statistics

	Definitions	Source	Mean	S.D	Min	Max	Obs
Inflation	Inflation rate (Consumer Price Index, % of annual)	WDI	12.490	25.542	-2.404	359.936	264
Exchange rate	Exchange rate volatility (Standard deviation of nominal exchange rate)	WDI	305.164	817.215	0.343	3843.128	275
Institutions	Institutional index (average values of CC, GE, RQ, VA, RL and PS)	WGI	0.002	1.484	-2.970	3.617	275
Finance	Private sector credit (Private sector credit, % of GDP)	WDI	23.996	28.811	0.198	160.124	269
GDP per capita	GDP per capita growth rate (% of annual)	WDI	2.923	4.865	-33.746	29.392	272
Public registries	Public credit registries coverage (% of adults)	WDI	1.756	6.898	0.000	49.800	186
Private bureaus	Private credit bureaus coverage (% of adults)	WDI	7.001	17.895	0.000	64.800	184
Dollarization	Financial Dollarization index	IFS	29.620	23.618	0.400	90	275

S.D: Standard Deviation. Min: Minimum. Max: Maximum. Obs: Observations. WDI : World Development Indicators WGI : World Governance Index IFS: International Financial Statistics
GE : Government Effectiveness, RQ : Regulatory Quality CC : Control of Corruption VA: Voice and Accountability PS Political Stability and Lack of Violence and RL : Rule of Law

Table 4: Correlation matrix (uniform sample size: 168)

Inflation	Sexch	Instidex	Findev	GDPpcg	PCR	PCB	FinDol	
1.000	0.367	-0.250	-0.293	-0.041	-0.192	-0.224	0.331	Inflation
	1.000	-0.246	-0.088	-0.088	-0.104	-0.165	0.243	Sexch
		1.000	0.530	0.001	0.263	0.609	-0.420	Instidex
			1.000	-0.071	0.312	0.635	-0.454	Findev
				1.000	0.083	-0.109	0.287	GDPpcg
					1.000	-0.110	-0.149	PCR
						1.000	-0.381	PCB
							1.000	FinDol

Sexch: Exchange rate volatility. Instidex: Institutional index. Findev: private sector credit. GDPpcg: GDP per capita growth. FinDol: Financial Dollarisation Index. PCR: public credit registries. PCB: private credit bureaus.

3.2 Methodology

3.2.1 Baseline specification

The Ordinary Least Squares specification is as follows in Eq. (1)

$$FD_{i,t} = \sigma_0 + \sigma_1 PCR_{i,t} + \sigma_2 PCB_{i,t} + \sum_{j=1}^{5} \sum_{h=1}^{5} \delta_j W_{h,i} + \varepsilon_{i,t} \quad (1),$$

where: $FD_{i,t}$ is the financial dollarization of country i at period t; σ is a constant; PCR, Public Credit Registries; PCB, Private Credit Bureaus; W is the vector of five control variables (inflation, exchange rate volatility, institutional index, private sector credit and GDP per capita growth), and $\varepsilon_{i,t}$ the error term. The specification is robust to heteroscedasticity and autocorrelation consistent (HAC) standard errors.

3.2.2Robustness Specification

The study adopts the Generalised Method of Moments (GMM) with forward orthogonal deviations as empirical strategy for robustness checks. The specification is the Roodman (2009ab) extension of Arellano and Bover (1995) which has been documented to limit instrument proliferation and control for cross sectional dependence (see Love & Zicchino, 2006; Baltagi, 2008). The two primary conditions for the implementation of the GMM technique are satisfied. On the one hand, the financial dollarization dependent variable is persistent, given that the correlation between financial dollarization and its first lag is above of the 0.800 threshold required to ascertain persistence, specifically it is 0.979. Moreover, consistent with the IMF (2015), financial dollarization in SSA is very persistent. On the other hand, the number of time series (T=12) is less than the number of cross sections (N=26). Hence, N>T. It is important to note that there is some bite on endogeneity because: (i) time-invariant variables or years are used to control for the unobserved heterogeneity and (ii) the instrumentation process accounts for simultaneity.

The following equations in levels (2) and first difference (3) summarize the standard GMM estimation procedure.

$$FD_{i,t} = \sigma_0 + \sigma_1 FD_{i,t-\tau} + \sigma_2 PCR_{i,t} + \sigma_3 PCB_{i,t} + \sum_{j=1}^{5} \sum_{h=1}^{5} \delta_j W_{h,i,t-\tau} + \eta_i + \xi_t + \varepsilon_{i,t} \quad (2)$$

$$FD_{i,t} - FD_{i,t-\tau} = \sigma_0 + \sigma_1 (FD_{i,t-\tau} - FD_{i,t-2\tau}) + \sigma_2 (PCR_{i,t} - PCR_{i,t-\tau}) + \sigma_3 (PCB_{i,t} - PCB_{i,t-\tau}) + \sum_{j=1}^{5} \sum_{h=1}^{5} \delta_j (W_{h,i,t-\tau} - W_{h,i,t-2\tau}) + (\xi_t - \xi_{t-\tau}) + \varepsilon_{i,t-\tau} \quad (3),$$

where: $FD_{i,t}$ is the financial dollarization of country i at period t; σ is a constant; τ represents the coefficient of autoregression; PCR, Public Credit Registries; PCB, Private Credit Bureaus; W is the vector of five control variables (inflation, exchange rate volatility, institutional index, private sector credit and GDP per capita growth), η_i is the country-specific effect, ξ_t is the time-specific constant and $\varepsilon_{i,t}$ the error term. In the specification, a two-*step* instead of a one-*step* procedure is adopted because it controls for heteroscedasticity.

3.2.3 Identification and exclusion restrictions

Consistent with recent literature (Dewan & Ramaprasad, 2014; Asongu & Nwachukwu, 2016a), all independent indicators are predetermined or suspected endogenous variables. Therefore, whereas the *gmmstyle* is adopted for the predetermined variables, only years are treated as strictly exogenous and the method for treating the *ivstyle* (years) is 'iv(years, eq(diff))' because it is highly unfeasible for the years to become endogenous in first-difference (see Roodman, 2009b).

To tackle the issue of simultaneity, lagged regressors are employed as instruments for forward-differenced variables. Accordingly, in order to purge fixed effects that are susceptible of influencing the investigated nexuses, Helmet transformations are performed for the regressors (see Asongu & De Moor, 2016). These transformations entail forward mean-differencing of the variables: the mean of future observations is deducted from the variables instead of subtracting the previous observations for the contemporaneous one (Roodman, 2009b, p. 104). These transformations enable parallel or orthogonal conditions between forward-differenced variables and lagged values. Regardless of the number of lags, in order to minimise the loss of data, with the exception of the last observation for each country, the underlying transformations are computable for all observations. "*And because lagged*

observations do not enter the formula, they are valid as instruments" (Roodman (2009b, p. 104).

The study further argues that the time invariant variables that are treated as strictly exogenous, influence financial dollarization exclusively through the endogenous explaining variables. The statistical relevance underlying this exclusion restriction is assessed with the Difference in Hansen Test (DHT) for instrument exogeneity. Accordingly, the alternative hypothesis of the test should be rejected for the instruments to explain financial dollarization exclusively via the endogenous explaining variables. Note should be taken of the fact that, in the standard instrumental variable procedure, rejecting the alternative hypothesis of the Sargan Overidentifying Restrictions (OIR) test shows that the instruments elucidate financial dollarization exclusively via the investigated mechanisms or suspected endogenous variables. Whereas this information criterion has been employed in the literature using an instrumental variable estimation technique (see Beck et al., 2003; Asongu & Nwachukwu, 2016b), in the GMM procedure (with forward orthogonal deviations) the DHT is employed to investigate whether time invariant variables exhibit strict exogeneity by explaining financial dollarization exclusively via the proposed channels (or endogenous explaining variables). Therefore, in the reported findings, we confirm the validity of the exclusion restriction test when the alternative hypothesis of DHT related to instrumental variables (year, eq(diff)) is rejected.

4. Empirical results

Table 5 and Table 6 below present the empirical findings. Whereas Table 5 shows baseline findings from Ordinary Least Squares (OLS), the GMM results are disclosed in Table 6. The following findings can be established from the baseline results. Private credit bureaus decrease financial dollarization whereas the effect from public credit registries is not significant. Most of the significant control variables have the expected signs. The unexpected negative effect from GDP per capita growth may be traceable to the fact the fruits of economic prosperity are not evenly distributed across the sub-region. Hence, the elite which enjoys more of the wealth from economic growth is more associated with activities that are linked to foreign currency compared to domestic currency which is more averagely used by the majority of the population. This explanation is consistent with a recent World Bank report on attainment of the Millennium Development Goals (MDGs) poverty targets which has revealed that extreme poverty has been decreasing in all regions of world with the exception of SSA (see Asongu & Nwachukwu, 2016c), despite the sub-region enjoying more than two decades of growth resurgence that began in the mid 1990s (Asongu & Nwachukwu, 2016d).

In Table 6, four post-estimation diagnostic tests are used to assess the validity of models[4]. Based on the underlying criteria, all the five specifications are valid. The following findings are can be established. Both public credit registries and private credit bureaus decrease financial dollarization. The significant control variables display the expected signs.

Table 5: Baseline Ordinary Least Squares

	Dependent Variable: Financial Dollarization Index				
Constant	**25.285*** **	**25.505*** **	**16.820*** **	**22.592*** **	**21.063*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Public Credit Registries	-0.220	-0.222	-0.240	-0.148	0.058
	(0.152)	(0.143)	(0.160)	(0.307)	(0.748)
Private Credit Bureaus	**-0.245*** **	**-0.248*** **	**-0.184*** **	**-0.136***	0.024
	(0.000)	**(0.000)**	**(0.008)**	**(0.073)**	(0.813)
Inflation	**0.679*** **	**0.590** **	**0.656*** **	**0.555** **	**0.553** **
	(0.004)	**(0.017)**	**(0.003)**	**(0.014)**	**(0.014)**
Exchange rate volatility	---	0.002	**0.003** **	**0.004*** **	**0.003** **
		(0.162)	**(0.047)**	**(0.004)**	**(0.023)**
Institution	**-3.720*** **	**-3.496** **	**-3.610** **	---	**-3.365** **
	(0.008)	**(0.015)**	**(0.010)**		**(0.015)**
GDP per capita growth	---	---	**1.981*** **	**1.954*** **	**2.007*** **
			(0.000)	**(0.000)**	**(0.000)**
Financial Development	---	---	---	**-0.211*** **	**-0.203*** **
				(0.000)	**(0.000)**
Adjusted R^2	0.249	0.254	0.336	0.353	0.377
Fisher	**23.82*** **	**21.50*** **	**18.68*** **	**27.16*** **	**25.62*** **
Observations	176	176	174	168	168

***,**,*: significance levels at 1%, 5% and 10% respectively. GDP: Gross Domestic Product.

[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 overidentification restrictions (OIR) tests should not be significant because their null hypotheses are the positions that instruments are valid or not correlated with the error terms. In essence, while the Sargan OIR test is not robust but not weakened by instruments, the Hansen OIR is robust but weakened by instruments. In order to restrict identification or limit the proliferation of instruments, we have ensured that instruments are lower than the number of cross-sections in most specifications. Third, the Difference in Hansen Test (DHT) for exogeneity of instruments is also employed to assess the validity of results from the Hansen OIR test. Fourth, a Fischer test for the joint validity of estimated coefficients is also provided*" (Asongu & De Moor, 2016, p.9).

Table 6: Generalised Method of Moments

	Dependent Variable: Financial Dollarization Index				
Constant	0.594	**12.188*** **	**9.841** **	**7.737** **	**8.491** **
	(0.579)	**(0.000)**	**(0.026)**	**(0.034)**	**(0.020)**
Financial Dollarization (-1)	**0.910*** **	**0.634*** **	**0.719*** **	**0.771*** **	**0.782*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Public Credit Registries	**-0.119*** **	**-0.205** *	-0.123	**-0.140** *	-0.066
	(0.000)	**(0.067)**	(0.216)	**(0.066)**	(0.464)
Private Credit Bureaus	**-0.097*** **	-0.059	-0.071	**-0.085** *	0.006
	(0.000)	(0.207)	(0.142)	**(0.053)**	(0.921)
Inflation	**0.136** **	**0.173*** **	**0.128** *	**0.146** **	0.034
	(0.020)	**(0.003)**	**(0.070)**	**(0.031)**	(0.582)
Exchange rate volatility	---	**-0.015*** **	**-0.008** **	**-0.003** **	**-0.004** *
		(0.000)	**(0.013)**	**(0.039)**	**(0.087)**
Institution	0.581	**-2.176** **	**-1.947** **	---	---
	(0.124)	**(0.012)**	**(0.020)**		
GDP per capita growth	---	---	-0.115	0.018	0.037
			(0.369)	(0.867)	(0.818)
Financial Development	---	---	---	-0.014	0.015
				(0.747)	(0.755)
AR(1)	(0.005)	(0.006)	(0.004)	(0.005)	(0.007)
AR(2)	**(0.130)**	**(0.105)**	**(0.163)**	**(0.135)**	**(0.122)**
Sargan OIR	(0.006)	**(0.246)**	**(0.170)**	(0.092)	(0.020)
Hansen OIR	**(0.304)**	**(0.562)**	**(0.649)**	**(0.953)**	**(0.939)**
DHT for instruments					
(a)Instruments in levels					
H excluding group	**(0.631)**	**(0.719)**	**(0.366)**	**(0.499)**	**(0.568)**
Dif(null, H=exogenous)	**(0.188)**	**(0.393**	**(0.713)**	**(0.982)**	**(0.957)**
(b) IV (years, eq (diff))					
H excluding group	**(0.250)**	**(0.210)**	**(0.825)**	**(0.644)**	**(0.672)**
Dif(null, H=exogenous)	**(0.407)**	**(0.932)**	**(0.288)**	**(1.000)**	**(0.998)**
Fisher	**1793.87*** **	**163.99*** **	**249.75*** **	**3296.32*** **	**2321.82*** **
Instruments	26	30	33	34	38
Countries	24	24	24	24	24
Observations	176	176	174	168	168

***,**,*: significance levels at 1%, 5% and 10% respectively. GDP: Gross Domestic Product. 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 Wald 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 OIR and DHT tests.

5. Concluding implications and future research directions

Financial dollarization in Sub-Saharan Africa is the most persistent compared to other regions of the world. This study has complemented the existing scant literature on dollarization in Africa by assessing the role of information sharing offices (public credit registries and private credit bureaus) on financial dollarization in 26 countries of SSA for the period 2001-2012. The empirical evidence is based on Ordinary Least Squares and Generalised Method of

Moments (GMM). The findings show that information sharing offices (which are designed to reduce information asymmetry) in the banking industry are a deterrent to dollarization.

To the best of our knowledge, this is the first study to have empirically shown that the de-dollarization process can be facilitated with information sharing offices. Hence, information sharing offices can complement a plethora of macroeconomic policies that have been established to curb dollarization, *inter alia*: market-based incentives, sound macroeconomic policies and micro-prudential measures. In order to sustain efforts toward economic stabilization, the role of information sharing offices in reducing dollarization can be enhanced if such credit bureaus are designed to: (i) restore macroeconomic stability (e.g. reducing inflation and ensuring the sustainability fiscal policy) by informing/convincing both lenders and borrowers that they can be confident in the value of domestic currency; (ii) consolidate the prudential framework (which provides incentives to hold deposits in domestic currency) in order to mitigate risks associated with currency mismatches; (iii) pursue market-based as opposed to administrative procedures targeting de-dollarization, essentially because information sharing offices are closer to the market compared to authorities who may engage authoritative de-dollarization initiatives that have proven not to work effectively (see IMF, 2015) and (iv) inform market participants on avenues of adequate rates of return for investments in domestic currency in the medium- and long-terms. For more targeted policy implications, future research can focus on assessing if established linkages further withstand empirical scrutiny within country-specific settings.

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