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**Reference:**

Asongu Simplicé A., Raheem Ibrahim D., Tchamyou Vanessa Simen.- Information asymmetry and financial dollarisation in Sub-Saharan Africa  
African journal of economic and management studies - ISSN 2040-0713 - (2018), p. -  
Full text (Publisher's DOI): <https://doi.org/doi:10.1108/AJEMS-11-2017-0291>

## **Information Asymmetry and Financial Dollarisation in Sub-Saharan Africa**

Forthcoming in: African Journal of Economic and Management Studies.

DOI: 10.1108/AJEMS-11-2017-0291.

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**Abstract**

**Purpose-** Financial dollarisation in sub-Saharan Africa is most persistent compared to other regions of the world. This study complements the existing scant literature on dollarisation in Africa by assessing the role of information sharing offices (public credit registries and private credit bureaus) on financial dollarisation in 25 sub-Saharan African countries for the period 2001-2012.

**Design/methodology/approach-** The empirical evidence is based on Ordinary Least Squares (OLS) and Generalised Method of Moments (GMM).

**Findings-** The findings show that information sharing offices (which are designed to reduce information asymmetry) in the banking industry are a deterrent to dollarisation. The underpinning assumption that financial development reduces financial dollarisation is confirmed.

**Originality/value-** There is scant literature on the relevance of information sharing offices in development outcomes in Africa. While the establishment of these offices in most countries in the continent began in 2004, scholarship on the importance of these offices in financial development is sparse.

*JEL Classification:* E31; E41; G20; O16; O55

*Keywords:* Dollarisation; Openness; Information Asymmetry; Africa

**Acknowledgement**

The authors are indebted to the editor and referees for constructive comments.

## 1. Introduction

The motivation for investigating the effect of reducing information asymmetry on financial dollarisation<sup>1</sup> in sub-Saharan Africa (SSA) is threefold, notably: dollarisation is a policy syndrome; the uniqueness of SSA and gaps in the literature.

First, financial dollarisation<sup>2</sup> is a policy syndrome for a multitude of reasons. In particular, dollarisation 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 (Marcelin & Mathur, 2015; Raheem & Asongu, 2018; Raheem, 2018). Accordingly, the implementation of economic policies can be complicated by dollarisation through a multitude of mechanisms, namely, by: (i) exposing 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) reducing the capacity of authorities to employ monetary policy effectively, especially the central bank's ability to stabilise 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 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 dollarisation is also favourable in specific circumstances. For instance, countries experiencing chaotic inflation could encourage transactions through the domestic financial system by authorising deposits in foreign currency in order to discourage residents from depositing abroad.

Second, compared to other regions in the world, dollarisation is most persistent in SSA<sup>3</sup>. In essence, dollarisation is prominent in SSA where it represents over 30% of bank loans and deposits. Accordingly, the uniqueness of SSA builds on the fact that since

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<sup>1</sup> Dollarisation and financial dollarisation are used interchangeably throughout the study.

<sup>2</sup> Dollarisation 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.

<sup>3</sup> According to the IMF (2015), dollarisation 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 persistence a given variable.

independence from colonial powers, the sub-region has experienced tumultuous development. The policy syndromes have included: political instability (which is hedged by macroeconomic policies through dollarisation); limited financial deepening (with over-reliance on the financial intermediary sector vis-à-vis stock markets which naturally fuels more hedging) and low development of the private sector (which is reflected in low demand for local currency) (Sikwila, 2016; Balima, 2017). 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 economic 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 shocks such as adverse variations to terms of trade and political unrests/civil conflicts that hindered economic recoveries and booms (Ssozi & Asongu, 2016a, 2016b). Moreover, with limited monetisation, the following characteristics became apparent: a small private export sector, restrictions to foreign exchange, growing informal economic sectors and capital flight (Efobi & Asongu, 2016; Nyasha & Odhiambo, 2015a, 2015b; Fanta, 2016; Makina, 2017; Chikalipah, 2017).

Third, the extant literature pertaining to information asymmetry and dollarisation has failed to engage the relationship between reducing information asymmetry and financial dollarisation. 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., 2016, 2017; Tchamyou & Asongu, 2017). On the other hand, studies on dollarisation have either been country-specific (see Kessy, 2011) or panel-based with a focus on determinants of dollarisation (Olalekan, 2009; Raheem & Asongu, 2018; IMF, 2015).

This study complements existing literature by assessing the role of reducing information asymmetry on dollarisation in SSA. Understanding the role of information sharing offices (i.e. public credit registries and private credit bureaus) in influencing dollarisation 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 a determinant of dollarisation such as financial crisis. In essence, the policy syndromes as discussed above are associated with high rates of dollarisation which is fundamentally caused by crises, such as: capital flight, withdrawal of bank savings and growth of the informal sector. Information sharing offices are theoretically

designed to mitigate these characteristics which reflect a negative investment climate including the lack of credit for investment purposes (Asongu & Biekpe, 2018; Asongu & Nwachukwu, 2018). After the 2008 global financial crisis, more information sharing offices were introduced across the sub-region (see Tchamyou & Asongu, 2017). Moreover, the impact of globalisation and negative consequences of macroeconomic instability motivate a study on assessing how reducing information asymmetry can affect financial dollarisation. In a nutshell, the use of foreign currencies in an economy could be the result of low access to domestic currency because of information asymmetry between lenders and borrowers in the banking industry (IMF, 2015). 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 (Asongu et al., 2016).

It is important to balance the narrative on the relevance of information sharing offices by articulating that financial access is not exclusively the outcome of information sharing because information sharing offices can also affect the level of ex-post defaults and quality of credit (Boateng et al., 2018). Moreover, because credit offices may be more concerned with the profiling of clients as means of reducing the loan default of banks, the information they provide could be one-sided. As recently documented by Boateng et al. (2018), the introduction of information sharing offices (while ensuring a level-playing field between banks); could considerably reduce the ability of banks' to collect information on credit. According to the narrative, the core purpose of gathering costly information by banks is to gain from informational rents owing to the corresponding information asymmetry. Hence, banks are still very likely to fight to consolidate their competitive edge by acquiring more information that is not ultimately shared with information sharing offices. This narrative on the collection of additional information for strategic interest is in accordance with Karapetyan and Stacescu (2014a, 2014b). Another challenge in information sharing is that, owing to distorted incentives on the part of borrowers, information sharing offices are obliged to play the role of a disciplining mechanism by advising borrowers on the long term inconveniences of defaulting on their debts and resorting to the informal financial sector as a substitute to the formal sector (Padilla & Pagano, 2000; Vercammen, 1995; Asongu et al., 2016).

The link between information sharing offices and financial dollarisation rests on the intuition that financial dollarisation in an economy is for the most part, in response to weak domestic financial development. Hence, improving domestic financial development by means of reducing information asymmetry between lenders and borrowers consolidates domestic

currency and domestic financial institutions, hence, discouraging dollarisation as a response to failing domestic currency and domestic financial development. Hence, there is an underlying assumption that domestic financial development reduces financial dollarisation.

In the light of the motivation above, this study complements the existing scant literature on dollarisation in Africa by assessing the role of information sharing offices (public credit registries and private credit bureaus) on financial dollarisation in 25 sub-Saharan African countries 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 dollarisation. Moreover, the underpinning assumption that financial development reduces financial dollarisation is confirmed.

The rest of the study is structured as follows. Section 2 discusses the stylised 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. Stylised facts, theoretical underpinnings and related literature**

### **2.1 Stylised facts**

In this section on the stylised facts, we engage the progress of financial dollarisation and access to foreign exchange in SSA (Raheem & Asongu, 2018). This background information is engaged in two strands, namely: (i) statistics on financial dollarisation 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 dollarisation) and the ratio of foreign currency in bank loans (loan dollarisation) are highest in SSA. A reason for the leading role of SSA in dollarisation 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 overall lack of capital to finance long term investments<sup>4</sup>. Accordingly, the resulting financing gap is very likely to be financed with foreign currency. The second group of countries with the highest rate of dollarisation is in Latin America. The high rate of dollarisation in this sub-region can be traceable to some countries that have abandoned their domestic currencies for the USD, namely: Peru, Ecuador, El-Salvador, Bolivia and Argentina. Moreover, it is important to note that Latin America was

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<sup>4</sup> The narrative is consistent with recent African business literature (Bartels et al., 2009; Tuomi, 2011; Darley, 2012; Asongu, 2014).

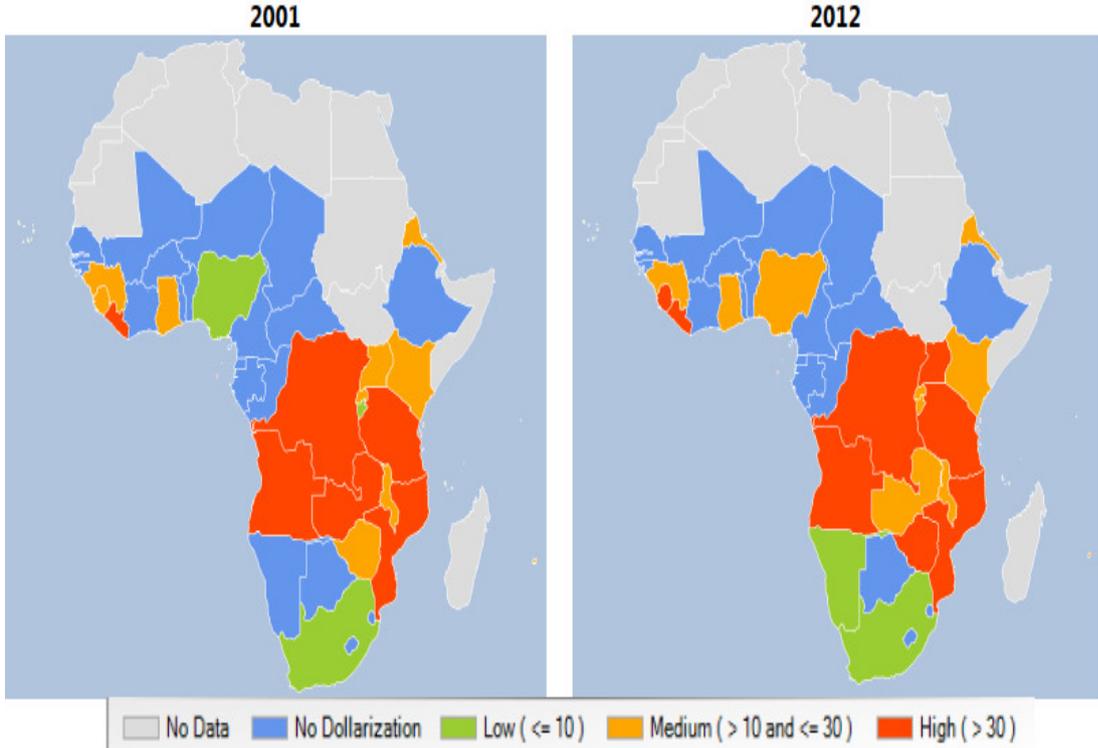
the first region to adopt a dollarisation policy to hedge against macroeconomic disequilibria. Third in the rankings is the ‘East & South Asia and the Pacific’ region which is substantially dominated by China and India because of their comparatively higher levels of foreign direct investments in the region.

**Table 1: Global trends of Financial Dollarisation**

Regions	Deposit dollarisation	Loan dollarisation
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
<b>Average</b>	<b>29.1</b>	<b>27</b>

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

**Figure 1: Pictorial Analysis of Dollarisation in SSA**



Source: IMF (2015)

A pictorial perspective of dollarisation 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 dollarisation in four sub-categories, namely: 2001-2004; 2005-2008; 2009-2012 and 2001-2012. It is apparent from the table that the three most dollarised countries in SSA are Angola, Liberia and the Democratic Republic of Congo (DRC) (also see Raheem &

Asongu, 2018). According to the IMF (2015), the following countries can equally be acknowledged as highly dollarised, namely: Ghana, Zambia, Mozambique, Tanzania and Sierra Leone. In line with the same narrative, moderately dollarised countries are Malawi, Kenya, Eritrea and Uganda. The remaining nations fall under the category of low dollarised 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 Dollarisation in SSA**

<b>Countries</b>	<b>2001-2004</b>	<b>2005-2008</b>	<b>2009-2012</b>	<b>2001-2012</b>
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
DRC	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. DRC: Democratic Republic of Congo.

A principal driver of dollarisation 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 dollarised economies in SSA identified above, statistics show comparatively high inflation rates in the corresponding countries (see Raheem & Asongu, 2018). For example between 2001 and 2012, the average inflation rate for the DRC 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 dollarisation is confirmed when the analysis is extended to the low dollarised 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 reflects the use of domestic currency (see Claus & Grimes, 2003; Tchamyu & Asongu, 2017). While the first is concerned with the transformation of risk characteristics in bank assets, the second is oriented towards channels via which liquidity from banks can be consolidated. Moreover, the two theoretical perspectives are consistent with the view that the principal mission of financial institutions is to boost intermediation efficiency by channelling mobilised deposits from lenders to credit for investment purposes.

In the light of the above theoretical insights, the connection between information sharing offices and dollarisation 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 (Sikwila, 2016; Balima, 2017). 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 (Triki & Gajigo, 2014; Asongu et al., 2016). Moreover, given that crises and macroeconomic instability are determinants of dollarisation, it is important to note that the policy syndromes engaged in the introduction are linked to higher rates of dollarisation which are fundamentally caused by crises that result in *inter alia*: withdrawal of bank savings, growth of the informal sector and capital flight (Efobi & Asongu, 2016; Nyasha & Odhiambo, 2015a, 2015b; Fanta, 2016; Makina, 2017; Chikalipah, 2017).

We have also observed from the stylised facts that the use of dollarisation on average in SSA decreased in a periodic interval (2009-2012) during which the recent global financial crisis occurred. Coincidentally, the sub-region also experienced an upsurge in the establishment of information sharing offices across the continent during the same period. The perspective that more information sharing offices were established across Africa during the financial crisis 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 Co-operation 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 (Raheem & Asongu, 2018).

### *2.2.2. Information asymmetry, dollarisation 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 dollarisation and financial development and (iii) determinants of dollarisation. First, on the nexus between information asymmetry and financial development, in accordance with recent African literature on information sharing (see Asongu et al., 2016), empirical studies 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 towards 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 affected by corruption (Barth et al., 2009 ) and influence antitrust intervention (Coccoresse, 2012).

Apparently, the engaged literature for the most part has been oriented towards 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 Co-operation 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 dollarisation but on 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 dollarisation. 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 related to foreign currency (De Nicolo et al., 2003; Levy-Yeyati, 2006). Honohan and Shi (2002) have shown that high dollarisation 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 dollarisation (Asel, 2010). Moreover, financial development has an inverse relationship with the level of dollarisation (Sikwila, 2016; Balima, 2017). This confirms the intuition for this study, notably: information sharing offices which are destined to promote domestic financial development (Triki & Gajigo, 2014; Asongu et al., 2016) should decrease financial dollarisation.

Third, on the determinants of dollarisation, with the exceptions of Olalekan (2009), Raheem and Asongu (2018) and the IMF (2015), studies have failed to engage the concern of dollarisation within the context of Africa. Olalekan (2009) has investigated the impact of macroeconomic variations on deposit dollarisation in eighteen countries in SSA for the period 1980 to 2004 in order to articulate how deposit dollarisation is explained by capital account restrictions and variations in exchange rate expectations. Kessy (2011) has argued that the most apparent impact from the liberalisation 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, dollarisation has been most persistent in SSA, with very few episodes of de-dollarisation. Moreover, of the five most dollarised 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 dollarisation. In contrast, an upward tendency has been recorded over the past decade in São Tomé and Príncipe, Liberia and the DRC. Raheem and Asongu (2018) have extended the literature on the determinants of dollarisation 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 dollarisation. More specifically, it is established that financial liberalisation and trade openness are positive drivers of dollarisation whereas natural resource rents have the opposite effect.

### **3. Data and methodology**

#### **3.1 Data and Background Information**

This study investigates a panel of 25 countries (listed in Table 2 above) 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 dollarisation 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 in accordance with recent dollarisation (see Raheem & Asongu, 2018) 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 dollarisation (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 dollarisation should be a stabilizing instrument in periods of high inflation.

Second, exchange rate volatility is also anticipated to increase financial dollarisation 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, 2017; Le Roux & Kelsey, 2016).

Third, from intuition, the quality of institutions should have a negative effect on dollarisation because it reassures investors on the credibility of government policies, especially those related to the enforcement of contracts and assurance in the objectivity of monetary authorities. This intuition is in accordance with the dollarisation 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 dollarisation. This anticipation which is consistent with Raheem and Asongu (2018) 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 dollarisation (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 distributed, dollarisation may increase. This increase is essentially traceable to the fact that compared to citizens in the low income strata, the elite is more likely to engage with projects/investments that require foreign currency. Such a tendency is very apparent 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 3 presents the data and the corresponding summary statistics whereas the correlation matrix is disclosed in Table 4.



**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
Dollarisation	Financial Dollarisation 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)

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

where,  $FD_{i,t}$  is the financial dollarisation of country  $i$  at period  $t$ ;  $\sigma_0$  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.

### 3.2.2 Robustness 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 (2009a, 2009b) 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 dollarisation dependent variable is persistent, given that the correlation between financial dollarisation and its first lag is 0.979 which is above the 0.800 threshold required to ascertain persistence. Moreover, consistent with the IMF (2015), financial dollarisation 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=25). 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) summarise the standard GMM estimation procedure.

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

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

where:  $FD_{i,t}$  is the financial dollarisation of country  $i$  at period  $t$ ;  $\sigma_0$  is a constant;  $\tau$  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),  $\eta_i$  is the country-specific effect,  $\xi_t$  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 (Roodman, 2009a; Boateng et al., 2018).

### 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, 2017). 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 from contemporary observations (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 computed for all observations. “And because lagged

*observations do not enter the formula, they are valid as instruments*” (Roodman (2009b, p. 104). It is important to note that, the Helmet transformations underpinning the instrumentation process cannot be reported in the tables capturing the regression output.

The study further argues that the time invariant variables that are treated as strictly exogenous, influence financial dollarisation 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 dollarisation 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 dollarisation 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 dollarisation 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.

Wintoki et al. (2012) have acknowledged that *“there is no single criteria for evaluating the joint strength of the instrument set of the dynamic panel system GMM estimator”* (p. 599). The procedure used in this study to confirm exclusion restrictions underpinning the identification process is consistent with Roodman (2009b) and recent literature employing the GMM technique (Asongu et al., 2017, 2018).

#### **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 dollarisation whereas the effect from public credit registries is not significant. In Table 6, four post-estimation diagnostic tests are used to assess the validity of models<sup>5</sup>. Based on the underlying criteria, all the five specifications are valid. The following

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<sup>5</sup>“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

findings are can be established. Both public credit registries and private credit bureaus decrease financial dollarisation.

The significant control variables display the expected signs. (i) The negative effect of financial development is consistent with the underlying assumption motivating a negative nexus between information sharing offices and financial dollarisation. Accordingly, the connection between information sharing offices and financial dollarisation is based on an underlying assumption that financial dollarisation is for the most part in responses to fragile and weak domestic financial development. Within this framework, consolidating domestic financial development by mitigating information asymmetry between bank lenders and borrowers (through information sharing offices) enhances domestic financial development and by extension discourages financial dollarisation. Therefore, we theoretically expected a negative effect from information sharing offices and financial development on financial dollarisation. The above narrative is consistent with the position in the literature that innovations within the domestic financial sector improve investments in domestic currency and by extension, discourage financial dollarisation (IMF, 2015; Raheem & Asongu, 2018).

(ii) The positive effect of inflation on dollarisation is expected as justified with the attendant literature. This expectation is founded on the premise that the value of money decreases as inflation increases in the light a corresponding decrease in purchasing power. On a more serious note, higher levels of inflation represent an incentive for asset reallocation, in view of mitigating higher levels of risks linked to currency affected by inflation. The process entails the buying of assets in foreign currency and selling of assets denominated in domestic currency. This narrative on the expected sign is in line with the literature on the positive role of dollarisation in stabilizing economies with high inflation (Canzoneri & Diba, 1992).

(iii) While we expected exchange rate volatility to positively influence financial dollarisation, the sign from the regression output is conflicting because it is expectedly positive in the OLS estimation but unexpectedly negative in the GMM regressions. A possible explanation could be that the intuition that investors are less likely to hold domestic currency in periods of high exchange rate fluctuations is more relevant in a static process than in a dynamic process. Elucidating this inference could be the object of future research.

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*(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, 2017, p.200).*

(iv) The negative role of institutions on financial dollarisation is consistent with logic and common sense. Accordingly, the quality of government (especially in terms of economic governance) reassures investors and citizens on the soundness of *inter alia*: the objectivity of monetary policies, the enforcement of contractual obligations and a favourable doing business environment. The logic supporting the expected sign is consistent with the dollarisation literature (Aizenman et al., 2005; De Nicolo et al., 2005; Levy-Yeyati, 2006; Doblado-Madrid, 2009).

(v) While GDP per capita growth can be anticipated to reduce financial dollarisation owing to an active and evolving economy that is backed by domestic currency (Yinusa, 2009; IMF, 2015), the anticipation can also be positive if the fruits of economic development are not evenly distributed across the population. Hence, in situations where economic growth is accompanied with growing inequality, the non-inclusive growth can be translated into a positive effect on financial dollarisation because, compared to citizens in the low income strata, the elite in the high income strata is more likely to engage with projects/investments that require foreign currency. The underlying tendency of non-inclusive development is apparent in SSA because despite more than two decades of growth resurgence, extreme poverty has been increasing in the sub-region (Asongu et al., 2015).

**Table 5: Baseline Ordinary Least Squares (Static estimation)**

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

\*\*\*, \*\*, \*: significance levels at 1%, 5% and 10% respectively. GDP: Gross Domestic Product. The information criteria include the adjusted coefficient of determination (R<sup>2</sup>) and the Fisher statistics. The Fisher test for the joint validity of estimated coefficients is under the null that estimated coefficients are jointly not valid.

**Table 6: Generalised Method of Moments (Dynamic estimation)**

Independent variables and information criteria	Dependent Variable: Financial Dollarisation Index				
Constant	0.594 (0.579)	<b>12.188***</b> <b>(0.000)</b>	<b>9.841**</b> <b>(0.026)</b>	<b>7.737**</b> <b>(0.034)</b>	<b>8.491**</b> <b>(0.020)</b>
Financial Dollarisation (-1)	<b>0.910***</b> <b>(0.000)</b>	<b>0.634***</b> <b>(0.000)</b>	<b>0.719***</b> <b>(0.000)</b>	<b>0.771***</b> <b>(0.000)</b>	<b>0.782***</b> <b>(0.000)</b>
Public Credit Registries	<b>-0.119***</b> <b>(0.000)</b>	<b>-0.205*</b> <b>(0.067)</b>	-0.123 (0.216)	<b>-0.140*</b> <b>(0.066)</b>	-0.066 (0.464)
Private Credit Bureaus	<b>-0.097***</b> <b>(0.000)</b>	-0.059 (0.207)	-0.071 (0.142)	<b>-0.085*</b> <b>(0.053)</b>	0.006 (0.921)
Inflation	<b>0.136**</b> <b>(0.020)</b>	<b>0.173***</b> <b>(0.003)</b>	<b>0.128*</b> <b>(0.070)</b>	<b>0.146**</b> <b>(0.031)</b>	0.034 (0.582)
Exchange rate volatility	---	<b>-0.015***</b> <b>(0.000)</b>	<b>-0.008**</b> <b>(0.013)</b>	<b>-0.003**</b> <b>(0.039)</b>	<b>-0.004*</b> <b>(0.087)</b>
Institutions	0.581 (0.124)	<b>-2.176**</b> <b>(0.012)</b>	<b>-1.947**</b> <b>(0.020)</b>	---	---
GDP per capita growth	---	---	-0.115 (0.369)	0.018 (0.867)	0.037 (0.818)
Financial Development	---	---	---	-0.014 (0.747)	0.015 (0.755)
AR(1)	(0.005)	(0.006)	(0.004)	(0.005)	(0.007)
AR(2)	<b>(0.130)</b>	<b>(0.105)</b>	<b>(0.163)</b>	<b>(0.135)</b>	<b>(0.122)</b>
Sargan OIR	(0.006)	<b>(0.246)</b>	<b>(0.170)</b>	(0.092)	(0.020)
Hansen OIR	<b>(0.304)</b>	<b>(0.562)</b>	<b>(0.649)</b>	<b>(0.953)</b>	<b>(0.939)</b>
DHT for instruments					
(a) Instruments in levels					
H excluding group	<b>(0.631)</b>	<b>(0.719)</b>	<b>(0.366)</b>	<b>(0.499)</b>	<b>(0.568)</b>
Dif(null, H=exogenous)	<b>(0.188)</b>	<b>(0.393)</b>	<b>(0.713)</b>	<b>(0.982)</b>	<b>(0.957)</b>
(b) IV (years, eq (diff))					
H excluding group	<b>(0.250)</b>	<b>(0.210)</b>	<b>(0.825)</b>	<b>(0.644)</b>	<b>(0.672)</b>
Dif(null, H=exogenous)	<b>(0.407)</b>	<b>(0.932)</b>	<b>(0.288)</b>	<b>(1.000)</b>	<b>(0.998)</b>
Fisher	<b>1793.87***</b>	<b>163.99***</b>	<b>249.75***</b>	<b>3296.32***</b>	<b>2321.82***</b>
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. The information criteria include: AR(1), AR(2), Sargan OIR, Hansen OIR, DHT and Fisher tests. The number of countries in the regression output is lower than the number of sampled countries because of issues in degrees of freedom in some variables. AR(1) & AR(2) are tests for first-order and second-order serial correlation in the first-differenced residuals, under the null of no serial correlation. The Hansen test of over-identification is under the null that all instruments are valid. The Diff-in-Hansen tests of exogeneity is under the null that instruments used for the equations in levels are exogenous. The Fisher test for the joint validity of estimated coefficients is under the null that estimated coefficients are jointly not valid.

## 5. Concluding implications, caveats and future research directions

Financial dollarisation in sub-Saharan Africa (SSA) is most persistent compared to other regions of the world. This study has complemented the existing scant literature on dollarisation in Africa by assessing the role of information sharing offices (public credit registries and private credit bureaus) on financial dollarisation in 25 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 dollarisation.

The variables in the conditioning information set largely display the expected signs. Inflation and exchange rate volatility increase financial dollarisation while institutional quality and financial development have the opposite effect. 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 Goal extreme poverty target 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 (Asongu & Nwachukwu, 2017a).

To the best of our knowledge, this is the first study to have empirically shown that the de-dollarisation 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 dollarisation, *inter alia*: market-based incentives, sound macroeconomic policies and micro-prudential measures. In order to sustain efforts towards economic stabilisation, the role of information sharing offices in reducing dollarisation can be enhanced if such credit bureaus are designed to: (i) restore macroeconomic stability (e.g. reducing inflation and ensuring the sustainability of 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-dollarisation, essentially because information sharing offices are closer to the market compared to authorities who may engage authoritative de-dollarisation initiatives that have proven not to work effectively (see IMF, 2015) and (iv) inform market participants on possibilities of adequate rates of return for investments in domestic currency in the medium- and long-terms.

In the GMM specifications, though we have been consistent with recent literature which has assumed that one lag is enough to capture past information (Asongu &

Nwachukwu, 2017b), there could be some variable omission bias in the light of Wintoki et al. (2012, pp. 599). 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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