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Liberalization and financial sector competition: a critical contribution to the empirics with an African assessment

Simplice A. Asongu

African Governance and Development Institute,
P.O. Box 18 SOA/ 1365 Yaoundé, Cameroon.
E-mail: asongusimplice@yahoo.com

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Simplice A. Asongu[1]

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Abstract

This paper investigates how financial, trade, institutional and political liberalization policies have affected financial sector competition in Africa using updated data to appraise second generation reforms. The 'freedom to trade' and 'economic freedom' indices are employed. Hitherto, unexplored financial sector concepts of formalization, semi-formalization, informalization and non-formalization are also introduced. The following findings are established. Firstly, relative to money supply: (1) with the exception of the economic freedom mechanism, liberalization policies have generally decreased the growth of the formal financial sector to the benefit of other financial sectors; (2) apart from the foreign direct investment and economic freedom channels, liberalization policies have been fruitful for semi-formal financial development at the cost of other financial sectors and; (3) with the exception of economic freedom, both the informal and non-formal sectors have developed owing to liberalization to the detriment of the formal financial sector. Secondly, relative to GDP, the semi-formal, informal and/or non-formal financial sectors have also generally improved as a result of liberalization. Policy implications are discussed.

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[1] Simplice A. Asongu is Lead economist in the Research Department of the AGDI (asongus@afridev.org).

1. Introduction

With the International Financial Statistics (2008) financial system definition debunked, the informal financial sector can no longer be marginalized in macroeconomic-based analysis in the face of burgeoning phenomena of mobile banking and knowledge economy. Accordingly, while the International Financial Statistics (2008) definition[2] of the financial system by the International Monetary Fund fails to take the informal financial sector into account, recent financial development literature has incontrovertibly shown a substantial positive correlation between the informal financial sector and soaring trends of mobile banking (Asongu, 2013a) and knowledge economy (Asongu, 2012a) in developing countries. Understanding the role of liberalization policies (especially second generation policies) in financial development from a sector-competition standpoint is of policy relevance for five main reasons. Firstly, the competitive dimension is of critical importance because the chain of structural and policy adjustments (at the financial, economic and political levels that were enshrined in the second generation financial reforms) had the ultimate goal of given impetus to economic growth as well as improving overall economic and financial efficiency (Janine & Elbadawi, 1992). Secondly, the role of financial reforms in financial development in developing countries is crucial because financial intermediation has been substantially documented as indispensible in channeling mobilized resources to economic agents. Thirdly, contrary to developed countries, a great chunk of the monetary based in developing countries does not transit through the formal banking sector, hence the informal financial sector can no longer be put on the margin from a macroeconomic perspective. Fourthly, as recently documented, over the past decade the growth of information and communication technologies has been substantially captured by the informal financial sector for the most part (Asongu,

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[2] Lines 24, 25 and 45 of the International Financial Statistics, October, 2008.

2013a)[3]. Fifthly, the recent wave of financial crises has brought renewed interest in the fierce debate about the lofty goals of liberalization policies and their implications for financial development, especially in developing countries (Kose et al., 2011; Asongu, 2012b).

The global financial crisis has dramatically unraveled the downsides of liberalization, as many emerging and developing economies (which had to grapple with surges in capital flows earlier in the last decade) are now experiencing a sharp reversal of those inflows as a result of the crisis (Kose et al., 2011; Asongu, 2012b). Financial channels that have greased the economic downturn have resurfaced old demons about the ambitions of financial globalization and its implications for growth and volatility (with a particular emphasis on developing countries). The spirit motivating this fear is the fact that, according to theoretical postulation the benefits of financial liberalization are expected to be higher in developing countries[4]. The current wave of liberalization policies began in the 1980s with growing cross border financial flows among industrial economies as well as among developing countries. This was facilitated by the liberalization of capital controls in many of these countries since it was widely anticipated that growing cross-border flows would generate higher appeals in terms of better capital allocation and improve possibilities of international risk-sharing. Accordingly, there has been a consensus among economic policy makers that the benefits ought to be large in developing countries that have more volatile income growth and tend to be relatively capital-poor (Kose et al., 2006).

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[3] It has been recently documented that, mobile banking is negatively correlated with traditional macroeconomic dynamics of depth, efficiency, activity and size. By relaxing the International Financial Statistics (2008) definition on which the indicators are based and considering a previously missing informal financial sector, mobile banking is found to be highly positively correlated with this formerly marginalized informal financial sector.

[4] From a theoretical view, financial globalization should ease the efficient international allocation of capital and promote international risk sharing. These benefits should be much higher for developing countries because they are relatively capital scarce and labor rich. Hence, access to foreign capital should help them increase investment and growth (Asongu, 2012b). Moreover, developing countries have more volatile output than advanced industrial countries which increases their potential welfare gains from international risk sharing (Kose et al., 2011).

With the surge in financial inflows, came a spade of currency and financial meltdowns in the late 1980s and 1990s. This pattern set the course for some change of vision in policy-making and academic circles, with some scholars advocating that developing countries opening-up their capital accounts have been more vulnerable to crises (and correspondingly more adversely affected) than their industrial counterparts (Kose et al., 2011; Henry, 2007; Asongu, 2012b). These developments have ignited a fierce and heated debate among academics and practitioners over the appeals of liberalization policies. While the debate over the positive gains from trade liberalization has been less heated and biased towards a consensus (Kose et al., 2006), that on the appeals of other liberalization policies (especially capital account openness) has intensified and become even more polarized (Asongu, 2012c).

Most African countries embarked on a chain of structural and policy adjustments at the financial, economic and political levels in the 1980s and 1990s. While a substantial bulk of the literature has examined the impact of financial reforms on financial development (Arestis et al., 2002; Batuo & Kupukile, 2010; Batuo et al., 2010; Asongu, 2012c), surprisingly, as far as we have reviewed there is currently no study that has investigated the incidence of these reforms (that targeted economic and financial efficiency) on financial sector competition. Hence, drawing from the experience of a continent that has been implementing development financial reforms, this study aims to investigate the incidence of liberalization policies on financial sector competition. This paper has a threefold contribution to the literature.

First, consistent with O'Toole (2012) many studies have been limited to more specific elements of the banking market structure like bank concentration and foreign bank participation. We steer clear of this mainstream approach by focusing on banking sector competition. While a substantial bulk of the literature has examined the impact of financial reforms on financial development (Arestis et al., 2002; Batuo & Kupukile, 2010; Asongu,

2012c), we argue that failure to introduce the informal financial sector that captures burgeoning financial activities (as highlighted in the first paragraph) is a substantial missing link in the literature. Accordingly, this contribution also draws from the burgeoning phenomenon of knowledge economy (Asongu, 2012a) and soaring mobile banking activities (Asongu, 2013a) that are captured by the informal financial sector for the most part.

Second, the present paper unites two streams of research by contributing at the same time to the macroeconomic literature on measuring financial development and responding to the growing field of economic development by means of informal sector promotion, microfinance, mobile banking, knowledge economy…etc, in suggesting a practicable way to disentangle the effects of various liberalization policies on financial sectors. Hence, we introduce measures of absolute and relative 'informal financial sector importance' as well as hitherto unexplored concepts of financial sector formalization, semi-formalization, informalization and non-formalization.

Third, by employing a plethora of liberalization policies (financial, trade, institutional, political et al.), we present a broad and exhaustive picture of the nexuses among liberalization policies and financial sector importance. Moreover, as opposed to past studies, the use of an updated data span (1996-2010) that captures second generation reforms provides results with more focused and updated policy implications.

The remainder of this paper is organized in the following manner. Section 2 presents the theoretical highlights and discusses the relevant literature before presenting propositions for testing the hypotheses challenging existing views. The data and methodology are discussed in Section 3. Empirical analysis is covered in Section 4. Section 5 concludes.

2. Theoretical highlights, literature, hypotheses and propositions

2.1 Theoretical highlight, finance and development

2.1.1 Theoretical highlights

Consistent with Fugazza & Fiess (2010), the conventional view sustains that liberalization would cause a rise in informality. Though the consensus is not universal, it is widely believed that globalization (especially) trade liberalization would increase competition for domestic producers. Accordingly, in attempts to mitigate production cost, domestic producers will seek to informally produce inputs from cheaper sources in order to reap of the benefits from informal production because informal producers for the most part do not comply with fiscal and legal regulations. In essence, increasing demand for informally produced commodities is expected to increase the informal sector in the aftermath of liberalization.

2.1.2 Background and motivation

Consistent with Batuo & Asongu (2014), most African countries under constraints by the Bretton Woods institutions embarked on a series of structural adjustment policies in which financial, trade, political and institutional liberalizations were central. Inter alia, the liberalization measures entailed policies that promoted free trade, deregulation, price controls and rationing, elimination of subsidies and privatization or downsizing or public services (Woodward, 1992; Asongu, 2014a). Trade, financial and institutional reforms are the most discussed forms (Batuo & Asongu, 2014).

Firstly, the objective of trade liberalization was that, removing trade barriers will lead to overall short-term welfare gain as well as poverty and inequality mitigation. In the medium term, trade liberalization is expected to stimulate economic growth and reap the efficiency (or static) rewards of trade. In the long-term, the potential positive effects include: the benefits of scale and competition; the flexibility induced by relying on market signals, and the constraints

on government incompetence or corruption (Grossman & Helpmann, 1991). Secondly, the goal of financial reforms was to improve financial and economic efficiency as well as provide impetus to growth (Janine & Elbadawi, 1992). Consistent with Batuo et al. (2010), first generation reforms adopted entailed: abolishing explicit controls on pricing and allocation of credit, relaxing controls on international capital movements, allowing of interests rates to be market-determined and reduction of direct government intervention in bank credit decisions. On the other hand, the second generation of reforms focused on institutional and structural adjustment constraints, rehabilitation of financial infrastructure, restoration of bank soundness and amelioration of supervisory, regulatory, institutional and legal environments.

Third, the dimension of institutions is the liberalization policies is crucial because, it is evident that the ability to design and implement structural adjustment programs is substantially a consequence of political commitment, skills, capacities and the independence, probity and competence of the bureaucracy. This institutional dimension surfaced because of failures and setbacks of structural adjustment programs in the 1980s as well as the functional and normative ideals of the politics of neoliberal thinking which were at the center of the strategies of Bretton Wood institutions (Batuo & Asongu, 2014).

In light of the above, relative to African states, many East Asian countries have achieved remarkable economic growth and development without better espousing the policies of the Bretton Wood institutions: a contradiction that is most relevant in the financial sector (O'Toole, 2012). In essence, Andersen et al. (2012) have pointed to the fact that countries in the fastest growing region in the world over the past two decades (of East Asia and the Pacific), have recorded the lowest levels of financial reforms as measured by Abiad et al. (2010). It follows that the relevance of foreign-led reforms in Africa for financial development could be questioned in light of the East Asian success story. As O'Toole (2012) has noted, in assessing how financial reforms have led to financial development Andersen et

al. (2012) has failed to isolate the potential channels via which the financial reforms could affect economic growth. The purpose of this paper is also to indirectly fill this gap in the African finance literature by considering three main financial sectors: formal, semi-formal and informal. Moreover, as sustained by Batuo & Asongu (2014), the liberalization literature has been limited to only a few dimensions of implemented policy reforms. This study is also a response to a recommendation by the authors to exhaustively assess the plethora of liberalization policies for more policy options.

2.1.3 Liberalization and financial sector activities

While the operations of the informal financial sector are not regulated, policies formulated by authorities affect them indirectly, whether favorably or adversely, essentially because informal finance inherently complements the formal component (Hoff & Stiglitz, 1998; Adeusi et al., 2012). Despite the fact that a substantial chunk of the monetary base circulates outside the formal banking sector in African countries, researchers have predominantly used financial development benchmarks of developed countries to assess financial development in the continent (Cho et al., 1986; Arestis et al., 2002; Ataullah et al., 2004; Al-Obaidan, 2008; Batuo & Kupukile, 2010). In essence, while liberalization policies targeted the formal financial sector for the most part, their incidence on other financial sectors has been relatively limited (Adeusi et al., 2012) and remained a 'black box' (Hyuha et al., 1993). An example of how liberalization policies affected informal finance could be understood from the higher prices charged by banks which paved the way for the expansion of the informal financial sector (Adeusi et al., 2012). Moreover, liberalization of the Information and Communication Technology sector has accelerated the burgeoning phenomenon of mobile banking that has substantially improved the informal banking sector to the detriment of the formal sector (Asongu, 2013a).

Consistent with Aryeetey (2005), in spite of institutional and structural reforms, there

has remained a credit gap in the financing of small and medium size enterprises that could only be filled by the informal and semi-formal financial sectors. According to the author, as would be expected by new structuralist economics, there are pressures on informal financial units to provide appropriate supporting finance to the private sector. According to this narrative under competitive market conditions, when firms fail to secure formal loans, they would obviously replace them with informal finance. Today, the substantially documented issues of surplus liquidity in African financial institutions is an indication that the liberalization measures implemented by countries in this continent might have substantially affected the informal financial sector due to credit rationing and information asymmetry in the formal banking sector (Saxegaard, 2006; Fouda, 2009; Asongu, 2014b,c)[5].

In fact, how liberalization has affected both formal and informal sectors as well as the changing contributions of the informal sector have remained crucial issues in the literature (Bairagya, 2010). According to the author, for all industrial units including small home-based enterprises in the informal sector, liberalization exposed to the inherent risk of free market competition. Hence, the incidence of economic liberalization generally fit on both formal and informal sectors (and the entire economy). For example, the shares of informal and informal sectors in terms of productivity, employment, income to the whole economy have been changing with the advent of liberalization activities. This is part of the motivation for the 'financial sector competition' intuition of this paper[6]. Accordingly, a substantial body of the literature has pointed to the little scholarly attention received on the nexus between liberalization and informality (Bairagya, 2010; Fugazza & Fiess, 2010). As far as we have reviewed, most of the literature that has addressed these issues have focused on the economic

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[5] In fact the literature has already covered exhaustive case studies showing how institutions deteriorated with the advent of liberalization policies. Consistent with Asongu (2011a), this is the case of many developing countries in Africa (Lemarchand, 1972), Southeast Asia (Scott, 1972), India (Wade, 1985) and Turkey (Sayari, 1977); post 1990 communist countries like Russia (Varsee, 1997) and many Latin American countries upon different waves of democratization (Weyland, 1998).

[6] Sector competition is even more evident because Bairagya (2010) has concluded that linkages between the formal and informal sectors help grow the informal manufacturing sector.

implications of liberalization (Chaudhuri & Banerjee, 2007; Chaudhuri et al., 2006; Chaudhuri & Mukherjee, 2002; Ghosh & Paul, 2008; Beladi & Yabuuchi, 2001; Marjit & Kar, 2007; Marjit & Maiti, 2005). The few studies that have assessed the financial implications of the phenomenon have failed to rethink the basic premises for the relevance financial indicators (Aryeetey, 2005; Adeusi et al., 2012)

2.2 Rethinking financial development indicators and first generation solutions

As underlined by recent African finance literature (Asongu, 2012a, 2013a), financial development indicators have been universally employed without due regard to country- and regional-specific financial development contexts or realities. Accordingly, the use of indicators is simply motivated by a presumption of universal validity (Gries et al., 2009)[7]. To the best of our knowledge, only a few papers have been directly focused on the quality of financial indicators with respect to development contexts (Beck et al., 1999; Asongu, 2012a, 2013a). A plethora of studies have identified the issues but failed to directly tackle them (Demetriades & Hussein, 1996; Khumbhakar & Mavrotas, 2005; Ang & McKibbin, 2007; Abu-Bader & Abu-Qarn; 2008). Therefore, a substantial bulk of the literature is consistent with the position that, financial depth in the perspective of money supply is not equal to liquid liabilities in every development context: essentially, because a great chunk of the monetary base in certain countries circulates outside the formal banking sector. We discuss the remainder of this section in two strands: the context of the problem and first generation solutions.

The issue revolves around the International Financial Statistics definition of the financial system that is biased toward developed countries. According to this definition, while the financial system consists of the formal and semi-formal financial sectors, the informal

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[7]Gries et al. (2009) state: "*In the related literature several proxies for financial deepening have been suggested, for example, monetary aggregates such as Money Supply (M2) on GDP. To date there is no consensus on the on the superiority of any indicator*" (p. 1851).

financial sector is marginal[8]. However, recent literature has demonstrated the relevance of the informal financial sector in Knowledge Economy (Asongu, 2012a) and mobile banking (Asongu, 2013a) that are substantially mitigating African income inequality (Asongu, 2013b).

In essence, money supply which represents the money stock in an economy has been used for decades as the standard measurement of liquid liabilities (World Bank, 1989; King & Levine, 1993). While this appreciation is quasi-true in the developed world, its relevance in developing countries has been substantially questioned. Critics have emphasized that in less developed nations, an improvement in money supply may reflect an extensive use of currency instead of an improvement in formal financial system deposits (liquid liabilities). Two generations of solutions have emerged in attempts to address the concern.

To the best of our knowledge, first generation solutions consist of a strand of studies that have questioned the universality of the International Financial Statistics' financial system definition. While this class of studies has identified the concern, it has addressed it only superficially without given due consideration to the informal financial sector. First, some authors have addressed the shortcoming by subtracting currency outside banks from money supply in the measurement of liquid liabilities (Demetriades & Hussein, 1996; Abu-Bader & Abu-Qarn, 2008). Second, another class of authors has sought to address to issue by deriving an indicator that broadly reflects financial depth. They have employed the first principal component of money supply and a plethora of other financial indicators (Khumbhakar & Mavrotas, 2005; Ang & McKibbin, 2007; Gries et al., 2009). This approach decreases the dimensionality of a set of highly correlated variables into an indicator or index without the loss of much information from the initial dataset. Hence, problems related to the quality of money supply as a proxy for liquid liabilities are mitigated. The principal setback of this solution is that money supply is juxtaposed with concepts of financial allocation efficiency

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[8] Lines 24, 25 and 45 of the IFS (2008).

(bank credit/bank deposits), financial size (deposit bank assets/central bank assets plus deposit bank assets), financial activity (private domestic credit)…etc. A common feature in the above two strands of solutions is the complete neglect of the informal financial sector.

Asongu (2012a, 2013a) has tackled these concerns by neither marginalizing the informal financial sector nor juxtaposing financial development concepts. He has provided a practicable way of disentangling the effects of the formal, semi-formal and informal financial sectors encompassed in money supply.

2.3 Propositions from second generation solutions and hypotheses

The second generation solutions proposed are motivated by the incorporation of the informal financial sector. As shown in Appendix 1, this previously missing component is integrated into the conception and definition of the financial system. We also decompose the existing measurement by the International Financial Statistics into its formal and semi-formal components. Table 1 below presents the propositions. While Panel A presents GDP-based measures, money supply indicators are presented in Panel B. Whereas improvements in the shares of propositions in the first panel are broad and relative to the general economic prosperity of a nation, improvements in the shares of propositions in the second panel are relative to money supply, implying one financial sector improves its share in money supply to the detriment of other sectors. Hence, they are measures of financial sector importance and/or competition (Asongu, 2013c). Propositions 1 & 5, 2 & 6, 3 & 7, and 4 & 8 respectively represent formal, semi-formal, informal and non-formal (semi-formal & informal) financial development.

Table 1: Summary of propositions

Panel A: GDP-based financial development indicators			
Propositions	Name(s)	Formula	Elucidation
Proposition 1	Formal financial development	Bank deposits/GDP	Bank deposits[9] here refer to demand, time and saving deposits in deposit money banks.
Proposition 2	Semi-formal financial development	(Financial deposits – Bank deposits)/ GDP	Financial deposits[10] are demand, time and saving deposits in deposit money banks and other financial institutions.
Proposition 3	Informal financial development	(Money Supply – Financial deposits)/GDP	
Proposition 4	Informal and semi-formal financial development	(Money Supply – Bank deposits)/GDP	
Panel B: Measures of financial sector importance			
Proposition 5	Financial intermediary formalization	Bank deposits/ Money Supply (M2)	From 'informal and semi-formal' to *formal* financial development (formalization)[11].
Proposition 6	Financial intermediary 'semi-formalization'	(Financial deposits - Bank deposits)/ Money Supply	From 'informal and formal' to *semi-formal* financial development (Semi-formalization)[12].
Proposition 7	Financial intermediary 'informalization'	(Money Supply – Financial deposits)/ Money Supply	From 'formal and semi-formal' to *informal* financial development (Informalisation)[13].
Proposition 8	Financial intermediary 'semi-formalization and informalization'	(Money Supply – Bank Deposits)/Money Supply	Formal to '*informal and semi-formal*' financial development: (Semi-formalization and informalization)[14]

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

In light of the preceding sections, the empirical section shall examine the following testable hypotheses.

Hypothesis 1: Liberalization improves the competitiveness of the formal financial sector. Proposition 1 and Proposition 5 will tackle this hypothesis.

Hypothesis 2: Liberalization improves the competitiveness of the semi-formal financial sector. Proposition 2 and Proposition 6 will address this hypothesis.

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[9] Lines 24 and 25 of the International Financial Statistics (October 2008).

[10] Lines 24, 25 and 45 of the International Financial Statistics (2008).

[11] Accordingly, in undeveloped countries money supply is not equal to liquid liabilities or bank deposits. While in undeveloped countries bank deposits as a ratio of money supply is less than one, in developed countries this ratio is almost equal to 1. This indicator appreciates the degree by which money in circulation is absorbed by the banking system. Here we define 'financial formalization' as the propensity of the formal banking system to absorb money in circulation.

[12] This indicator measures the rate at which the semi-formal financial sector is evolving at the expense of formal and informal sectors.

[13] This proposition appreciates the degree by which the informal financial sector is developing to the detriment of formal and semi-formal sectors.

[14] The proposition measures the deterioration of the formal banking sector in the interest of other financial sectors (informal and semi-formal). From common sense, propositions 5 and 8 should be almost perfectly antagonistic, meaning the former (formal financial development at the cost of other financial sectors) and the latter (formal sector deterioration) should almost display a perfectly negative degree of substitution or correlation (See Appendix 2).

Hypothesis 3: Liberalization ameliorates the competiveness of the informal financial sector. Proposition 3 and Proposition 7 will tackle this hypothesis.

Hypothesis 4: Liberalization improves the competiveness of the non-formal financial sector. Proposition 4 and Proposition 8 will address this hypothesis.

In the light of the theoretical and empirical underpinnings covered above, the hypotheses and propositions challenge existing views in at least four dimensions: (a) the definition of the financial system; (b) disentangling the existing measurement into formal and semi-formal financial sectors; (c) adding the previously missing informal sector to the definition and; (d) the challenge of assessing channels of liberalization for potential poverty mitigation is for the first time seen from various financial sector lenses because of recent evidence on the substantial relevance of informal finance in African development (Aryeetey, 2005; Adeusi et al., 2012; Asongu, 2013a,b,c; Meagher, 2013). How these challenges to existing conceptions contribute to existing literature has already been substantially covered in the introduction.

3. Data and Methodology

3.1 Data

We assess a panel of 28 African countries with annual data from the African Development Indicators of the World Bank, Chinn & Ito (2002), Gwartney et al. (2011) and, the Financial Development and Structure Database for the period 1996 to 2010[15]. Limitations to the number of countries and periodicity of analysis have a twofold justification: (1) constraints in data availability on institutional quality and; (2) the motivation of capturing the effects of second generation reforms (that targeted institutional and structural constraints) in a bid for more focused and updated policy implications.

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[15] We restrict our sample to African countries because of their relatively lower levels in formal financial development and higher need for informal sector promotion. Unlike in the developed world, the informal and semi-formal financial sectors play an important role in the economic prosperity of developing countries (Ang & McKibbin, 2007; Abu-Bader & Abu-Qarn, 2008).

The dependent variables are absolute and relative measures of financial sector competition recently documented in the financial development literature (Asongu, 2012a). These variables as defined in Appendix 2 are the result of a rethinking of the International Financial Statistics (2008) financial system definition that does not incorporate the informal financial sector into its definition of the financial system[16]. Hence, by relaxing the International Financial Statistics (2008) definition and introducing a previously missing informal financial sector (as well as disentangling the pre-existing measurement into its constituent components), absolute and relative financial development indicators have been theoretically proposed and empirically validated in recent financial development literature (Asongu, 2012a, 2013a).

For the independent variables, we distinguish among five types of liberalization policies: financial, trade, institutional, political and other liberalizations. (1) Financial liberalization is proxied with: *de jure* capital account openness (KAPOPEN), developed by Chinn & Ito (2002); and *de facto* capital account openness (foreign direct investment: FDI). KAOPEN is the first principal component of four binary indicators in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions and it takes higher values for more open financial regimes. We are motivated to add subtlety to the analysis by complementing KAOPEN with FDI because: the former may not capture the actual ebb and flow of cross border capital and its impact (Aizenman et al., 2009); the private sector often circumvents capital account restrictions, nullifying the expected effect of regulatory capital controls (Edwards, 1999) and; more recently, China's *de facto* openness, despite its *de jure* closeness has been subject to discussion in research circles (Prasad & Wei, 2007; Aizenman & Glick, 2009; Shah & Patnaik, 2009). (2) Trade liberalization is measured by trade openness and exports. Whereas the former is the sum of imports and exports of commodities as a % of

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[16] Lines 24, 25 and 45 of the International Financial Statistics, October, 2008.

GDP, the latter only consists of commodity exports on GDP. (3) Institutional liberalization is the first principal component of six government quality indicators: corruption-control, government effectiveness, rule of law, regulation quality, political stability and voice & accountability. (4) Political liberalization is measured by the Democracy index. (5) Other liberalization measures include: economic freedom and 'freedom to trade' (Gwartney, 2011). 'Freedom to trade internationally' is an index encompassing: taxes on international trade (international trade tax revenues as % of trade sector; mean tariff rate and standard deviation of tariff rates); regulatory trade barriers (non tariff trade barriers and compliance cost of exporting and importing); size of trade sector relative to expected; black market exchange rates and international market capital controls ('foreign ownership /investment' restrictions and capital controls). Economic freedom broadly represents: legal structure and security of property rights; freedom to trade internationally; access to sound money; size of government (expenditures, taxes and enterprises) and; regulation of credit, labor and business. These liberalization measures have been used in recent African financial literature (Asongu, 2013d; Batuo & Asongu, 2014).

Control variables include: inflation, government expenditure, human development, economic prosperity (GDP growth), foreign aid and population growth. The expected sign of inflation is unclear. While low and stable inflation rates generally provide a favorable environment for financial development, high inflation on the other hand, does quite the opposite. In addition, recent African finance literature has established a negative association between inflation and financial intermediary allocation efficiency (Asongu, 2013a). Economic prosperity, human development and population growth should be positive to financial development (Asongu, 2011b). The effects of development assistance and government expenditure are contingent on the quality of institutions. They would naturally improve

financial development if the budget allocated for investment is not misallocated through corrupt practices (Ndikumana, 2000).

The 'summary statistics' (Panel A of Table 2) of the variables used in the panel regressions reveals that there is quite some variation in the data utilized so that one should be confident that reasonable estimated nexuses should emerge. Countries examined are presented in Panel B of Table 2. Details about the correlation analysis (showing the nexuses among key variables used in the study), and variable definitions are presented in the appendices. The object of the correlation matrix (Appendix 3) is to explore issues resulting from overparametization and multicollinearity. Based on a preliminary analysis of the correlation coefficients, there do not appear to be any disturbing issues in terms of the relationships to be estimated. In Appendix 2, the variables are defined and the corresponding sources revealed.

Table 2: Summary statistics and presentation of countries

	Panel A: Summary Statistics					
		Mean	S.D	Min	Max	Obser.
GDP-based	Proposition 1	0.255	0.204	0.036	0.935	363
financial	Proposition 2	0.003	0.010	-0.007	0.097	419
development	Proposition 3	0.050	0.055	-0.292	0.198	419
indicators	Proposition 4	0.053	0.057	-0.290	0.244	419
	Proposition 5	0.749	0.161	0.175	1.456	360
M2-based financial	Proposition 6	0.011	0.036	-0.024	0.224	360
development	Proposition 7	0.238	0.161	-0.457	0.824	360
indicators	Proposition 8	0.238	0.161	-0.457	0.824	360
Financial	KAOPEN	-0.505	1.278	-1.843	2.477	392
Liberalization	Foreign Direct Investment (FDI)	2.777	4.252	-8.629	36.114	346
Trade	Trade	68.687	29.967	21.574	187.68	401
Liberalization	Exports	30.245	14.618	5.820	69.032	401
Institutional &	Institutional Index	0.088	2.152	-4.569	5.233	320
Political Liberalizations	Democracy	3.263	3.959	-8.000	10.000	224
Other	Freedom to Trade	6.060	0.917	3.400	8.100	250
Liberalizations	Economic Freedom	6.118	0.632	4.710	7.820	250
	Inflation	7.239	9.496	-100.00	46.561	395
	Government Expenditure	4.304	10.670	-34.882	61.364	298
Control Variables	Human Development	1.913	8.0128	0.204	47.486	341
	Economic Prosperity	4.273	3.710	-16.740	27.462	420
	Foreign Aid	9.447	8.946	-0.251	54.785	392
	Population growth	2.275	0.741	0.042	4.146	420

Panel B: Presentation of Countries

Botswana, Cameroon, Ivory Coast, Egypt, Ethiopia, Gabon, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mauritania, Mauritius, Morocco, Nigeria, Senegal, Sierra Leone, South Africa, Tanzania, Tunisia, Uganda, Zambia, Niger, Mali, Guinea, Burkina Faso, Burundi, Central African Republic.

S.D: Standard Deviation. Min: Minimum. Max: Maximum. Obser: Observations.

3.2 Methodology

3.2.1 Principal Component Analysis

Principal component analysis is a method used to reduce variables numbers. Due to the high correlation among various good government quality indicators, one might question the redundancy of some information. Therefore, we use principal component analysis to reduce the dimensions of: government-effectiveness, voice & accountability, rule of law, corruption-control, regulation quality and political stability. Principal component analysis is a widely employed statistical technique used to reduce a larger set of correlated variables into a smaller set of uncorrelated variables called principal components that account for most of the information in the original data set. In the selection of the principal components, the criteria applied to determine how many common factors to retain are obtained from Kaiser (1974) & Jolliffe (2002). The authors recommend a Kaiser 1 criterion which consists of selecting principal components with an eigenvalue greater than one because it represent a substantial portion of common information among the set of correlated variables. Therefore, only a principal component with an eigenvalue greater than one is retained. As shown in Table 3 below, the first principal component is appropriate since it has an eigenvalue of 4.705 and represents more than 78% of information in the institutional indicators combined. This first principal component will subsequently represent the institutional liberalization index.

Table 3: Principal Component Analysis for Institutional Index (Instidex)

Principal Components	Component Matrix(Loadings)						Proportion	Cumulative Proportion	Eigen Value
	V & A	**R.L**	**R.Q**	**G.E**	**PS**	**CC**			
First P.C	0.369	0.435	0.412	0.425	0.388	0.416	0.784	0.784	4.705
Second P.C	-0.690	0.103	0.258	0.436	-0.453	0.227	0.083	0.867	0.499
Third P.C	-0.591	0.187	-0.299	-0.051	0.724	0.002	0.054	0.922	0.327

P.C: Principal Component. V& A: Voice & Accountability. R.L: Rule of Law. R.Q: Regulation Quality. GE: Government Effectiveness. PS: Political Stability. CC: Control of Corruption.

3.2.2 Estimation technique

When compared with cross-country analysis, estimation with dynamic panel data has some important upsides and one downside (Demirgüç-Kunt & Levine, 2008). On the positive side: (1) it makes use of both time series and the cross sectional variations in the data; (2) in cross-country regressions, the unobserved country-specific effect is part of the error term, so that correlations between the error term and the exogenous variables results in biased estimated coefficients. More so, in cross-country regressions, if the lagged dependent variable is included among the explanatory variables, the country-specific effect is certainly correlated with the regressors. A measure of controlling for the presence of the unobserved country-specific effect is to first-difference the regression equation to eliminate the country-specific effect and, then make use of instrumental variables to control for endogeneity[17]. Addressing the endogeneity concern is the second positive side of dynamic panel data analysis. Uncontrolled endogeneity can substantially bias estimates and lead to misleading inferences and unhealthy policy recommendations. Dynamic panel data analysis addresses this endogeneity issue by using lagged values of exogenous variables as instruments.

The principal downside linked with dynamic panel data analysis is using data-averages over shorter time spans. Consequently, the estimated results reveal short-run impacts and not long-term effects, which should be kept in mind when interpreting and discussing results. The redeeming feature however is that, the use of average data mitigates short-run disturbances that may loom substantially large.

The dynamic panel regression model is expressed as follows:

$$FSD_{i,t} = \sigma_0 + \sigma_1 FSD_{i,t-1} + \sigma_2 F_{i,t} + \sigma_3 T_{i,t} + \sigma_4 I_{i,t} + \sigma_5 P_{i,t} + \sigma_6 O_{i,t} + \sigma_y W_{i,t} + \eta_i + \xi_t + \varepsilon_{i,t} \qquad (1)$$

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[17] More generally, a variable is endogenous when it is correlated with the error term. Endogeneity can result from autoregression with autocorrelated errors, simultaneity or omitted variables and measurement error. Moreover, a loop of causality between the dependent parameter and the independent variable results in endogeneity.

Where 't' stands for the period and 'i' represents a country. *FSD* is financial sector development; F, financial liberalization (KAOPEN and FDI); T, trade liberalization (trade and exports); I, institutional liberalization (Instidex); P, political liberalization (democracy); O, other liberalizations (economic freedom and freedom to trade). $W_{i,t}$ is a vector of control variables (inflation, government expenditure, human development, economic prosperity, foreign aid and population growth)[18] with $6 < y < 13$ (y being the subscript corresponding to the estimated coefficient), η_i is a country-specific effect, ξ_t is a time-specific constant and $\varepsilon_{i,t}$ an error term.

Estimates will be unbiased if and only if, the explaining variables above are strictly exogenous. Unfortunately, this is not the case in the real world because: (1) while they have a substantial incidence on financial sector development, the reverse effect cannot be ruled-out because the importance of financial sectors in an economy also have some bearing on the plethora of regressors; (2) the regressors could be correlated with the error term ($\varepsilon_{i,t}$) and; (3) country- and time-specific effects could also be correlated with other variables in the model, which is often the case with lagged dependent variables included in the equations. Hence, an issue of endogeneity emerges as a result of endogenous regressors. A way of dealing with the problem of the correlation between the individual specific-effect and the lagged dependent variables involves eliminating the individual effect by first differencing. Therefore Eq. (1) becomes:

$$FSD_{i,t} - FSD_{i,t-1} = \sigma_1(FSD_{i,t-1} - FSD_{i,t-2}) + \sigma_2(F_{i,t} - F_{i,t-1}) + \sigma_3(T_{i,t} - T_{i,t-1}) + \sigma_4(I_{i,t} - I_{i,t-1})$$
$$+ \sigma_5(P_{i,t} - P_{i,t-1}) + \sigma_6(O_{i,t} - O_{i,t-1}) + \sigma_y(W_{i,t} - W_{i,t-1}) + (\xi_t - \xi_{t-1}) + (\varepsilon_{i,t} - \varepsilon_{i,t-1}) \quad (2)$$

However Eq. (2) presents another concern; estimation by Ordinary Least Squares (OLS) is still biased because there remains a correlation between the lagged endogenous independent variable and the error term. In order to tackle this further concern, we estimate

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[18] We have already discussed the expected signs of control variables in the Data section.

the regression in differences jointly with the regression in levels using the Generalized Method of Moments (GMM) estimation. The technique uses lagged levels of the regressors as instruments in the difference equation, and lagged differences of the regressors as instruments in the level equation, hence exploiting all the orthogonality conditions between the lagged dependent variables and the error term. Between the difference GMM estimator (Arellano & Bond, 1991) and the system GMM estimator (Arellano & Bover, 1995; Blundell & Bond, 1998), we go for the latter with respect to Bond et al. (2001, 3-4)[19].

In specifying the dynamic panel system estimation, we opt for the *two-step* GMM because it corrects the residuals for heteroscedasticity. In the *one-step*, the residuals are considered to be homoscedastic. The assumption of no auto-correlation in the residuals is relevant as past lagged variables are to be used as instruments for the endogenous variables. Moreover, the estimation depends on the hypothesis that the lagged values of the dependent variable and other independent variables are valid instruments in the regression. When the error terms of the level equation are not auto-correlated, the first-order auto-correlation of the differenced residuals should be significant while their second-order auto-correlation: *AR(2)* should not be. The validity of the instruments is investigated with the Sargan over-identifying restrictions (OIR) test. In summary, the main arguments for using the system GMM estimation are that: it does not eliminate cross-country variation, it mitigates potential biases of the difference estimator in small samples and, it can control for the potential endogeneity of all regressors (Asongu, 2013e).

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[19] "*We also demonstrate that more plausible results can be achieved using a system GMM estimator suggested by Arellano & Bover (1995) and Blundell & Bond (1998). The system estimator exploits an assumption about the initial conditions to obtain moment conditions that remain informative even for persistent series, and it has been shown to perform well in simulations. The necessary restrictions on the initial conditions are potentially consistent with standard growth frameworks, and appear to be both valid and highly informative in our empirical application. Hence we recommend this system GMM estimator for consideration in subsequent empirical growth research*". Bond et al. (2001, pp. 3-4).

4. Empirical analysis and discussion of results

4.1 Presentation of results

This section aims to examine the testable hypotheses outlined in Section 2.3.

Table 5, Table 6, Table 7 and Table 8 below present results on the investigation of Hypothesis 1, Hypothesis 2, Hypothesis 3 and Hypothesis 4 respectively. Regardless of tables, the first (last) four columns represent models with the GDP-based (M2-based) financial sector competition dependent variables. The findings of Tables 5-8 are summarized in Table 4 from which the following general conclusions could be established. (1) With the exception of the economic freedom mechanism, liberalization policies have generally decreased the growth of the formal financial sector to the benefit of other financial sectors (see Proposition 5). (2) Apart from FDI and economic freedom mechanisms, liberalization policies have been fruitful for semi-formal financial sector development at the cost of other financial sectors (see Proposition 6). (3) With the exception of economic freedom, both the informal (Proposition 7) and non-formal (Proposition 8) sectors have developed owing to liberalizations to the detriment of the formal financial sector. (4) Relative to GDP, the semi-informal (Proposition 2), informal (Proposition 3) and/or non-formal (Proposition 4) financial sectors have also generally improved as a result of liberalization. (5) *De facto* capital account openness (FDI) and democracy have been detrimental to formal financial development (relative to GDP) and the absence of clear sign in the effect of trade (Proposition 5) is the result of short-run disturbances that may loom substantially large in the formal banking sector. Hence, business cycle fluctuations affect the results as one move from two to three-year nonoverlapping intervals.

The significant control variables have the expected signs: development assistance, government expenditure, population growth and economic prosperity broadly improve various financial sectors. The negative incidence of economic freedom on the non-formal

(semi-formal and informal) financial sector is due to the weight of its legal component (see definition in Section 3.1 and high correlation (0.68) with the institutional index (*Instidex*) in Appendix 3). Accordingly, institutional red-tape and too much regulation greatly deter the non-formal financial development (Batuo et al., 2010).

Table 4: Summary of the results

		Hypothesis 1 Formal F.S		Hypothesis 2 Semi-formal F.S		Hypothesis 3 Informal F.S		Hypothesis 4 Nonformal F.S	
		Prop. 1	Prop.5	Prop.2	Prop.6	Prop.3	Prop.7	Prop.4	Prop.8
Financial Liberalization	KAOPEN	na	-	+	na	+	+	+	+
	FDI	-	na	na	-	na	+	na	+
Trade Liberalization	Trade	na	?	na	na	+	na	+	+
	Exports	na	-	+	+	+	+	+	+
Institutional Liberalization	Instidex	na	-	na	+	na	na	na	na
Political Liberalization	Democracy	-	na	na	+	+	na	na	na
Other Liberalizations	TFree	na	°	°	°	°	°	na	°
	EFree	na	+	-	-	-	-	-	-

Prop: Proposition. F.S: Financial Sector. KAOPEN: *de jure* capital account openness. FDI: *de facto* capital account openness. Instidex: First principal component of corruption-control, government effectiveness, rule of law, regulation quality, voice & accountability and political stability. TFree: Freedom to Trade. EFree: Economic Freedom. ?: both positive and negative signs. na: not applicable due to insignificant estimates. °: not used in the regressions because of issues of overparametization and multicolinearity.

One conclusion stands out clear from findings in Table 5 below: globalization has generally mitigated the formal financial sector in the interest of other financial sectors. A slight exception to this finding that is consistent with the theoretical underpinnings outlined in Section 2.1 is the economic freedom channel. The results of Proposition 1 are broadly consistent with those of Proposition 5 in this conclusion.

Table 5: Two-step System GMM estimation for Hypothesis 1

		Dependent variable: Formal Financial Development							
		Formal Financial Development (Prop.1)				Financial Development Formalization (Prop.5)			
		Two Year NOI		Three Year NOI		Two Year NOI		Three Year NOI	
Constant		0.017	-0.068	0.024	-0.033	-0.131	-0.052	**0.052***	**-0.275****
		(0.169)	(-0.283)	(0.291)	(-0.257)	(-1.413)	(-0.362)	**(1.878)**	**(-2.104)**
Finance_1		**1.099***	**1.145***	**1.115***	**1.158***	**1.019***	**1.131***	**1.244***	**1.116***
		(17.63)	**(5.179)**	**(12.28)**	**(9.031)**	**(7.546)**	**(7.712)**	**(36.53)**	**(17.73)**
Financial Liberalization	Kaopen	0.0005	-0.001	0.003	0.001	**-0.008****	-0.002	**0.004***	**-0.013***
		(0.131)	(-0.100)	(0.515)	(0.176)	**(-2.057)**	(-0.738)	**(2.814)**	**(-2.869)**
	FDI	0.0006	0.003	**-0.002***	-0.001	0.001	0.0002	0.0004	-0.003
		(0.451)	(1.200)	**(-1.649)**	(-0.602)	(0.960)	(0.111)	(0.899)	(-1.425)
Trade Liberalization	Trade	-0.000	---	0.000	---	**-0.0004****	---	**0.0001***	-0.0007
		(-0.007)		(0.131)		**(-2.926)**		**(1.709)**	(-1.303)
	Exports	---	0.0001	---	-0.000	---	**-0.0008****	---	
			(0.194)		(-0.247)		**(-2.247)**		
Institutional &Political Liberalizations	Instidex	-0.001	0.006	0.003	0.001	0.001	0.003	0.0004	**-0.011***
		(-0.222)	(1.043)	(1.084)	(0.329)	(0.384)	(0.988)	(0.261)	**(-1.646)**
	Demo	-0.0004	**-0.002***	**-0.001***	**-0.001***	0.0001	-0.001	0.0001	0.001
		(-0.632)	**(-1.927)**	**(-3.217)**	**(-2.425)**	(0.247)	(-0.652)	(0.176)	(0.605)
Freedom of Trade		---	-0.002	---	---	---	---	---	---
			(-0.181)						
Economic Freedom		-0.004	---	-0.003	0.002	0.027	---	**-0.013***	**0.044****
		(-0.387)		(-0.284)	(0.149)	(1.326)		**(-3.247)**	**(2.184)**
Inflation		---	---	---	---	-0.0002	-0.0007	---	---
						(-0.227)	(-0.523)		
Government Expenditure		---	0.0005	---	---	0.0003	---	---	---
			(0.893)			(0.982)			
Human Development		---	---	---	---	---	---	---	---
Economic Prosperity		---	**-0.003***	---	-0.0008	**-0.004****	**-0.004***	---	-0.0006
			(-3.287)		(-0.488)	**(-2.067)**	**(-2.862)**		(-0.239)
Foreign Aid		-0.000	---	**0.001***	**0.001***	---		0.0003	0.001
		(0.210)		**(3.673)**	**(1.732)**			(1.242)	(0.807)
Population Growth Rate		0.002	0.027	---	0.006	---	0.005		-0.023
		(0.282)	(0.613)		(0.383)		(0.355)		(-1.584)
Test for AR(2) errors		**-1.585**	**-1.614**	**-1.362**	**-1.545**	**-1.407**	**-0.906**	**0.821**	**-1.169**
		[0.112]	**[0.106]**	**[0.172]**	**[0.122]**	**[0.1594]**	**[0.364]**	**[0.411]**	**[0.242]**
Sargan OIR test		**12.994**	**6.522**	**5.103**	**6.380**	**8.761**	**11.490**	**6.770**	**8.671**
		[0.976]	**[0.999]**	**[0.746]**	**[0.604]**	**[0.9989]**	**[0.993]**	**[0.561]**	**[0.370]**
Wald(joint) test		**2538***	**4600***	**23845***	**1417***	**2605***	**3609***	**2544***	**5066***
		[0.000]	**[0.000]**	**[0.000]**	**[0.000]**	**[0.0000]**	**[0.000]**	**[0.000]**	**[0.000]**

*;**;***: significance levels of 10%, 5% and 1% respectively. Z-statistics in parentheses. [ ]: P-values. Instidex: Institutional index. NOI: Non overlapping interval. FDI: Foreign Direct Investment. Demo: Democracy. OIR: Overidentifying Restrictions. Prop: Propositions.

From the results in Table 6, liberalization policies have generally been instrumental in the rise of the semi-formal financial sector. As evidenced from the findings of Proposition 6, exceptions to these are the FDI and economic freedoms channels.

Table 6: Two-step System GMM estimation for Hypothesis 2

		Dependent variable: Semi-Formal Financial Development							
		Semi-Formal Financial Development (Prop.2)				Financial Development Semi-Formalization (Prop.6)			
		Two Year NOI		Three Year NOI		Two Year NOI		Three Year NOI	
constant		0.0002	0.001	-0.003	**0.046***	-0.003	0.0002	**0.038***	0.019
		(0.228)	(0.408)	(-0.522)	**(43.97)**	(-0.758)	(0.047)	**(1.791)**	(0.988)
Finance_1		**0.345***	**0.344***	0.295	**1.196***	**0.443***	**0.445***	**0.964***	**0.953***
		(3.186)	**(3.465)**	(1.289)	**(43.97)**	**(3.004)**	**(3.034)**	**(27.07)**	**(18.24)**
Financial Liberalization	Kaopen	-0.000	-0.0001	-0.0003	**0.004***	-0.001	-0.001	-0.0005	-0.0005
		(-0.100)	(-0.359)	(-0.667)	**(2.271)**	(-0.918)	(-0.936)	(-0.447)	(-0.411)
	FDI	-0.0002	-0.000	-0.000	0.0004	**-0.0007***	**-0.0006***	0.0004	**0.0005***
		(-0.849)	(-0.663)	(-0.372)	(0.577)	**(-1.750)**	**(-1.787)**	(1.499)	**(1.949)**
Trade Liberalization	Trade	0.000	---	0.000	---	0.000	---	-0.000	---
		(0.454)		(0.328)		(0.807)		(-0.085)	
	Exports	---	-0.000	---	**0.0003***	---	-0.000	---	**0.0001***
			(-0.431)		**(1.849)**		(-0.065)		**(1.727)**
Institutional &Political Liberalizations	Instidex	-0.0004	-0.0004	-0.0001	0.002	-0.001	-0.001	**0.002***	**0.0027***
		(-0.722)	(-0.799)	(-0.192)	(1.232)	(-1.486)	(-1.454)	**(2.180)**	**(1.896)**
	Demo	0.0001	0.0001	-0.000	-0.0006	0.0006	**0.0006***	-0.0003	-0.0003
		(0.326)	(0.698)	(-0.078)	(-0.909)	(1.440)	**(1.745)**	(-1.126)	(-0.976)
Freedom of Trade		---	---	---	---	---	---	---	---
Economic Freedom		---	---	0.0004	**-0.014***	---	---	**-0.007***	**-0.006***
				(0.433)	**(-2.336)**			**(-2.014)**	**(-1.704)**
Inflation		0.000	0.000	0.0001	---	0.0006	0.0006	**0.001***	**0.001***
		(0.503)	(0.545)	(0.730)		(0.952)	(0.966)	**(2.454)**	**(2.042)**
Government Expenditure		-0.000	-0.000	---	---	-0.000	-0.000	---	---
		(-0.670)	(-0.782)			(-0.529)	(-0.733)		
Human Development		---	---	---	---	---	---	---	---
Economic Prosperity		-0.000	0.000	0.000	0.0009	---	0.000	**-0.0008***	**-0.0009***
		(-0.198)	(0.046)	(0.206)	(1.104)		(0.045)	**(-1.646)**	**(-1.886)**
Foreign Aid		---	---	---	---	---	---	0.0001	0.000
								(1.207)	(0.460)
Population Growth Rate		---	-0.0003	---	**0.008***	---	-0.0009	---	0.004
			(-0.318)		**(2.480)**		(-0.444)		(1.603)
Test for AR(2) errors		**0.592**	**0.651**	**0.964**	**-0.247**	**0.046**	**0.012**	**0.839**	**0.757**
		[0.553]	**[0.514]**	**[0.334]**	**[0.804]**	**[0.962]**	**[0.990]**	**[0.400]**	**[0.449]**
Sargan OIR test		**6.082**	**4.392**	**3.560**	**7.804**	**6.381**	**6.304**	**1.167**	**1.351**
		[1.000]	**[1.000]**	**[0.894]**	**[0.452]**	**[0.999]**	**[0.999]**	**[0.996]**	**[0.994]**
Wald(joint) test		**22.58***	**22.70***	5.911	**3395***	**69.35***	**124.5***	**2926***	**3126***
		[0.007]	**[0.011]**	[0.748]	**[0.000]**	**[0.000]**	**[0.000]**	**[0.000]**	**[0.000]**

*;**;***: significance levels of 10%, 5% and 1% respectively. Z-statistics in parentheses. [ ]: P-values. Instidex: Institutional index. NOI: Non overlapping interval. FDI: Foreign Direct Investment. Demo: Democracy. OIR: Overidentifying Restrictions. Prop: Propositions.

Table 7 below; on the incidences of liberalization policies on the informal financial sector broadly confirm the theoretical underpinnings. This is with the slight exception of the economic freedom channel.

Table 7: Two-step System GMM estimation for Hypothesis 3

| | | Informal Financial Development (Prop.3) | | | | Financial Development Informalization (Prop.7) | | | |
		Two Year NOI		Three Year NOI		Two Year NOI		Three Year NOI	
constant		0.023	0.017	**0.083****	0.049	0.109	0.020	**0.278***	**0.206***
		(0.563)	(0.529)	**(2.511)**	(1.160)	(1.493)	(0.373)	**(1.934)**	**(1.902)**
Finance_1		**1.108****	**1.191****	**1.201****	**1.196****	**0.966****	**0.864****	**1.107****	**1.073****
		(13.98)	**(24.20)**	**(33.00)**	**(42.02)**	**(8.212)**	**(5.905)**	**(24.60)**	**(13.94)**
Financial Liberalization	Kaopen	0.002	0.002	**0.004****	**0.004****	**0.009****	-0.0003	**0.017****	**0.014****
		(1.512)	(1.174)	**(2.039)**	**(1.989)**	**(2.432)**	(-0.072)	**(3.182)**	**(3.386)**
	FDI	-0.0002	-0.0001	-0.0006	0.0004	-0.000	-0.001	0.002	**0.004****
		(-0.227)	(-0.185)	(-0.939)	(0.557)	(-0.031)	(-0.668)	(1.256)	**(2.105)**
Trade Liberalization	Trade	**0.0001****	---	0.000	---	0.0002	---	0.0004	---
		(2.340)		(1.103)		(1.202)		(1.435)	
	Exports	---	**0.0002****	---	**0.0003****	---	**0.0007***	---	0.001
			(2.218)		**(2.029)**		**(1.646)**		(1.021)
Institutional &Political Liberalizations	Instidex	0.0003	-0.0001	0.001	0.002	-0.001	-0.002	0.002	0.006
		(0.246)	(-0.142)	(1.168)	(1.225)	(-0.661)	(-0.800)	(0.387)	(1.062)
	Demo	---	**0.0004****	-0.0001	-0.0006	---	---	-0.0001	-0.0007
			(2.379)	(-0.324)	(-0.939)			(-0.064)	(-0.339)
Freedom of Trade		---	---	---	---	---	---	---	---
Economic Freedom		**-0.009***	**-0.007***	**-0.01****	**-0.014***	**-0.024****	-0.010	**-0.057****	**-0.055****
		(-1.761)	**(-1.679)**	**(-2.791)**	**(-1.739)**	**(-1.962)**	(-1.212)	**(-2.332)**	**(-2.115)**
Inflation		-0.0002	-0.0002	0.000	---	-0.0009	-0.0007	-0.000	-0.000
		(-1.367)	(-1.289)	(0.194)		(-1.341)	(-1.348)	(-0.040)	(-0.027)
Government Expenditure		0.000	---		---	-0.0003	-0.0001	---	---
		(0.100)				(-1.280)	(-0.665)		
Human Development		---	---	---	---	---	**-0.001****	---	---
							(-3.065)		
Economic Prosperity		0.0009	**0.001****	**0.001***	0.0009	**0.003****	**0.004****	**0.004***	0.004
		(1.554)	**(2.155)**	**(1.923)**	(0.925)	**(2.174)**	**(2.721)**	**(1.707)**	(1.074)
Foreign Aid		---	---	---	-0.000	---	---	-0.002	**-0.002***
					(-0.182)			(-1.364)	**(-1.751)**
Population Growth Rate		**0.006****	**0.004****	---	**0.008****	0.006	0.016	---	0.031
		(2.376)	**(2.191)**		**(2.007)**	(0.748)	(1.189)		(1.574)
Test for AR(2) errors		-1.408	-1.555	0.293	-0.143	-1.286	-1.101	-1.527	-1.394
		[0.159]	[0.119]	[0.769]	[0.886]	[0.198]	[0.270]	[0.126]	[0.163]
Sargan OIR test		8.114	9.334	6.903	7.996	5.167	3.537	10.344	8.578
		[0.999]	[0.998]	[0.547]	[0.433]	[1.000]	[1.000]	[0.241]	[0.379]
Wald(joint) test		2778***	3031***	3760***	4297***	6859***	23374***	13103***	12825***
		[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]

*;**;***: significance levels of 10%, 5% and 1% respectively. Z-statistics in parentheses. [ ]: P-values. Instidex: Institutional index. NOI: Non overlapping interval. FDI: Foreign Direct Investment. Demo: Democracy. OIR: Overidentifying Restrictions. Prop: Propositions.

Results on the non-formal (semi-formal and informal) sector in Table 8 below are broadly consistent with those of the informal sector in Table 7 above.

Table 8: Two-step System GMM estimation for Hypothesis 4

		Dependent variable: Informal & Semi-formal financial Development(FD)							
		Informal and semi-formal FD (Prop.4)				FD Non-formalization (Prop.8)			
		Two Year NOI		Three Year NOI		Two Year NOI		Three Year NOI	
constant		-0.039**	0.026	0.111**	0.068**	-0.027	0.088	0.311*	0.230*
		(-2.285)	(0.794)	(2.502)	(2.362)	(-0.822)	(1.413)	(1.923)	(1.895)
Finance_1		1.156***	1.170***	1.221***	1.201***	1.067***	1.098***	1.095***	1.069***
		(13.27)	(19.26)	(23.19)	(19.28)	(13.25)	(11.21)	(22.67)	(13.74)
Financial Liberalization	Kaopen	0.0009	0.003*	0.006***	0.005***	0.005*	0.009***	0.018***	0.014***
		(0.750)	(1.912)	(2.736)	(3.812)	(1.795)	(3.693)	(3.434)	(3.917)
	FDI	-0.001	-0.0006	-0.0004	0.000	-0.001	-0.002	0.002	0.003**
		(-1.186)	(-0.687)	(-0.584)	(0.034)	(-1.162)	(-1.382)	(1.130)	(2.414)
Trade Liberalization	Trade	0.0002***	---	0.0001**	---	0.0004**	---	0.0003	---
		(2.702)		(2.020)		(2.336)		(1.159)	
	Exports	---	0.0003***	---	0.0006***	---	0.0008**	---	0.001
			(0.001)		(3.591)		(2.125)		(1.435)
Institutional &Political Liberalizations	Instidex	0.0004	0.0004	0.002	0.001	-0.001	0.002	0.002	0.007
		(0.220)	(0.281)	(1.309)	(1.113)	(-0.349)	(1.115)	(0.467)	(1.284)
	Demo	---	0.0003	-0.0001	0.0003	---	---	0.0004	-0.0004
			(1.030)	(-0.295)	(0.823)			(0.210)	(-0.192)
Freedom of Trade		-0.002	---	---	---	---	---	---	---
		(-0.769)							
Economic Freedom		---	-0.010**	-0.02***	-0.021***	---	-0.028**	-0.064**	-0.063**
			(-2.119)	(-3.253)	(-3.741)		(-2.512)	(-2.428)	(-2.459)
Inflation		---	0.0000	---	0.0001	---	0.0003	0.001	0.001
			(0.024)		(0.448)		(0.395)	(0.588)	(0.797)
Government Expenditure		0.000	---	---	---	-0.0004	---	---	---
		(0.870)				(-1.086)			
Economic Prosperity		0.001*	0.001**	0.002***	0.002**	0.004**	0.004***	0.004*	0.004
		(1.840)	(2.516)	(3.079)	(2.387)	(2.050)	(2.799)	(1.646)	(1.143)
Foreign Aid		---	---	0.0001	0.0001		---	-0.001	-0.002
				(0.422)	(0.525)			(-1.036)	(-1.395)
Population Growth Rate		0.011***	0.006***	---	0.009***	0.005	0.004	---	0.035*
		(3.359)	(0.004)		(2.905)	(0.596)	(0.399)		(1.902)
Test for AR(2) errors		-1.597	-1.521	0.460	0.886	-1.511	-1.988**	-1.033	-0.899
		[0.110]	[0.128]	[0.645]	[0.375]	[0.130]	[0.046]	[0.301]	[0.368]
Sargan OIR test		8.047	12.79***	7.688	6.734	7.413	16.005	9.707	8.211
		[0.999]	[0.979]	[0.464]	[0.565]	[0.999]	[0.914]	[0.286]	[0.413]
Wald(joint) test		3268***	1368***	2855***	2289***	4076***	2856***	12408***	10826***
		[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]

*;**;***: significance levels of 10%, 5% and 1% respectively. Z-statistics in parentheses. [ ]: P-values. Instidex: Institutional index. NOI: Non overlapping interval. FDI: Foreign Direct Investment. Demo: Democracy. OIR: Overidentifying Restrictions. Prop: Propositions.

4.2 Discussion of results, policy implications and recommendations

The findings have broadly confirmed the conventional view which sustains that liberalization increases informality. The slight exception of the economic freedom parameter to this mainstream wisdom is also in accordance with Fugazza & Fiess (2010) on the position that the consensus is not universal. Though the view may not be universal, it is widely believed that liberalization may boost the informal financial sector in Africa for the following reasons, inter alia. (1) In attempts to mitigate production cost, domestic producers will seek

to informally produce inputs from cheaper sources in order to reap of the benefits from informal production because informal producers for the most part do not comply with fiscal and legal regulations (Aryeetey, 2005; Bairagya, 2010; Adeusi et al., 2012). (2) Openness has not been accompanied by a corresponding increase in financial allocation efficiency (Asongu, 2012c), leading to substantial issues of surplus liquidity in African financial institutions (Fouda, 2009; Saxegaard, 2006). Hence, there has been an increase in the demand for informal financial services (Aryeetey, 2005) to meet up the growing demand for investment needs in the continent (Rolfe & Woodward, 2004; Alagidede, 2008; Bartels et al., 2009; Tuomi , 2011; Kolstad & Wiig, 2011; Darley, 2012; Asongu, 2012d). This general positive nexus with the informal financial sector is also in line with recent African development literature that has established a positive correlation between the informal financial sector and soaring trends of mobile banking (Asongu, 2013a) and knowledge economy (Asongu, 2012a).

The findings have also shown that the economic freedom channel is an exception to the predictions from the theoretical underpinnings. Accordingly, while economic freedom improves the formal financial sector, it consistently mitigates its semi-formal and informal financial counterparts. The explanation to this exception is simple: economic freedom has consistently been found (using the same dataset and time span) to improve financial allocation efficiency (Asongu, 2013d), which ultimately diminishes issues of surplus liquidity and eventual recourse for informal financial services. It is also interesting to note that the effect of the economic freedom index may be due to the substantial weight of its legal structure component. The intuition for this interpretation is consistent with the Public interest theory which holds that regulation is supplied to correct inefficient market practices and the informal sector often circumvents capital account restrictions, nullifying the expected effect of regulatory capital controls (Edwards, 1999).

The empirical results which are based on a rethinking of the financial system definition have shown consistently that the informal financial sector grows after liberalization policies. Hence, consistent with Adeusi et al. (2012), the positive role played by the informal financial intermediary market has been established in this paper and thus, doubts have been raised about mainstream orthodox thinking in policy prescriptions which are essentially based on the role of a financial system without the informal sector. The principal policy recommendation is that adequate consideration and proper recognition should be given informal financial institutions in the financial system of African countries. These will create incentives for more research that is focused on the underground economy and induce more policy measures that regulate the informal economy.

Our paper has focused on the incidence of a plethora of liberalization initiatives on financial sector competition. However, further research attention should be devoted to assessing how these dynamics have affected investment and growth. Moreover, investigating the effect of the relationship on Africa's two most important development concerns (unemployment and poverty) is also an interesting future research direction.

5. Conclusion

This paper has investigated how financial, trade, institutional and political liberalization policies have affected financial sector competition in Africa using updated data to appraise second generation reforms. The 'freedom to trade' and 'economic freedom' indices have been employed. Hitherto, unexplored financial sector concepts of formalization, semi-formalization, informalization and non-formalization have also been introduced.

From sound theoretical and empirical underpinnings, four hypotheses have been assessed based on eight propositions in order to challenge existing views in many dimensions inter alia: the definition of the financial system; disentangling the existing measurement into formal and semi-formal financial sectors and; adding the previously missing informal sector

to the definition. These assessments broadly represent a threefold contribution to existing literature. First, we have focused on financial sector competition and steered clear of the mainstream more specific elements of banking market structure like bank concentration and foreign bank participation. Second, we have united two streams of research by contributing at the same time to the macroeconomic literature on measuring financial development and responded to the growing field of economic development by means of informal sector promotion, microfinance, mobile banking, knowledge economy…etc, in suggesting a practicable way to disentangle the effects of various liberalization policies on financial sectors. This has led to the introduction of absolute and relative measures of financial sector importance as well as hitherto unexplored concepts of financial sector formalization, semi-formalization, informalization and non-formalization. Third, by employing a plethora of liberalization policies (financial, trade, institutional, political et al.), we have presented a broad and exhaustive picture of the nexuses among liberalization policies and financial sector importance. Moreover, as opposed to past studies, the use of an updated data span (1996-2010) that captures second generation reforms has provided results with more focused and updated policy implications.

The empirical analyses which are based on principal component analysis and an endogeneity robust dynamic system GMM estimation have led to the following findings. Firstly, relative to money supply: (1) with the exception of the economic freedom mechanism, liberalization policies have generally decreased the growth of the formal financial sector to the benefit of other financial sectors; (2) apart from the foreign direct investment and economic freedom channels, liberalization policies have been fruitful for semi-formal financial development at the cost of other financial sectors and; (3) with the exception of economic freedom, both the informal and non-formal sectors have developed owing to liberalization to the detriment of the formal financial sector. Secondly, relative to GDP, the

semi-formal, informal and/or non-formal financial sectors have also generally improved as a result of liberalization. Policy implications and future research directions have been discussed.

Appendices

Appendix 1: Segments of the financial system by degree of formality in Paper's context

Paper's context			Tiers	Definitions	Institutions	Principal Clients
Formal financial system	IMF Definition of Financial System from International Financial Statistics (IFS)	Formal Financial sector (Deposit Banks)	Formal banks	Licensed by central bank	Commercial and development banks	Large businesses, Government
Semi-formal and informal financial systems		Semi-formal financial sector (Other Financial Institutions)	Specialized non-bank financial institutions		Rural banks, Post banks, Saving and Loan Companies, Deposit taking Micro Finance banks	Large rural enterprises, Salaried Workers, Small and medium enterprises
			Other non-bank financial institutions	Legally registered but not licensed as financial institution by central bank and government	Credit Unions, Micro Finance NGOs	Microenterprises, Entrepreneurial poor
	Missing component in IFS definition	Informal financial sector	Informal banks	Not legally registered at national level (though may be linked to a registered association)	Savings collectors, Savings and credit associations, Money lenders	Self-employed poor

Source (Asongu, 2012a)

Appendix 2: Variable definitions

Variables	Signs	Variable definitions	Sources
Panel A: GDP based financial variables			
Formal Financial Development	Prop.1	Bank deposits/GDP. Bank deposits here refer to demand, time and saving deposits in deposit money banks (Lines 24 and 25 of International Financial Statistics (IFS); October 2008).	Asongu (2012a)
Semi-formal financial development	Prop.3	(Financial deposits – Bank deposits)/ GDP. Financial deposits are demand, time and saving deposits in deposit money banks and other financial institutions. (Lines 24, 25 and 45 of IFS, October, 2008).	Asongu (2012a)
Informal financial development	Prop.3	(Money Supply – Financial deposits)/GDP	Asongu (2012a)
Informal and semi-formal financial development	Prop.4	(Money Supply – Bank deposits)/GDP	Asongu (2012a)
Panel B: M2 based financial variables			
Financial intermediary formalization	Prop.5	Bank deposits/ Money Supply (M2). From 'informal and semi-formal' to *formal* financial development (formalization)	Asongu (2012a)
Financial intermediary 'semi-formalization'	Prop.6	(Financial deposits - Bank deposits)/ Money Supply. From 'informal and formal' to *semi-formal* financial development (Semi-formalization)	Asongu (2012a)
Financial intermediary 'informalization'	Prop.7	(Money Supply – Financial deposits)/ Money Supply. From 'formal and semi-formal' to *informal* financial development (Informalisation).	Asongu (2012a)
Financial intermediary 'semi-formalization and informalization'	Prop.8	(Money Supply – Bank Deposits)/Money Supply. Formal to '*informal and semi-formal*' financial development: (Semi-formalization and informalization).	Asongu(2012a)
Panel C: Liberalization Independent Variables			
Financial Liberalization 1	KAOPEN	De Jure Capital Openness	Chinn & Ito (2002)
Financial Liberalization 2	FDI	Foregin Direct Investment(% of GDP)	WDI(World Bank)
Trade Liberalization 1	Trade	Imports + Exports of Commodities(% of GDP)	WDI (World Bank)
Trade Liberalization 2	Export	Exports of Good & Services(% of GDP)	WDI (World Bank)
Institutional Liberalisation1	Instidex	1st Principal Component of: RL; RQ; CC;V&A; PS; GE	P.C Analysis
Democracy	Demo	Institutionalized Democracy(Estimate)	WDI (World Bank)
Trade Freedom	TFree	Freedom of Trade Index	Gwartney et al. (2011). Economic Freedom Dataset
Economic Freedom	EcoFree	Economic Freedom Index	
Panel D: Control Variables			
Inflation	Inflation	Consumer Price Index (Annual %)	WDI (World Bank)
Government Expenditure	GE	Government Final Expenditure (% of GDP)	WDI (World Bank)

Human Development	IHDI	Inequality adjusted Human Development Index	WDI (World Bank)
Economic Prosperity	GDPg	GDP growth rate (annual %)	WDI (World Bank)
Foreign-Aid	NODA	Net Official Development Assistance (% of GDP)	WDI (World Bank)
Population Growth	Popg	Population Growth Rate (annual %)	WDI (World Bank)

WDI: World Bank Development Indicators. GDP: Gross Domestic Product. PC: Principal Component. RL: Rule of Law. RQ: Regulation Quality. CC: Corruption-Control. V& A: Voice & Accountability. PS: Political Stability. GE: Government Effectiveness.

Appendix 3: Correlation analysis

Financial (Fin) Dependent Variables								Liberalization (Lib) Independent Variables								Control Variables						
GDP-Based Measures				Sector Importance Measures				Fin. Lib.		Trade Lib.		Inst & Pol. Lib		Other Libs								
Prop1	Prop2	Prop3	Prop4	Prop5	Prop6	Prop7	Prop8	KAOP	FDI	Trade	Exports	Instidex	Demo	TFree	EFree	Infl	GE	IHDI	GDPg	NODA	Popg	
1.000	0.076	0.099	0.110	0.598	-0.038	-0.590	-0.590	-0.375	0.040	0.290	0.290	0.519	0.187	0.209	0.499	-0.098	-0.02	0.09	0.041	-0.433	-0.61	Prop1
	1.000	0.104	0.278	-0.065	0.884	-0.134	-0.134	-0.016	-0.08	-0.01	-0.030	0.037	0.002	-0.02	-0.03	0.066	-0.01	-0.04	0.031	0.006	-0.00	Prop2
		1.000	0.984	-0.606	-0.030	0.613	0.613	0.002	-0.05	-0.06	-0.044	-0.110	-0.18	-0.02	-0.15	-0.142	0.00	-0.11	-0.06	0.019	-0.00	Prop3
			1.000	-0.597	0.166	0.559	0.559	-0.009	-0.06	-0.06	-0.048	-0.100	-0.18	-0.02	-0.15	0.123	0.00	-0.12	-0.05	0.019	-0.00	Prop4
				1.000	-0.111	-0.974	-0.974	0.354	0.158	0.339	0.352	0.605	0.26	0.34	0.618	0.060	0.05	0.18	0.071	-0.332	-0.39	Prop5
					1.000	-0.111	-0.111	-0.104	-0.09	-0.02	-0.071	-0.013	0.067	-0.06	-0.08	0.194	-0.04	-0.03	0.019	0.134	0.10	Prop6
						1.000	1.000	-0.330	-0.13	-0.33	-0.336	-0.606	-0.27	-0.33	-0.60	-0.105	-0.05	-0.17	-0.07	0.301	0.36	Prop7
							1.000	-0.330	-0.13	-0.33	-0.336	-0.606	-0.27	-0.33	-0.60	-0.105	-0.05	-0.17	-0.07	0.301	0.36	Prop8
								1.000	0.058	0.050	0.110	0.300	0.188	0.542	0.692	0.117	0.04	-0.11	0.091	-0.206	-0.11	KAOP
									1.000	0.470	0.107	0.094	0.010	0.331	0.306	-0.302	0.07	-0.03	0.095	-0.015	-0.15	FDI
										1.000	0.840	0.472	0.193	0.451	0.344	-0.110	0.04	-0.12	-0.02	-0.25	-0.42	Trade
											1.000	0.507	0.154	0.464	0.380	-0.019	0.02	-0.09	-0.08	-0.48	-0.43	Exports
												1.000	0.542	0.574	0.680	-0.009	-0.00	0.13	0.146	-0.409	-0.34	Instidex
													1.000	0.324	0.381	0.152	0.01	0.11	0.125	-0.016	-0.08	Demo
														1.000	0.770	0.230	0.01	0.08	0.097	-0.429	-0.19	TFree
															1.000	0.084	0.12	0.12	0.14	0.021	-0.37	EFree
																1.000	-0.17	0.04	0.021	0.178	0.09	Infl
																	1.00	-0.22	0.214	0.040	0.02	GE
																		1.00	-0.05	-0.095	0.01	IHDI
																			1.000	0.158	0.23	GDPg
																				1.000	0.50	NODA
																					1.00	Popg

Prop: Proposition. KAOP: De Jure measure of Capital Openness. FDI: Foreign Direct Investment. Instidex: Institutional Development Index. Demo: Democracy. TFree: Freedom to Trade. EFree: Economic Freedom. Infl: Inflation. GE: Government Expenditure. IHDI: Inequality Adjusted Human Development Index. GDPg: GDP growth rate. NODA: Net Official Development Assistance. Popg: Population growth rate. Inst. & Pol: Institutional and Political.

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