emeraldinsight

International Journal of Managerial Finance

Financial inclusion and financial sector development in Sub-Saharan Africa: a panel VAR approach

Ebenezer Bugri Anarfo, Joshua Yindenaba Abor, Kofi Achampong Osei, Agyapomaa Gyeke-Dako,

Article information:

To cite this document:
Ebenezer Bugri Anarfo, Joshua Yindenaba Abor, Kofi Achampong Osei, Agyapomaa Gyeke-Dako, (2019) "Financial inclusion and financial sector development in Sub-Saharan Africa: a panel VAR approach", International Journal of Managerial Finance, https://doi.org/10.1108/IJMF-07-2018-0205
Permanent link to this document:
https://doi.org/10.1108/IJMF-07-2018-0205

Downloaded on: 07 June 2019, At: 04:09 (PT)
References: this document contains references to 59 other documents.
To copy this document: permissions@emeraldinsight.com
The fulltext of this document has been downloaded 97 times since 2019*

Users who downloaded this article also downloaded:

(2019),"Financial inclusion matters for economic growth in India: Some evidence from cointegration analysis", International Journal of Social Economics, Vol. 46 Iss 1 pp. 132-151 https://doi.org/10.1108/IJSE-10-2017-0444

(2013),"Financial inclusion and its determinants: evidence from India", Journal of Financial Economic Policy, Vol. 5 Iss 1 pp. 4-19 https://doi.org/10.1108/17576381311317754

Access to this document was granted through an Emerald subscription provided by emerald-srm:534301 []

For Authors

If you would like to write for this, or any other Emerald publication, then please use our Emerald for Authors service information about how to choose which publication to write for and submission guidelines are available for all. Please visit www.emeraldinsight.com/authors for more information.

About Emerald www.emeraldinsight.com

Emerald is a global publisher linking research and practice to the benefit of society. The company manages a portfolio of more than 290 journals and over 2,350 books and book series volumes, as well as providing an extensive range of online products and additional customer resources and services.

Emerald is both COUNTER 4 and TRANSFER compliant. The organization is a partner of the Committee on Publication Ethics (COPE) and also works with Portico and the LOCKSS initiative for digital archive preservation.

*Related content and download information correct at time of download.

Downloaded by University of Ghana At 04:09 07 June 2019 (PT)

The current issue and full text archive of this journal is available on Emerald Insight at:
www.emeraldinsight.com/1743-9132.htm

Financial inclusion and financial sector development in Sub-Saharan Africa: a panel VAR approach

Ebenezer Bugri Anarfo
Department of Finance and Accounting, Ghana Institute of Management and Public Administration, Achimota, Ghana, and
Joshua Yindenaba Abor, Kofi Achampong Osei and Agyapomaa Gyeke-Dako
Department of Finance, University of Ghana, Accra, Ghana

Received 17 July 2018
Revised 7 October 2018
19 November 2018
Accepted 20 November 2018

Downloaded by University of Ghana At 04:09 07 June 2019 (PT)

Abstract

Purpose – The purpose of this paper is to investigate the dynamic link between financial inclusion and financial sector development (FSD) in Sub-Saharan Africa.

Design/methodology/approach – This paper employs a panel vector autoregressive framework to examine the dynamic link between financial inclusion and FSD in Sub-Saharan Africa.

Findings – The findings indicate that there is a reverse causality between FSD and financial inclusion in both the Sub-Saharan Africa countries sample and the full sample. It is evident that financial inclusion is a driver of FSD and vice versa.

Practical implications – The practical implication of this study is that financial inclusion should not only be pursued as a policy objective but it could also be an outcome variable of FSD and vice versa. This implies that African economies and governments in their effort to enhance financial inclusion, FSD can serve as a policy tool. This means that policies aimed at promoting financial inclusion will not impede FSD because the two are complementary. This suggests that we can achieve financial inclusion without sacrificing FSD and vice versa.

Originality/value – This paper provides first empirical evidence of the link between financial inclusion and FSD from the Sub-Saharan Africa perspective using data sourced from World Development Indicators spanning from 1990 to 2014 for 48 Sub-Saharan African economies and 217 economies in the world for the full sample.

Keywords Economic growth, Financial inclusion, Financial sector development, Panel vector autoregression

Paper type Research paper

1. Introduction

A major issue that has gained much momentum in the last two decades globally is the extent of coverage of financial systems and institutions. This has been generally discussed under the term financial inclusion or financial exclusion (Bhanot *et al.*, 2012; Hasnol *et al.*, 2013). Generally, the term "financial inclusion" is concerned with how an economy's financial services incorporate the vulnerable and low-income earners in such way that they are not marginalised from gaining access to financial products and services (Sinclair, 2013). Over the years, African countries have made much effort and progress towards advancing financial inclusion. The feat of some innovative financial instruments such as mobile money in Africa offers more opportunities mostly for the poor, youth, rural dwellers and small and medium enterprises (SMEs) to be financially included for poverty reduction (Abor *et al.*, 2018). Policy makers have recognised that access to finance for the marginalised and the poor is essential for social cohesion and poverty alleviation (Sinclair and Bramley, 2011).

JEL Classification — A10, B23, B26, E44

International Journal of Managerial Finance
© Emerald Publishing Limited
1743-9132
DOI 10.1108/IJMF-07-2018-0205

Thus, it is therefore not surprising that financial inclusion has become a topical issue by policy makers, researchers, development partners and global development financial institutions.

This is so because financial inclusion has greater implications for financial sector development (FSD). Thus, FSD greatly depends on the extent of financial inclusion and vice versa. Increased in financial inclusion could promote FSD because the development of the financial sector in an economy depends on the number of people that have access to finance and the level of financial inclusion could also depend on the level of FSD. This study examines the extent to which financial inclusion affects FSD and vice versa. Lack of knowledge of this reverse causality could make policy makers pursue either financial inclusion or FSD as a policy objective when they could be an outcome variable of each other. This suggest that FSD should not only be pursued as a policy objective but it can also be an outcome variable of financial inclusion and vice versa. While policy makers continue to seek for ideas from researchers to implement financial inclusion policies effectively, research works in this area remain scarce.

Most empirical studies on financial inclusion has mostly been clustered around how financial inclusion is measured and promoted (Allen *et al.*, 2016; Treasury, 2004; Marshall, 2004; Hanning and Jansen, 2010; Sarma, 2008; Demirguc-Kunt and Klapper, 2012; Ardic *et al.*, 2011). Other studies have also focussed on how financial inclusion impact on income inequality, poverty reduction and economic growth (Brune *et al.*, 2011; Burgess and Pande, 2005; Honohan, 2007, 2008; Rojas-Suarez, 2010; Sarma, 2008; Thorat, 2006; Chibba, 2009; Dabla-Norris *et al.*, 2015; Kpodar and Andrianaivo, 2011; Johal, 2016; Sharma, 2016).

Therefore, the empirical examination of the relationship between financial inclusion and financial development using a panel vector Autoregressive (pVAR) framework is yet to be examined from the perspective of Sub-Saharan Africa. Though, studies have investigated the link between FSD and financial inclusion but these studies are theoretical in nature and, therefore, lack empirical evidence (Allen *et al.*, 2014; Otchere, 2016). Allen *et al.* (2014) attempted to establish what the degree of FSD and financial inclusion in Africa would be if the nature of the relationships that exists between financial inclusion and FSD in the rest of the developing world is the same. Using other developing economies as benchmarks, they find that for 32 of 40 African countries, the degrees of FSD and financial inclusion fall short of predicted values, thus suggesting significant gaps in the financial development–financial inclusion nexus for Africa.

Thus, there is a yawning gap remaining in the empirical literature regarding the implications of FSD on financial inclusion and vice versa. Thus, the bi-causal linkages between FSD and financial inclusion appear to have escaped the attention of policy makers and researchers, and this has led to a limited comprehension of the link between FSD and financial inclusion. However, for policy makers in both emerging and developing economies, having a grasp of the reverse causality between FSD and financial inclusion is key if they are to put their countries and economies on the path of accelerated pro-poor growth. This study will provide policy prescriptions that can guide policy makers in their efforts to alleviate poverty and achieve sustainable growth in Sub-Saharan Africa through FSD and financial inclusion.

We use pVAR estimation technique because it provides a framework that is flexible where all the variables are considered as endogenous in the system of equations. pVAR estimation technique is now considered the standard instrument for analysing the impacts of economic policy transmissions and other economic variables interactive behaviour. We used pVAR in order to subdue endogeneity issues to establish the causality between financial inclusion and FSD in Sub-Saharan Africa. The use of pVARs also enables us to generate the generalised impulse responses to recognise the effect of a shock of one variable on the other variables. Unlike the usual Cholesky impulse responses, using the generalised impulse responses enables us to produce shocks that do not change with the ordering of the

Downloaded by University of Ghana At 04:09 07 June 2019 (PT)

variable (Issahaku *et al.*, 2016). We also analysed the variance decompositions (VDCs) of financial inclusion and FSD in order to express the length of the overall effect of a shock unlike the impulse response functions (IRFs) that shows only the future direction of the variables when a shock occurs.

The study controlled for economic growth where economic growth was added to the pVAR framework. This is because economic growth according to the literature is a driver of FSD and financial inclusion. FSD and financial inclusion could also be drivers of economic growth (Park and Mercado, 2015; Suleiman and Abu-Qaun, 2008; Creane *et al.*, 2003; Odhiambo, 2005).

Some empirical papers have analysed the effect of financial inclusion on economic growth together with income inequality and poverty alleviation (Park and Mercado, 2015). Other researchers have also investigated the link between economic growth and FSD (Levine, 1997; Tsuru, 2000; Suleiman and Abu-Qaun, 2008; Creane *et al.*, 2003; Odhiambo, 2005). However, despite empirical findings supporting the positive impact of financial inclusion on growth and the effect of FSD on economic growth, there is a gap remaining in the literature regarding the tripartite relationship among financial inclusion, FSD and economic growth. Thus, the tripartite relationship among financial inclusion, FSD and economic growth appears to have escaped the knowledge of empirical researchers; as a result, there is a limited understanding of the relationship among financial inclusion, economic growth and FSD. However, for policy makers in both Sub-Saharan Africa and emerging countries, having an understanding and insight on the tripartite relationship among financial inclusion, FSD and economic growth is paramount for putting their economies on the path of accelerated economic growth and development. This study attempts to bridge the gap by investigating the tripartite relationship amongst financial inclusion, FSD and economic growth from Sub-Saharan Africa perspective using a pVAR estimation technique.

One of the major problems besetting the study of financial inclusion–FSD nexus is the use of weak and inappropriate proxies for financial inclusion. Financial inclusion is always proxied by single variable measures such as the number of ATMs per hundred thousand adults, number of depositors with commercial banks per thousand adults, the number of bank branches per thousand adults (e.g. Evans, 2016; Mbutor and Uba, 2013). We posit that the financial inclusion proxies listed above do not adequately capture the other key measures of financial inclusion such as, number of borrowers from commercial banks and bank accounts per thousand adults. Conclusions and results arising from such studies that use weak and inappropriate financial inclusion proxies could be biased and misleading and may not be important for policy making. Not that past studies did not recognise the problems and weaknesses of using single variable proxies, they always deal with the issue by using many of these single variable-based measures to perform what they term as robustness checks. This solution, though good but not sufficient as the alternative proxies themselves may be capturing different dimensions and aspects or just one aspect of financial inclusion. It is now being recognised that financial inclusion has at least two main dimensions – demand side factors (usage) and supply side factors (access). Therefore, it is imperative that measures of financial inclusion reflect the multidimensional nature of financial inclusion. We address this measurement gap by constructing a composite index for financial inclusion after deriving the weights (factor loadings) from a panel principal component analysis (PCA). Unlike previous proxies, our composite measure is able to capture the two key dimensions of financial inclusion – usage and access. By employing these multidimensional measures, we are able to assess the link between financial inclusion and FSD from a holistic standpoint.

This study contributes to the discipline of managerial finance and economics in several ways. First, the use of pVAR enables us to analyse the dynamic link among financial inclusion, FSD and economic growth including the country-specific fixed effects simultaneously.

Downloaded by University of Ghana At 04:09 07 June 2019 (PT)

Second, using generalised impulse responses enable us to specifically single out the effect of each of the variables shocks in the system on the other variables, one at a time.

We also contribute to the literature of managerial finance by showing that financial inclusion and FSD are complements and not contradictory as opposed to other studies that argued that financial inclusion can impede FSD due to subprime lending (Khan, 2011). We argued that financial inclusion can be achieved without sacrificing FSD. The managerial implication of this study is that central banks and other financial institutions should not only pursue FSD as a policy objective but it can be an outcome variable of financial inclusion and vice versa. This study also broadens the knowledge frontier in economics and finance disciplines by examining the tripartite relationship among financial inclusion, FSD and economic growth from the perspective of Sub-Saharan Africa.

Another contribution of this study is that we overcome the use of inadequate proxies for financial inclusion by constructing multidimensional index of financial inclusion based on a panel PCA. As compared to previous studies, we use an array of econometric techniques which enables us to overcome endogeneity, model selection bias and contribute to panel estimation procedure.

Finally from a theory point of view, this study will form the basis for theory development on the nexus of financial inclusion–FSD reverse causality. Uncovering the theoretical underpinnings of this reverse causality will enable Sub-Saharan Africa countries' policy makers to formulate policies that will to help them get the optimum results of financial inclusion and FSD.

This paper seeks to answer the following three research questions:

RQ1. Does financial inclusion and FSD Granger-cause each other?

RQ2. Is there a theoretical basis supporting the existence of a tripartite relationship amongst financial inclusion, FSD and economic growth?

RQ3. Does financial inclusion, FSD and economic growth Granger-cause each other?

The main result from the empirical analysis is that there is a reverse causality between financial inclusion and FSD in both the Sub-Saharan Africa countries sample and the full sample. It is evident that financial inclusion is a driver of FSD and vice versa.

The rest of this study is structured as follows. Section 2 presents the literature review, Section 3 reports the econometric methodology where the empirical model is discussed together with the IRFs and the forecast error variance decomposition (FEVD). Section 4 presents the empirical results and also discusses both the FEVD and IRFs of the pVAR model and Section 5 reports the summary and conclusions of the study.

2. Literature review

Financial inclusion has gained much attention in recent times because of its ability to promote economic growth and FSD. At the same time, it helps to foster greater income equality and ensure inclusive growth. Although much has been done towards promoting financial inclusion, there is still more to be done. The movement towards an all-inclusive global financial sector has gained much momentum over the last decade. This was largely precipitated by the credit crunch that stifled growth of banks for which the high levels of global financial inclusion were identified as a contributing factor (Khan, 2011). This was so because there was an attempt to expand financial access to a pool of borrower's which resulted in a reduction in lending standards. This suggests that promoting financial inclusion could sometimes lower the quality of assets (subprime lending) (Khan, 2011).

According to Hanning and Jansen (2010), the pursuance of financial inclusion represents the current consensus regarding the role of finance to economic development and poverty alleviation; they contend that financial inclusion is an outcome of the evolution of financial

Downloaded by University of Ghana At 04:09 07 June 2019 (PT)

Downloaded by University of Ghana At 04:09 07 June 2019 (PT)

sector policies in emerging economies and shows insights into the affirmative effect of access to finance on the livelihood of the vulnerable and the marginalised. Hanning and Jansen (2010) posit that the movement towards inclusive finance has undergone three phases. These include state-sponsored agricultural and industrial development through direct credit, market-driven development through deregulation, liberalisation and institutions building aimed at reducing the effects of government and market failures. Direct credit programmes instituted by governments in developing countries often involve issuance of credit facilities to farmers and small businesses while regulating the use of such funds. The move was initiated to assist those persons who could not access bank loans at prevailing market rates; therefore, such credits were aimed at the rural poor at lending rates below market rates.

The relevance of financial inclusion in the development and policy circles is due in part to its poverty alleviating feature that, ultimately, can contribute significantly to achieving social cohesion and sustainable economic growth. Given the state of economic development in Sub-Saharan Africa and the important role of financial inclusion in development, several development agencies and international financial institutions have made significant progress to enhance financial inclusion in Sub-Saharan Africa. Nevertheless, gaps in financial inclusion remain severe in several Sub-Saharan African countries. Studies have shown that financial inclusion gaps exist in the developing world in general where the number of financially excluded people is more than 2.7bn, while about 400m SMEs lack access to the formal sources of finance (IFC, 2012).

Though some progress has been achieved in recent times on the continent, it is imperative to evaluate the current position of financial inclusion in Sub-Saharan Africa. The goal of this study is to examine the empirical relations between financial inclusion and FSD which serves as catalysts for economic development. There is an increasing empirical and theoretical evidence that indicates that financial systems that are serving low-income groups enhance pro-poor growth (Beck *et al.*, 2014). Inadequate access to financial products and services has a negative impact on poverty alleviation and growth efforts since it makes it problematic for the poor to gather their savings in building assets that will insulate them from been affected by risks and also investing in income-generating assets. Since there has been much emphasis on the poverty alleviation role of finance in recent times, conscious attempts have been made by policy makers to constantly expand quality financial services in a much broader range to the vulnerable (Morduch, 1999; Robinson, 2001). It is against this backdrop that providing financial services to the those who do not have access to banking services have become a major issue of concern for policy makers, development finance institutions, academics and practitioners who are emphasising financial inclusion as a tool for policy making. FSD is being recognised as a prerequisite for economic growth and poverty alleviation (Chibba, 2009). With a majority of population in rural areas that are facing economic challenges, financial inclusion is an indispensable tool for the sustainability of economic growth of Sub-Saharan Africa economies.

A new approach towards financial inclusion emerged during the latter part of the 1980s where attention shifted and where financial institutions were providing financial service to only certain segments of the public that lack access to finance. This method of providing financial services shifted attention from households and individual firms to institutions based on their capacity to provide financial services on a more widespread and sustainable basis. This shift led researchers to focus on microfinance and rural finance where banking services were geared towards the poor as a viable and sustainable finance approach and this resulted in a new concept called the financial system paradigm (Otero and Rhyne, 1994).

Researchers that investigate the effect of FSD on economic growth base their argument on the essential roles efficient financial systems play in an economy. Creane *et al.* (2003) identify these roles as mainly covering the mobilisation of savings, promotion of investment

through identification and financing of promising business opportunities, monitoring managerial performance, allowing for trading, risk diversification, hedging and facilitating goods and services exchange. By performing these roles, Seetanah *et al.* (2010) argue that financial systems ultimately result in the rapid accumulation of human capital and physical capital, allocation of resources efficiently and faster technological advancement, all of which boost economic development and growth.

Mohan (2006) posits that a financial system that is well developed broadens access to credit whereas a financial system that is underdeveloped limits access to credit and in some cases constraints people from having access to their own funds resulting in lending from informal sources at high cost. According to him, this results in a cycle where fewer economic activities can be financed and consequently lead to a negative impact on economic growth. This further shows that financial deepening promotes economic growth through expanding access to financial products and services to the poor, while in some underdeveloped financial systems growth is restricted to the internal expansion potential of individual firms. In a developed financial system, "financial institutions develop appraisal techniques, information gathering and sharing mechanisms which enables them to finance firm's activities leading to increased productivity" (Mohan, 2006, p. 5).

The debate on the effect of economic growth on FSD is widely explored. Most empirical papers have found evidence of a positive relationship between economic growth and FSD and this indicates that there is a reverse causality between them (Odhiambo, 2011).

Furthermore, Giné and Townsend (2004) use empirical evidence from Thailand to indicate that expanding access to financial services results in increased growth. The term economic growth has been coined to explain growth that includes the poor and marginalised in the economy. According to Beck *et al.* (2008), this has been made possible due to the increase in usage of financial products which tends to improve financial development, income equality and poverty alleviation. Thus, financial inclusion may contribute to growth through the channel of financial development or may directly impact on income inequality and poverty, thus leading to economic growth.

3. Methodology

This study uses a pVAR estimation technique to investigate the dynamic and causal relationship amongst financial inclusion, FSD and economic growth. The study used the pVAR estimation techniques because it addresses issues of endogeneity among the variables and it also makes it possible to generate IRFs and VDC of the variables. The use of pVAR model creates a framework that is more flexible where all the variables in the system equation are considered as endogenous. pVARs are now considered as the standard tool for analysis if one wants to know the impact of policy transmissions as well as economic variables interactive behaviour. The study adopts the panel data technique in order to enhance the efficiency of the estimation due to the challenges when using short period of times series data. The pVAR estimation technique treats the variables in the system of multiple time-series as endogenous and that makes it appropriate for the study. The VAR framework was introduced by Sims (1980) and since then it has been generally used in economics and finance studies. The VAR framework permits unobserved individual heterogeneity with panel data. The pVAR estimation technique which was developed by Holtz-Eakin *et al.* (1988), has been widely used in finance and economics studies (Love and Ariss, 2014; Love and Zicchino, 2006). This study adds to the extant literature by examining the endogenous interaction among financial inclusion, FSD and economic growth of Sub-Saharan African economies by using a pVAR estimation technique. The use of pVAR addresses the problem of endogeneity, which is one of the most serious issues in econometric modelling of panel data analysis. The general pVAR model is stated as follows.

Downloaded by University of Ghana At 04:09 07 June 2019 (PT)

We consider a k-variate pVAR of the order p with panel-specific fixed effects which are represented by the system of linear equations below:

$$Y_{it} = Y_{it-1}A_1 + Y_{it-2}A_2 + \ldots + Y_{it-p+1}A_{P-1} + Y_{it-p}A_P + X_{it}B + u_{it} + e_{it},$$

$$i \in \{1, 2, \ldots, N\}, t \in \{1, 2, \ldots, T_i\},$$

where Y_{it} is a $(1 \times k)$ dependent variables vector; X_{it} is a $(l \times l)$ exogenous covariates vector; u_{it} and e_{it} are $(1 \times k)$ vectors of dependent variable-specific fixed effects and error term respectively. The (kxk) matrices A_1, A_2, …., A_{P-1}, A_P and the (lxk) matrix B are coefficients to be computed. We assume that the innovations have the following features: $E[e_{it}] = 0, E[e'_{it}e_{it}] = \sum$ and $E[e'_{it}e_{it}] = O$ for all $t > s$.

The baseline pVAR model following Love and Zicchino (2006) is given by:

$$Z_{it} = \tau_1 Z_{it-1} + f_i + d_t + e_{it},$$

where Z_{it} is a three-variable vector [*FINDEX, FSD, GDPERGR*]; f_i captures fixed effects – unobservable time invariant effects specific to each country; d_t captures time dummies that are country specific which represent each country-specific macro shocks; e_{it} the random error term iid. The pVAR framework is made up of three equations and they are specified as follows:

$$FINDEX_{it} = \sum_{j=1}^{p} \emptyset_{1j} FINDEX_{it-j} + \sum_{j=1}^{p} \emptyset_{2j} FSD_{it-j} + \sum_{j=1}^{p} \emptyset_{3j} GDPERGR_{it-j} + f_i + d_t + \varepsilon_{it},$$

$$FSD_{it} = \sum_{j=1}^{p} \emptyset_{1j} FSD_{it-j} + \sum_{j=1}^{p} \emptyset_{2j} FINDEX_{it-j} + \sum_{j=1}^{p} \emptyset_{3j} GDPERGR_{it-j} + f_i + d_t + \varepsilon_{it},$$

$$GDPERGR_{it} = \sum_{j=1}^{p} \emptyset_{1j} GDPERGR_{it-j} + \sum_{j=1}^{p} \emptyset_{2j} FINDEX_{it-j} + \sum_{j=1}^{p} \emptyset_{3j} FSD_{it-j} + f_i + d_t + \varepsilon_{it}.$$

We determined the lag length by using a model selection criterion such as the modified Akaike, Bayesian or quasi information criteria, thus known as MAIC, MBIC and MQIC, respectively since we are using a pVAR framework. We will use the modified AIC, BIC and QIC since these criteria can generate results that are more robust (Qu and Perron, 2007). After estimating all the parameters of the pVAR, we generate the IRFs and the VDCs . The IRFs enable us to explain the response of an endogenous variable over time to a shock in another variable in the system while the FEVD indicates the contributions of each source of shock to the variance of each endogenous variable at a given forecast period.

3.1 Data source and description of variables

The data sources and the description of the variables are presented in Table I. All the financial inclusion variables were all obtained from the International Financial Statistics (IFS). The rest of the variables were taken from the World Development Indicators (WDI). The full sample comprise of 217 countries while 48 countries make up the Sub-Saharan Africa sample. Even though this study focussed on Sub-Saharan Africa, the study considers the full sample as well to see if the African story is different. The study uses a balanced panel annual data spanning from 1990 to 2014.

Downloaded by University of Ghana At 04:09 07 June 2019 (PT)

Variable	Notation	Description	Data source
Financial Inclusion Index	FINDEX	An index of ATMs per hundred thousand adults, bank branches per hundred thousand adults, commercial bank branches per hundred thousand adults, bank accounts per thousand adults, borrowers from commercial banks per hundred adults and depositors with commercial banks per thousand adults	IFS
Financial Inclusion	ATMSPHTA	ATMs per hundred thousand adults	IFS
Financial Inclusion	BRPHTA	Bank branches per hundred thousand adults	IFS
Financial Inclusion	CBB	Commercial bank branches per hundred thousand adults	IFS
Financial Inclusion	BAPTA	Bank accounts per thousand adults	IFS
Financial Inclusion	BFCB	Borrowers from commercial banks per hundred adults	IFS
Financial Inclusion	DCBPTA	Depositors with commercial banks per thousand adults	IFS
Financial Sector Development	FSD	Domestic credit provided by financial sector (% of GDP)	WDI
Economic Growth	GDPERGR	GDP per capita growth rate (annual %)	WDI

Notes: WDI, World Development Indicators; IFS, International Financial Statistics

Table I. Data source and variable description

Downloaded by University of Ghana At 04:09 07 June 2019 (PT)

3.2 Principal component analysis (PCA)

The study used panel PCA estimation technique to construct a financial inclusion index (FINDEX) made up of six selected measures of financial inclusion. According to this estimation techniques, the *j*th factor index can be specified as:

$$FINDEX_j = W_{J1}X_1 + W_{J2}X_2 + W_{J3}X_3 + \ldots + W_{JP}X_P,$$

where $FINDEX_j$ *i*s the Financial Inclusion Index; Wj is the weight of the parameter of the factor score; X is the original figure of the respective components; while P is the number of variables in the equation. The financial inclusion composite index has been constructed by two dimensions of financial inclusion where each dimension consists of three factors. The first dimension is the supply side factors which include; ATMs per hundred thousand adults (ATMSPHTA), Bank branches per hundred thousand adults (BRPHTA), Commercial bank branches per hundred thousand adults (CBB). The second-dimension factors are the demand side factors which include bank accounts per thousand adults (BAPTA), borrowers from commercial banks per thousand adults (BFCB) and depositors with commercial banks per thousand adults (DCBPTA). The FINDEX is made up of six factors. The index is specified as follows:

$$FINDEX = f(ATMSPHTA, BRPHTA, CBB, BAPTA, BFCB, DCBPTA).$$

4. Discussion of empirical results

4.1 Descriptive statistics

The descriptive statistics of the variables of the Sub-Saharan Africa sample and the full sample are reported in Table II. However, since the predictive power of the mean is affected by outliers, the median of the distribution is what we used for our discussion.

ATMSPHTA, which is a measure of financial inclusion, has a median of 3.54 per hundred thousand adults in Sub-Saharan Africa, while the world median value is 30.33 ATMs per hundred thousand adults. This indicates that the degree of financial inclusion in Sub-Saharan Africa is still very low relative to the rest of the world. The rest of the measures of financial inclusion which include: BAPTA, BFCB, BRPHTA, CBB and DCBPTA have median values of 87.13, 2.84, 2.97, 17.42 and 106.48, respectively, in the Sub-Saharan Africa sample, while their world median

	ATMSPHTA	BAPTA	BRPHTA	CBB	BFCB	DCBPTA	FSD	GDPERGR
Sub-Saharan Africa Sample								
Mean	8.87	172.13	5.07	5.66	40.98	216.66	30.83	1.69
Median	3.54	92.16	3.01	2.97	17.42	106.48	17.75	1.56
Maximum	66.20	1,688.27	54.78	54.17	257.67	1,777.71	2,066.18	141.64
Minimum	0.00	0.00	0.13	0.12	0.00	0.00	−79.09	−50.24
SD	13.73	211.22	7.53	8.47	55.50	293.87	72.63	8.38
Skewness	2.21	2.93	4.01	3.29	1.89	2.88	20.58	5.01
Kurtosis	7.23	16.68	21.38	14.51	5.86	12.89	568.18	90.33
Jarque–Bera	603.26	3,394.42	7,977.48	3,604.23	262.31	2,074.39	14,570,790.00	367,019.30
Probability	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Observations	387.00	368.00	476.00	492.00	281.00	380.00	1,089.00	1,140.00
Full (world) sample								
Mean	41.48	512.87	20.17	19.37	171.54	520.12	57.77	2.15
Median	30.33	337.76	13.03	12.57	97.18	339.50	42.85	2.20
Maximum	290.66	3,368.39	285.00	289.83	1,156.05	3,371.49	2,066.18	141.64
Minimum	0.00	0.00	0.13	0.12	0.00	0.00	−114.69	−65.00
SD	44.28	559.67	27.38	26.41	208.89	545.97	62.02	6.42
Skewness	1.86	1.90	5.37	5.68	1.97	1.78	9.03	2.76
Kurtosis	7.59	7.81	45.39	50.65	7.13	7.38	262.21	80.41
Jarque–Bera	2,423.50	1,277.59	144,111.00	195,843.00	1,217.62	1,145.91	11,975,600.00	1,197,198.00
Probability	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Observations	1,668.00	816.00	1,809.00	1,959.00	897.00	862.00	4,257.00	4,770.00

Source: Authors estimate from research data

Table II.
Descriptive statistics

values are 337.76, 13.03, 12.57, 97.18 and 339.50, respectively. From the median distribution of the other measures of financial inclusion above, the Sub-Saharan Africa values are lower compared to the world or full sample values. This suggests that the degree of financial inclusion in Sub-Saharan Africa is relatively low relative to the world level of financial inclusion.

Domestic credit provided by financial sector as a percentage of GDP, which is a measure of FSD has a median of 17. In total, 75 per cent in Sub-Saharan Africa, while that of the full sample is 42.85 per cent. This means that domestic credit provided by the financial sector is 17.75 per cent of GDP, while the full sample median is 42.85 per cent. The explanation we offer for this finding is that the degree of FSD in Sub-Saharan Africa is low relative to the world. GDP per capita growth rate (GDPERGR) in Sub-Saharan Africa has a median value of 1.56 per cent, while that of the world (full sample) median is 2.20 per cent. It implies that world economic growth rate is higher than Sub-Saharan Africa and this explains why the living standards in Sub-Saharan Africa are lower relative to the rest of the world.

4.2 Unit root test results

In panel data analysis, it is essential that the variables are stationary. Stationary test is necessary because the variables order of integration will help select the correct model for the computation of the parameters. Different estimation techniques have been developed for testing unit roots in panel data such as Levin *et al.* (2002, LLC) and Im *et al.* (2003, IPS). The LLC and IPS tests both assume that the null hypotheses in each series in the panel has a unit root, but the alternate hypotheses of the LLC test assumes each series to be stationary with an identical autoregressive parameter for all panel units while the alternate hypothesis of the IPS test permits unit roots for some of the individual series if not for all, that is, the autoregressive parameters are not the same. This study employed four panel unit root test: augmented Dickey–Fuller (ADF) test, the

Downloaded by University of Ghana At 04:09 07 June 2019 (PT)

Levine–Lin Chu (LLC) test, Im Pesaran and Shin (IPS) test and Philips–Perron (PP) test. There are a number of advantages of using panel unit root tests when compared with using individual time-series-based unit root tests. First, the use of panel data-based unit root tests has more predictive power compare to their univariate counter parts. We used four panel unit root test because the conventional ADF has low statistical power when identifying stationarity more especially in short panels in a panel setting. Second, panel unit root tests do not restrict but allows for country-level fixed effects and also variations in time for the coefficients across the panels. Besides, panel data approach gives options for estimation ranging from no trend and non-constant estimation to estimations with a constant and deterministic trend testing for similar time effects. These approaches provide a greater level of flexibility in computing the coefficients (Issahaku *et al.*, 2016).

The results of the panel unit root test for the Sub-Saharan Africa sample and the full sample are reported in Table III. The results from Table III show that all the variables are integrated of order zero I(0) except FINDEX variable that is integrated of order one I(1) in the case of the Sub-Saharan African sample. This implies that not all the variables used in the study follow a unit root process. We used the first difference of the variables that are integrated of order one I(1) in the analysis.

4.3 Selection and computation of the lag order

The technique for selecting the appropriate model is reported in Table IV. Based on the selection criteria of the three models by Andrews and Lu (2001) and the overall co-efficient of determination, first-order pVAR model is preferred. This is because it has the least MBIC, MAIC and MQIC values. Based on the results on the model selection in Table IV, we use the first-order pVAR.

	FINDEX	FSD	GDPERGR
Sub-Sahara Africa sample			
Level			
LLC	6.76	−4.85***	−7.92***
IPS	11.94	−3.63***	−10.64***
ADF	5.89	153.88***	285.44***
PP	6.86	165.09***	596.77***
First difference			
LLC	−9.21***		
IPC	−4.69***		
ADF	131.64***		
PP	144.50***		
Full sample			
Level			
LLC	7.73	0.02	−37.24***
IPS	11.6	2.52	−34.54***
ADF	153.63	394.16	1,865.32***
PP	222.67	412.93*	1,984.32***
First difference			
LLC	−1,433.6***	−44.50***	
IPC	−85.57***	−40.80***	
ADF	588.69***	2,221.05***	
PP	607.68***	2,790.21***	

Table III.
Panel unit root test

Sources: Authors estimate from research data. *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$

Downloaded by University of Ghana At 04:09 07 June 2019 (PT)

Downloaded by University of Ghana At 04:09 07 June 2019 (PT)

4.4 Regression results

There is a confirmation of a reverse causality between FINDEX and FSD. This evidence is shown in Table V. There is a strong evidence of a positive impact of the lag of FSD on FINDEX in Sub-Saharan Africa as indicated by the statistical significance and also the positive co-efficient of the lag of FSD as shown in Table V. The explanation offers for this finding is that a financial sector that is well-developed will lead to financial inclusion. This is because a well-developed financial sector easily provides people access to financial services. On the other hand, it is also evident that the lag of financial inclusion significantly impacts FSD. It implies that when more people are financially included, it promotes FSD and stability. Our results are consistent with other theoretical papers that argued that financial inclusion has a positive impact on FSD (Allen *et al.*, 2014; Otchere, 2016). Our results depart from earlier studies in two ways. First, unlike earlier theoretical studies that look at a unidirectional relationship between financial inclusion and FSD, we examine the bi-causal relationship between financial inclusion and FSD. We believe that, knowledge generated from unidirectional studies is unreliable since the variables could depend on each other. Second, we found a reverse causality between financial inclusion and FSD suggesting that financial inclusion and FSD complement each other unlike other studies that argued that financial inclusion lower asset quality (subprime lending) which leads to financial instability thereby hampering financial development (Khan, 2011). The results of this study also show that central banks and financial institutions policies aim at advancing financial inclusion will not sacrifice the development of the financial sector but rather it will improve it and vice versa.

In the full sample results in Table VI, there is evidence of reverse causality between FINDEX and FSD; hence the results from the Sub-Saharan Africa are not significantly

Lag	CD	*J*	*J p*-value	MBIC	MAIC	MQIC
1	0.9997355	22.76279	0.6976881	−115.7445	−31.23721	−65.53185
2	0.9998122	12.61969	0.8136526	−79.71849	−23.38031	−46.2434
3	0.999521	5.963437	0.7435721	−40.20565	−12.03656	−23.46811

Notes: MBIC, modified Bayesian criteria; MQICM, modified Hannan–Quinn information criteria; MAIC, modified Akaike information criteria

Table IV. Lag order selection and estimation

	FINDEX	FSD	GDPERGR
FINDEX(−1)	0.555808***	4.353277***	0.881856
	(0.12711)	(1.53070)	(1.12263)
	[4.37264]	[2.84398]	[0.78553]
FSD(−1)	0.004319***	0.934227***	0.022389
	(0.00182)	(0.02195)	(0.01610)
	[2.36939]	[42.5574]	[1.39066]
GDPERGR(−1)	0.011872	−0.150325	0.512635***
	(0.01074)	(0.12935)	(0.09487)
	[1.10523]	[−1.16213]	[5.40362]
R^2	0.235238	0.924146	0.038053
Adj. R^2	0.220389	0.922674	0.019374
F-statistic	15.84123	627.4402	2.037235

Notes: Standard errors are shown in parenthesis and *t*-statistics are shown in square brackets. *,**,***Significant at 10, 5 and 1 per cent levels, respectively

Table V. Sub-Saharan Africa sample panel VAR results, financial inclusion index, financial sector development and economic growth

different from the full sample results. This finding is concurring with other theoretical studies that examines the link between financial inclusion and FSD (Honohan, 2007, 2008; Rojas-Suarez, 2010). The only difference between the two samples results is that the lag of economic growth is statistically significant in determining FINDEX whiles the lag of FSD is also significant driver of economic growth (GDPERGR) for the full sample results. The results of the full sample show the existence of a tripartite relationship among financial inclusion, FSD and economic growth.

4.5 Variance decomposition

The FEVD concurs with the results based on residual covariance matrix of the underlying pVAR model Cholesky decomposition of the Sub-Saharan Africa countries (see Tables VII–IX) and the pVAR model of the full sample (see Tables X–XII). The results in Table VII indicate that the contribution of FSD (second column) and GDPERGR (third column) explained 0.00 and 0.00 per cent, respectively, of the variation of FINDEX) in the short run, i.e. one year and the same amount of variation applies to the full sample in Table X. In ten years, more than 5.41 and 1.98 per cent of the variation in FINDEX is explained by FSD (second column) and GDPERGR (third column) shocks, respectively, in Table VII while in the full sample, the results in Table X indicate

Table VI. Full sample panel VAR results, financial inclusion index, financial sector development, economic growth

	FINDEX	FSD	GDPERGR
FINDEX(−1)	0.305342***	3.485151**	0.598118
	(0.06655)	(1.64820)	(1.23918)
	[4.58806]	[2.11452]	[0.48267]
FSD(−1)	0.000752**	1.023598***	0.019810***
	(0.00037)	(0.00911)	(0.00685)
	[2.04319]	[112.321]	[2.89123]
GDPERGR(−1)	0.013630***	-0.115573	0.200217**
	(0.00469)	(0.11617)	(0.08734)
	[2.90562]	[−0.99483]	[2.29229]
R^2	0.073608	0.970579	0.009908
Adj. R^2	0.065446	0.970319	0.001185
F-statistic	9.018353	3744.239	1.135862

Notes: Standard errors are shown in parenthesis and *t*-statistics are shown in square brackets. *,**,***Significant at 10, 5 and 1 per cent levels, respectively

Table VII. Variance decomposition of FINDEX (Sub-Saharan Africa sample results)

Period	SE	FINDEX	FSD	GDPERGR
1	0.390796	100.0000	0.000000	0.000000
2	0.448930	98.91737	0.253023	0.829604
3	0.470694	97.72322	0.746556	1.530220
4	0.481536	96.72597	1.381065	1.892969
5	0.488279	95.88742	2.079818	2.032759
6	0.493253	95.14003	2.794103	2.065868
7	0.497359	94.44716	3.496016	2.056825
8	0.500976	93.79483	4.170922	2.034245
9	0.504276	93.17888	4.812028	2.009089
10	0.507342	92.59809	5.416954	1.984958

Note: Variance decomposition of FINDEX, FSD and GDPERGR of Sub-Saharan Africa sample

Downloaded by University of Ghana At 04:09 07 June 2019 (PT)

Period	SE	FINDEX	FSD	GDPERGR
1	4.706080	0.004607	99.99539	0.000000
2	6.674710	6.866450	92.53184	0.601707
3	8.276050	13.81873	85.31367	0.867600
4	9.640308	19.09765	80.00157	0.900772
5	10.82235	22.92980	76.22018	0.850018
6	11.86007	25.73323	73.48626	0.780516
7	12.78151	27.82808	71.45754	0.714381
8	13.60761	29.43093	69.91175	0.657324
9	14.35423	30.68530	68.70509	0.609606
10	15.03356	31.68722	67.74282	0.569969

Table VIII. Variance decomposition of FSD (Sub-Saharan Africa sample results)

Period	SE	FINDEX	FSD	GDPERGR
1	3.451487	0.115842	0.303057	99.58110
2	3.892642	0.627570	0.509596	98.86283
3	4.025809	1.457904	0.779583	97.76251
4	4.079996	2.218814	1.094552	96.68663
5	4.109691	2.828546	1.434703	95.73675
6	4.130469	3.307955	1.784098	94.90795
7	4.147379	3.693925	2.131750	94.17433
8	4.162252	4.016066	2.470842	93.51309
9	4.175837	4.294399	2.797520	92.90808
10	4.188479	4.541712	3.109864	92.34842

Table IX. Variance decomposition of GDPERGR (Sub-Saharan Africa sample results)

Period	SE	FINDEX	FSD	GDPERGR
1	0.302084	100.0000	0.000000	0.000000
2	0.327111	94.31222	0.561726	5.126053
3	0.331541	92.89395	0.872638	6.233408
4	0.332460	92.54547	1.070328	6.384204
5	0.332829	92.37717	1.231112	6.391719
6	0.333111	92.23437	1.383064	6.382569
7	0.333386	92.09145	1.536481	6.372071
8	0.333668	91.94331	1.695282	6.361406
9	0.333963	91.78848	1.861097	6.350427
10	0.334273	91.62627	2.034737	6.338997

Note: Variance decomposition of FINDEX, FSD and GDPERGR of the full (world) sample

Table X. Variance decomposition of FINDEX (full sample results)

Period	SE	FINDEX	FSD	GDPERGR
1	7.481328	0.021711	99.97829	0.000000
2	10.66821	1.103092	98.55040	0.346508
3	13.25238	1.916335	97.71077	0.372893
4	15.53092	2.445591	97.20891	0.345502
5	17.61994	2.795552	96.88709	0.317362
6	19.58170	3.037272	96.66745	0.295282
7	21.45453	3.211843	96.50958	0.278574
8	23.26387	3.342930	96.39127	0.265798
9	25.02764	3.444605	96.29958	0.255818
10	26.75900	3.525586	96.22657	0.247848

Table XI. Variance decomposition of FSD (full sample results)

Downloaded by University of Ghana At 04:09 07 June 2019 (PT)

that the contribution of FSD (second column) and economic growth (GDPERGR) (third column) explained 2.03 and 6.34 per cent of the variation of FINDEX in the long run, i.e., ten years. However, after one year which is the short run, more than 0.005 and 0.00 per cent of the variation in FSD is explained by financial inclusion and the GDPERGR shocks respectively when using the Sub-Saharan Africa sample in Table VIII and the variation is 0.02 and 0.00 per cent, respectively, when using the full sample according to Table XI. But ten years in the long run, more than 31.69 and 0.57 per cent of the variation in FSD is explained by financial inclusion and the GDPERGR shocks, respectively, when using the Sub-Saharan African sample in Table VIII and the variations are 3.53 and 0.25 per cent, respectively, when using the full sample according to the results in Table XI. Table IX represents the variance decomposition of economic growth (GDPERGR) of the Sub-Saharan Africa sample and Table XII represents the full sample. It shows that FINDEX and FSD shocks contribute about 0.11 and 0.30 per cent, respectively of the variation of GDPERGR in the short run when using the Sub-Saharan Africa as shown in Table IX and 0.61 and 6.07 per cent, respectively, in the full sample in Table XII. In 10 years in the long run, FINDEX and FSD shocks explain about 4.54 and 3.11 per cent, respectively of the variation of GDPERGR when using the Sub-Saharan Africa sample as shown in Table IX. Table XII represents the VDC of GDPERGR of the full sample, whereas after ten years (long run), FINDEX and FSD shocks explain about 0.90 and 7.44 per cent, respectively, of the variation of GDPERGR.

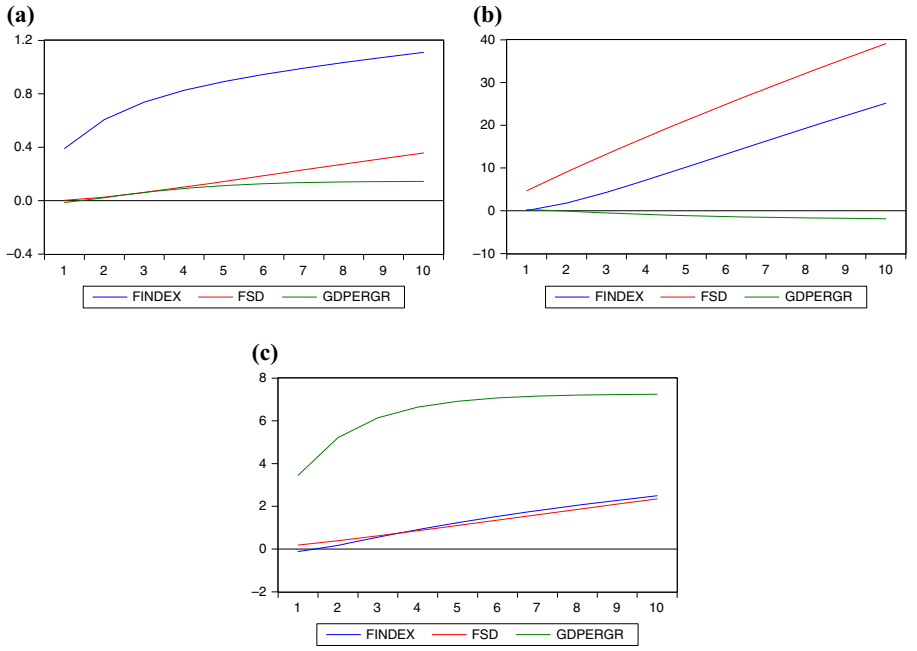
4.6 Impulse response functions

All the endogenous variables IRFs are displays in Figure 1 of the pVAR model of the Sub-Saharan Africa sample. The accumulated impulse responses are presented over time. The response of FINDEX to FSD and economic growth rate shocks is positive and statistically significant. This appears to concur with the findings in the Sub-Saharan Africa samples. The accumulated response of financial inclusion to FSD shocks shows it is positive and is statistically significant. This means that a well-developed financial sector can induce financial inclusion. Figure 2 displays the IRFs for all the endogenous variables of the pVAR model of the full sample. The accumulated impulse responses are reported over time. The response of financial inclusion to FSD and economic growth (GDP per capita) shocks in the full sample is positive and statistically significant. This means increase in FSD and economic growth enhances financial inclusion. The accumulated response of financial inclusion to monetary policy rate shocks in the full sample shows it is not statistically significant. The accumulated response of FSD and economic growth (GDPERGR) of both samples are also shown.

Table XII. Variance decomposition of GDPERGR (full sample results)

Period	SE	FINDEX	FSD	GDPERGR
1	5.624751	0.606281	6.072594	93.32112
2	5.751157	0.801230	6.356493	92.84228
3	5.763513	0.852702	6.515026	92.63227
4	5.768317	0.868858	6.641541	92.48960
5	5.772371	0.876685	6.763093	92.36022
6	5.776431	0.882307	6.887240	92.23045
7	5.780644	0.887369	7.016417	92.09621
8	5.785057	0.892393	7.151602	91.95601
9	5.789692	0.897562	7.293324	91.80911
10	5.794565	0.902949	7.441971	91.65508

Downloaded by University of Ghana At 04:09 07 June 2019 (PT)



Notes: (a) Accumulated response of FINDEX to generalized one SD innovations; (b) accumulated response of FSD to generalized one SD innovations; (c) accumulated response of GDPERGR to generalized one SD innovations

Figure 1.
Impulse response functions of the Sub-Saharan African sample

5. Conclusions and policy implications

FSD continues to play a key role in Sub-Saharan Africa because it is becoming the major source of funds and has implications for financial inclusion and macroeconomic policy and stability. There is an evidence of a reverse causality between financial inclusion and FSD in Sub-Saharan Africa. This implies that financial inclusion and FSD reinforces each other. The policy implication of this reverse causality is that financial inclusion and FSD are complementary and not contradictory as opposed to other researchers that argued that financial inclusion could impede FSD as a result of subprime lending (Khan, 2011). The results suggest that central banks and other financial institutions can leverage on the positive effect of financial inclusion on FSD to enhance the development of the financial sector instead of pursuing only FSD as a policy objective. Another managerial implication of the study is that; financial inclusion should not only be pursued as a policy objective but it could also be an outcome variable of FSD. This implies that FSD can serve as a policy tool for African economies and governments in their effort to enhance financial inclusion. This means that policies aimed at promoting financial inclusion will not impede FSD. This suggests that we can achieve financial inclusion without sacrificing FSD.

This study broadens the extant literature on financial inclusion–FSD–economic growth nexus by using a pVAR approach to established the relationship among these variables. This study contributes to theory advancement by establishing the tripartite relationship amongst financial inclusion, FSD and economic growth. The IRFs generated enables us to understand the behaviour of the variables to policy shocks.

Downloaded by University of Ghana At 04:09 07 June 2019 (PT)

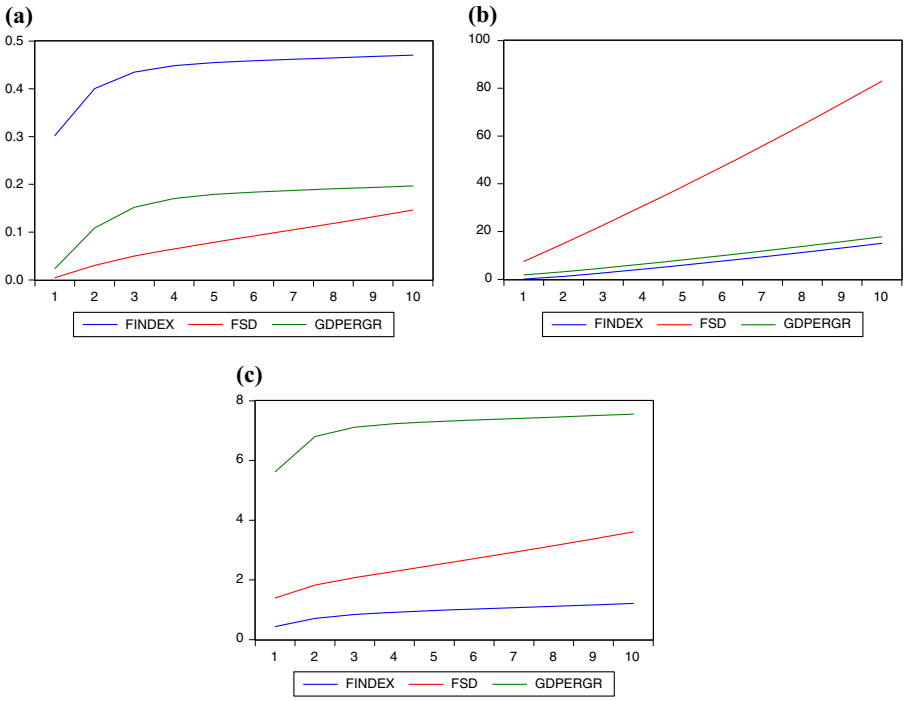


Figure 2.
Impulse response functions of the full sample

Notes: (a) Accumulated response of FINDEX to generalized one SD innovations; (b) accumulated response of FSD to generalized one SD innovations; (c) accumulated response of GDPERGR to generalized one SD innovations

References

Abor, J.Y., Amidu, M. and Issahaku, H. (2018), "Mobile telephony, financial inclusion and inclusive growth", *Journal of African Business*, Vol. 19 No. 3, pp. 430-453, doi: 10.1080/15228916.2017.1419332.

Allen, F., Demirguc-Kunt, A., Klapper, L. and Peria, M.S.M. (2016), "The foundations of financial inclusion: understanding ownership and use of formal accounts", *Journal of Financial Intermediation*.

Allen, F.E., Carletti, R., Cull, J., Qian, L., Senbet and Valenzuela, P. (2014), "The African financial development and financial inclusion gaps", World Bank Policy Working Paper No. 7019, Washington, DC.

Andrews, D. and Lu, B. (2001), "Consistent model and moment selection procedures for GMM estimation with application to dynamic panel data models", *Journal of Econometrics*, Vol. 101 No. 1, pp. 123-164.

Ardic, O.P., Hermann, M. and Mylenko, N. (2011), "Access to financial services and the financial inclusion agenda around the world: a cross-country analysis with a new data set", working paper, World Bank Policy Research.

Beck, T., Degryse, H. and Kneer, C. (2014), "Is more finance better? Disentangling intermediation and size effects of financial systems", *Journal of Financial Stability*, Vol. 10, pp. 50-56.

Beck, T., Demirguc-Kunt, A. and Martinez Peria, M.S. (2008), "Banking services for everyone? Barriers to bank access and use around the world", *World Bank Economic Review*, Vol. 22 No. 3, pp. 397-430.

Downloaded by University of Ghana At 04:09 07 June 2019 (PT)

Downloaded by University of Ghana At 04:09 07 June 2019 (PT)

Bhanot, D., Bapat, V. and Bera, S. (2012), "Studying financial inclusion in north-east India", *International Journal of Bank Marketing*, Vol. 30 No. 4, pp. 465-484.

Brune, L., Gine, X., Goldberg, J. and Yang, D. (2011), "Commitments to save: a field experiment in rural Malawi", World Bank Policy Research Working Paper No. 5748, Washington, DC.

Burgess, R. and Pande, R. (2005), "Do rural banks matter? Evidence from the Indian social banking experiment", *American Economic Review*, Vol. 95 No. 3, pp. 780-795.

Chibba, M. (2009), "Financial inclusion, poverty reduction and the millennium development goals", *European Journal of Development Research*, Vol. 21 No. 2, pp. 213-230.

Creane, S., Goyal, A., Mushfiq, M. and Sab, R. (2003), "Financial development and growth in the Middle East and North Africa", IMF working paper, Washington, DC.

Dabla-Norris, E., Townsend, Y.J.I. and Unsal, D.F. (2015), "Identifying constraints to financial inclusion and their impact on and inequality: a structural framework for policy", working paper, IMF.

Demirguc-Kunt, A. and Klapper, L. (2012), "Measuring financial inclusion: the Global Findex Database", Policy Research Working Paper No. 6025, World Bank.

Evans, O. (2016), "The effectiveness of monetary policy in Africa: modeling the impact of financial inclusion", *Iranian Economic Review*, Vol. 20 No. 3, pp. 327-337.

Giné, X. and Townsend, R. (2004), "Evaluation of financial liberalization: a general equilibrium model with constrained occupation choice", *Journal of Development Economics*, Vol. 74 No. 2, pp. 269-307.

Hanning, A. and Jansen, S. (2010), "Financial inclusion and financial stability: current policy issues", ADBI Working Paper No. 259, Asian Development Bank Institute, Tokyo, available at: www.adbi.org/working-paper/2010/12/21/4272.financial.inclusion.stability.policy.issues/ (accessed 24 November 2017).

Hasnol, A.M., Alwee, P. and Salleh, M. (2013), "Integrating financial inclusion and saving motives into institutional zakat practices: a case study on Brunei", *International Journal of Islamic and Middle Eastern Finance and Management*, Vol. 8 No. 2, pp. 150-170.

Holtz-Eakin, D., Newey, W. and Rosen, H. (1988), "Estimating vector autoregressions with panel data", *Econometrica*, Vol. 56 No. 6, pp. 1371-1395.

Honohan, P. (2007), "Cross-country variation in household access to financial services", paper prepared for the Conference on "Access to Finance", World Bank, Washington, DC, 15–16 March.

Honohan, P. (2008), "Cross-country variation in household access to financial services", *Journal of Banking and Finance*, Vol. 32 No. 11, pp. 2493-2500.

IFC (2012), *IFC Advisory Services Access to Finance Annual Review 2011*, International Finance Corporation World Bank Group, Washington, DC.

Im, K.S., Pesaran, M.H. and Shin, Y. (2003), "Testing for unit roots in heterogeneous panels", *Journal of Econometrics*, Vol. 115 No. 1, pp. 53-74.

Issahaku, H., Harvey, S.K. and Abor, J.Y. (2016), "Does development finance pose an additional risk to monetary policy?", *Review of Development Finance*.

Johal, S. (2016), "Tackling poverty and inequality through financial inclusion: a case study of India", *Third ISA Forum of Sociology, Vienna*.

Khan, H.R. (2011), "Financial inclusion and financial stability: are they two sides of the same coin?", Address by Shri H.R. Khan, Deputy Governor of the Reserve Bank of India, at BANCON 2011, organized by the Indian Bankers Association and Indian Overseas Bank, Chennai, 4 November, available at: www.bis.org/review/r111229f.pdf (accessed 30 November 2017).

Kpodar, K. and Andrianaivo, M. (2011), "ICT, financial inclusion, and growth evidence from African countries", available at: www.maturesex.gsma.com/mobilefordevelopment/wp-content/uploads/2012/06/imfworkingpaperictfinancialinclusion.pdf

Levin, A., Lin, C.-F. and Chu, C.-S.J. (2002), "Unit root tests in panel data: asymptotic and finite-sample properties", *Journal of Econometrics*, Vol. 108 No. 1, pp. 1-24.

Levine, R. (1997), "Financial development and economic growth: views and agenda", *Journal of Economic Literature*, Vol. 35, pp. 688-726.

Love, I. and Ariss, R.T. (2014), "Macro-financial linkages in Egypt: a panel analysis of economic shocks and loan portfolio quality", *Journal of International Financial Markets, Institutions and Money*, Vol. 28 No. 2014, pp. 158-181.

Love, I. and Zicchino, L. (2006), "Financial development and dynamic investment behavior: evidence from panel VAR", *The Quarterly Review of Economics and Finance*, Vol. 46 No. 2, pp. 190-210.

Marshall, J.N. (2004), "Financial institutions in disadvantaged areas: a comparative analysis of policies encouraging financial inclusion in Britain and the United States", *Environment and Planning A*, Vol. 36 No. 2, pp. 241-261.

Mbutor, M.O. and Uba, I.A. (2013), "The impact of financial inclusion on monetary policy in Nigeria", *Journal of Economics and International Finance*, Vol. 5 No. 8, pp. 318-326.

Mohan, R. (2006), "Agricultural credit in India: status, issues and future agenda", *Economic and Political Weekly*, pp. 1013-1023.

Morduch, J. (1999), "The microfinance promise", *Journal of Economic Literature*, Vol. 37 No. 4, pp. 1569-1614.

Odhiambo, N.M. (2005), "Financial development and economic growth in Tanzania: a dynamic casualty test", *The African Finance Journal*, Vol. 7 No. 1, pp. 1-17.

Odhiambo, N.M. (2011), "Economic growth and carbon emissions in South Africa: an empirical investigation", *International Business and Economics Research Journal*, Vol. 10 No. 7, pp. 75-84.

Otchere, I. (2016), "Financial inclusion and development in Africa: gaps, challenges and policy recommendations", 18TH AERC Senior Policy Seminar, Nairobi, 22-23 March.

Otero, M. and Rhyne, E. (1994), "Financial services for microenterprises: principles and institutions", in Otero, M. and Rhyne, E. (Eds), *The New World of Microenterprise Finance*, Kumarian Press, Hartford, CT, pp. 11-26.

Park, C.-Y. and Mercado, R.V. Jr (2015), "Financial inclusion, poverty, and income inequality in developing Asia", ADB Economics Working Paper Series No. 426, Asian Development Bank, New Delhi.

Qu, Z. and Perron, P. (2007), "Estimating and testing structural changes in multivariate regressions", *Econometrica*, Vol. 75 No. 2, pp. 459-502.

Robinson, M. (2001), *The Microfinance Revolution: Sustainable Banking for the Poor*, World Bank, Washington, DC.

Rojas-Suarez, L. (2010), "Access to financial services in emerging powers: facts, obstacles, and policy implications", OECD Global Development Background Papers, Washington, DC.

Sarma, M. (2008), "Index of financial inclusion", Indian Council for Research on International Economic Relations Working Paper No. 215, New Delhi.

Seetanah, B.P., Sawkut, R., Sannasee, V. and Seetanah, B. (2010), "Stock market development and economic growth in developing countries: evidence from panel VAR framework.

Sharma, D. (2016), "Nexus between financial inclusion and economic growth: evidence from the emerging Indian Economy", *Journal of Financial Economic Policy*, Vol. 8 No. 1, pp. 13-36.

Sims, C. (1980), "Macroeconomics and reality", *Econometrica*, Vol. 48 No. 1, pp. 1-48.

Sinclair, S. (2013), "Financial inclusion and social financialisaton: Britain in a European context", *International Journal of Sociology and Social Policy*, Vol. 33 Nos 11/12, pp. 658-676.

Sinclair, S. and Bramley, G. (2011), "Beyond virtual inclusion communications inclusion and digital divisions", *Social Policy and Society*.

Suleiman, A.-B. and Abu-Qaun, A. (2008), "Financial development and economic growth: the Egyptian experience", *Journal of Policy Modelling*, Vol. 30 No. 5, pp. 887-898.

Thorat, U. (2006), "Financial inclusion and millennium development goals", *RBI Bulletin*, Vol. 50 No. 2, pp. 239-243.

Downloaded by University of Ghana At 04:09 07 June 2019 (PT)

Treasury, H.M.S. (2004), *Promoting Financial Inclusion*, HM Treasury, London.

Tsuru, K. (2000), "Finance and growth: some theoretical considerations, and a review of the empirical literature", Economics Department Working Papers No. 228, Washington Centre.

Further reading

Abrigo, M. and Love, 1 (2015), "Estimation of panel vector autoregression in Stata: a package of programs", available at: http://paneldataconference2015.ceu.hu/ProgramMichael-Abrigo.pdf (accessed 12 October 2017).

Andrews, D.W.K. and Lu, B. (1999), "Consistent model and moment selection criteria for GMM estimation with application to dynamic panel data models", Cowles Foundation Discussion Paper No. 1233, Yale University, New Haven, CT.

Beck, T., Demirgüç-Kunt, A. and Maksimovic, V. (2004), "Bank competition and access to finance: international evidence", *Journal of Money, Credit, and Banking*, Vol. 36 No. 3, pp. 627-648.

King, R. and Levine, R. (1993), "Finance and growth: Schumpeter might be right", *Quarterly Journal of Economics*, Vol. 108 No. 3, pp. 717-738.

Luintel, M. and Khan, M. (1999), "A quantitative reassessment of the finance–growth nexus: evidence from a multivariate VAR", *Journal of Development Economics*, Vol. 60 No. 2, pp. 381-405.

Odhiambo, N.M. (2004), "The demand for money in Tanzania: a dynamic test of McKinnon's complementarity hypothesis", *The African Finance Journal*, Vol. 6 No. 1, pp. 21-36.

About the authors

Ebenezer Bugri Anarfo is Lecturer at the GIMPA Business School. Prior to joining GIMPA Business School, he served as a Graduate Teaching and Research Assistant at GIMPA Business School while he was Master's Student. He obtained his Bachelor's Degree in Economics and Sociology from the University of Ghana in 2006 and Master of Science Degree in Business Administration (Finance Option) GIMPA. He is also currently Doctoral Student at the University of Ghana Business School. His research interests are in the areas of FDI, economic growth and development, capital structure, event studies, mergers and acquisition and mental health. His work on capital structure studies has been published in reputable journals. He has also worked at the Socio-economic Department of Crops Research Institute in Kumasi as Research Assistant when he was doing his national service and taught at Centre for Business Management and Financial Studies as an Economics Tutor. His areas of teaching interest include international finance, econometrics, microeconomics, macroeconomics, corporate finance, financial management, and risk management in financial institutions, managerial economics and business research methods and quantitative methods. Ebenezer Bugri Anarfo is the corresponding author and can be contacted at: eanarfo@gimpa.edu.gh

Joshua Yindenaba Abor is Professor of Finance and Dean of the University of Ghana Business School. He holds a PhD Degree in Finance from the University of Stellenbosch in Cape Town after completing the coursework component (Financial Economics) of the PhD at the Department of Economics, Harvard University, USA. He is also Fellow of the Association of Chartered Certified Accountants (FCCA) (UK). Joshua Yindenaba Abor is Researcher with the African Economic Research Consortium and Fellow with the International Institute for Advanced Studies, Ghana. He has held Visiting Scholar positions at the International Monetary Fund (IMF), Washington DC in the USA. He was Visiting Professor of Finance at the UCT Graduate School of Business, University of Cape Town, South Africa (2011–2016) and he is currently Visiting Professor of Development Finance at the University of Stellenbosch Business School, Cape Town. He serves on the editorial boards of a number of international business, finance and economics journals. He has contributed to the financial economics and finance literature, mainly in the areas of banking and finance, development finance, financial market development, corporate finance and governance, international financial flows and growth and health finance. He has been involved in projects sponsored by Africa Economic Research Consortium, International Growth Centre, WK Kellogg Foundation, African Centre for Economic Transformation, and Industrial Development Corporation and is currently part of a collaborative research project on "Delivering

Downloaded by University of Ghana At 04:09 07 June 2019 (PT)

inclusive financial development and growth" funded by Department for International Development (DFID) and Economic and Social Research Council (ESRC). His papers have appeared in reputable international journals. His most recent book is on Entrepreneurial Finance for MSMEs: *A Managerial Approach for Developing Markets*, published by Palgrave Macmillan (Springer Nature), UK. He also serves on the boards of some companies, including SAS Finance Group and National Banking College. He served as Chairman of SIC Life Company Ltd and currently chairs the Board of Best Western Premier Hotel. He is also Member of the Bank of Ghana Monetary Policy Committee.

Kofi Achampong Osei is currently Associate Professor of Finance at the University of Ghana Business School. He served as the Acting Dean of UGBS from 1 August 2010 to 31 July 2011. Prior to that he was appointed the substantive Vice-Dean of the University of Ghana Business School from 1 August 2009 to 31 July 2011. He has also served as the Head of Department of the Banking and Finance Department of the School. Prior to that, he served as Head of the Management Unit which comprised the Marketing, Finance, Human Resource and Operations Management Departments of the School. He has also served as the Head of the Center for Management Research and Professional Development (CMRPD) of UGBS which is responsible for training of personnel from industry. During that period, he was additionally in charge of the Enterprise Development Services (EDS) of the School. EDS is responsible for the training and provides services targeted at small- and medium-scale enterprises development in the country. He has consulted for the World Bank and has been a visiting research scholar to the International Monetary Fund (IMF) on three six-week occasions in 1996, 2000 and 2008 under the AERC/IMF visiting research scholar's programme. He has also spent one year with the Deakin University in Australia as Visiting Scholar. He has taught in various causes in finance and economics for several years both locally and internationally including international finance, financial markets, investment, corporate finance, managerial economics and others. His areas of research interests include emerging stock markets, capital market efficiency and international financial markets. He has published extensively in reputable international journals including the *South African Journal of Economics*, *Journal of Economic Studies*, *International Journal of Social Economics*, *Journal of Risk Finance*, *African Finance Journal* and others. He is also active Researcher with the African Economic Research Consortium (AERC).

Agyapomaa Gyeke-Dako has a PhD in Financial and Development Economics from the University of Nottingham, UK, MSc Degree Economics and Financial Economics from the University of Nottingham, UK and BA Degree in Economics with Geography from the University of Ghana. She is currently Lecturer at the University of Ghana Business School. Prior to her joining the University of Ghana Business School, she worked with Durham Business School, UK as a Teaching Fellow for three years, lecturing in various courses. She has published in the University of Peking Press and has submitted a number of papers for publication. She is also now Co-researcher on a collaborative research with the World Trade Institute, University of Geneva and WITS University South Africa (Funding from Swizz Science Foundation and Swizz Agency for Development and Co-operation). In addition, she is working on a project funded by the International Growth Centre. She has been affiliated with the Leverhulme Centre for Research on Globalisation and Economic Policy (GEP) and the Chinese Economic Association (CEA) and is also Reviewer in *Thunderbird International Business Review*. Her research interest is in the area of financial and development economics.

Downloaded by University of Ghana At 04:09 07 June 2019 (PT)

For instructions on how to order reprints of this article, please visit our website:
www.emeraldgrouppublishing.com/licensing/reprints.htm
Or contact us for further details: **permissions@emeraldinsight.com**