Original Article

Financial Globalisation Dynamic Thresholds for Financial Development: Evidence from Africa

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Abstract We investigate whether financial development benefits from financial globalisation are questionable until certain thresholds of financial globalisation are attained. The empirical evidence is based on (i) data from 53 African countries for the period 2000–2011 and (ii) interactive Generalised Method of Moments with forward orthogonal deviations. The following findings are established. First, thresholds of Net Foreign Direct Investment Inflows as a percentage of GDP (FDIgdp) from which financial globalisation increases money supply are 20.50 and 16.00 for below- and above-median sub-samples of financial globalisation, respectively. Second, FDIgdp thresholds from which financial globalisation increases banking system activity and financial system activity for below-median sub-samples of financial globalisation are 13.81 and 13.29, respectively. Third, for financial size, there is evidence of: (i) a positive threshold of 21.30 in the full sample and (ii) consistent increasing returns without a modifying threshold for the above-median sub-sample. Policy implications are discussed.

Nous faisons une enquête pour savoir si les avantages au développement financier de la mondialisation financière sont contestables jusqu'à ce que certains seuils de la mondialisation financière soient atteints. Les données empiriques sont fondées sur; (i) les données de 53 pays africains pour la période 2000–2011 et (ii) la Méthode interactive des Moments Généralisés avec des déviations orthogonales avants. Les résultats suivants sont avérés. Tout d'abord, les seuils des entrées nettes d'investissements direct à l'étranger en pourcentage du PIB (IDE Pib), à partir desquels la mondialisation financière augmente la masse monétaire, sont respectivement en dessous et au-dessus de la médiane de 20,50 et 16,00 des sous-échantillons de la mondialisation financière. Ensuite, les seuils IDE Pib, à partir desquels la mondialisation financière augmente l'activité du système bancaire et l'activité du système financier, sont respectivement de 13,81 et 13,29. Enfin, en ce qui concerne le volume financier, il y a des preuves de: (i) un seuil positif de 21,30 à l'ensemble de l'échantillon et (ii) rendements croissants réguliers sans modification du seuil pour les sous-échantillons au-dessus de la médiane. Les retombées politiques sont discutées.

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Introduction

The recent financial crisis has resurfaced the debate over threshold conditions for benefits from financial globalisation (Kose *et al*, 2011; Asongu, 2014). There is some moderate consensus in theoretical and empirical literature on the need for some initial conditions before development rewards from financial openness can be materialised. The narratives include, *inter alia*, potential risks of opening capital accounts without initial requirements (Kose *et al*, 2011), the need for country-specific characteristics in financial openness strategies (Prasad and Rajan, 2008) and questionable benefits from financial globalisation in domestic financial development[1] (Henry, 2007).

Although, from theoretical underpinnings, financial globalisation is appealing as a means to international risk sharing and efficient allocation of capital, there are growing strands in the literature questioning the *thesis* for greater benefits in less-developed countries[2] (Kose *et al*, 2006; Kose *et al*, 2011). These *anti-theses* include, among others, complete account liberalisation as a substantial drawback to global financial stability (Bhagwati, 1998; Rodrik, 1998; Stiglitz, 2000) and a hidden agenda of extending the benefits of international trade in goods to assets (Asongu, 2014). Conversely, some empirical literature from the *thesis* sustain that growing financial liberalisation has enabled transitions from low to middle income in many countries while at the same time substantially enhancing economic stability in developed nations (Fischer, 1998; Summers, 2000).

The hypothesis/conjecture on stability of advanced nations has been seriously called to question in the wake of the recent global financial meltdown. This has reignited the heated debate on the merits of financial globalisation in financial development, with some scholars openly professing that the hypothesis of recent financial engineering generating substantial gains is less convincing (Rodrik and Subramanian, 2009). During the crisis, developing countries that earlier experienced surges in flows of capital have had to witness a sharp decrease in the same flows (Kose *et al*, 2011). The positions of Kose *et al* (2011) and Henry (2007) are broadly consistent with a growing stream of post-crisis African literature (Asongu, 2014; Price and Elu, 2014; Motelle and Biekpe, 2015). Price and Elu (2014) have recently concluded that credit contraction during the 2008–2009 financial crises had more adverse growth consequences on Sub-Saharan African (SSA) countries that are members of the CFA (French African Colonies) monetary union. Motelle and Biekpe (2015) have also investigated the hypothesis that deeper financial integration is a source of domestic financial instability in the financial sector and confirmed the hypothesis within the Southern African Development Community (SADC). Asongu (2014) has investigated whether financial initial conditions are necessary to materialise the rewards of financial globalisation in Africa to conclude that only financial threshold conditions of size are necessary to enjoy the domestic financial development rewards of financial globalisation. Moreover, whereas the hypothesis is only partially valid for financial depth, it not confirmed for financial dynamics of efficiency and activity.

The present line of enquiry aims to extend the above stream of literature by investigating financial globalisation dynamic thresholds for financial development in African countries. In essence, it investigates what levels of financial openness are needed to enjoy the financial development benefits of financial globalisation. Its main contribution to the literature is to indirectly investigate the Henry (2007) and Kose *et al* (2011)[3] hypothesis within the context of African countries. By 'indirect', we mean that we aim to articulate financial globalisation thresholds instead of financial development thresholds, required for financial globalisation to benefit domestic financial development. Essentially, we assess at what thresholds a hypothetically negative effect of financial globalisation on financial development becomes positive.[4] Understanding such thresholds has relevant policy implications because the role of policy has been to either encourage or discourage capital inflows (Rodrik and Subramanian, 2009, pp. 16–17; Asongu, 2014, p. 166). However limiting the policy challenge exclusively to a bipolar debate (of either increasing or decreasing capital inflows) is misleading because the effects of financial globalisation on development outcomes could be positive or negative, depending on certain thresholds of financial globalisation. Hence, it is essential for policy makers to know what levels of capital flows are required to either promote or reduce financial development.

The study in the literature closest to the current article is Asongu (2014). Therefore, we devote space to clarifying how the positioning of this line of enquiry steers clear of underlying study. Significant differences that advance the extant of knowledge in the debate are at least fourfold,

namely: (i) underpinning hypothesis and threshold variable, (ii) conception of threshold, (iii) sample and periodicity and (v) methodology. First, the underlying hypothesis on threshold for the benefit from financial globalisation is indirect because it focuses on financial globalisation instead of financial development. Second, the conception and definition of threshold are aligned with a cut-off point in the financial globalisation variable. In essence, a financial development threshold in Asongu is established on the basis of consistent significance of financial globalisation with either increasing positive magnitude or decreasing negative magnitude, throughout the conditional distribution of financial development. Third, regarding the sample and periodicity: the underlying paper is limited to 15 African countries for the period 1996–2009, whereas we focus on 53 African countries for the period 2000–2011. Fourth, contrary to quantile regressions that involve assessing the relevance of financial globalisation throughout the conditional distributions of financial development dynamics, we employ an endogeneity-robust Generalized Method of Moments (GMM) with forward orthogonal deviations as opposed to differencing. In order to avail room for more policy implications, we further condition the investigated nexus on above- and below-median levels of financial globalisation.

The rest of the study is structured as follows. The next section engages views, conflicts and the agenda of this line of enquiry. The data and methodology are covered in the following section. The subsequent section presents the results and discussion. The final section concludes with implications and further directions.

Views, Conflicts and Agenda

The decision on whether to make a transition from a closed capital account regime to an open or liberalised one has been an issue of intense debate and controversy. According to Asongu (2014), there are two main perspectives on the policy relevance of capital account lateralisation in developing countries.

The first stream on 'allocation efficiency' is substantially motivated by underpinnings of the neoclassical growth model developed by Solow (1956). Accordingly, the neoclassical model supposes that capital account liberalisation facilitates the efficient allocation of international resources. In essence, it entails capital resource flow to capital-scarce developing countries from capital-abundant developed countries where the return of capital is relatively low. In developing countries, corresponding positive externalities include, *inter alia*, reduced cost of capital, increased investment and pro-poor growth that is needed to raise living standards (Fischer, 1998; Obstfeld, 1998; Rogoff, 1999; Summers, 2000; Batuo and Asongu, 2015). In line with the narrative, over the past decades, many developing countries have used these arguments on potential rewards to justify capital account liberalisation policies.

There is another stream of the literature that simply considers the justification of allocation efficiency as a fanciful means of extending the gains from international trade in goods to international trade in assets. According to this sceptical perspective, the hypothesis of 'allocation efficiency' is feasible only if the domestic economies do not experience volatilities, with the exception of barriers to the free movement of capital. Given distortions and volatilities experienced by developing countries in recent decades, sceptics have begun arguing that the theoretical appeals of capital account liberalisation do not converge with the practical reality of capital account openness (Batuo and Asongu, 2015). As far as we have reviewed, these sceptical perspectives can best be articulated by Rodrik (1998) and Rodrik and Subramanian (2009) with provocative titles like 'Who Needs Capital-Account Convertibility?' and 'Why Did Financial Globalization Disappoint?', respectively. According to Rodrik (1998), there is no relationship

between capital openness and the rate of investment or growth in developing countries. The author has concluded that, although the rewards to capital openness are difficult to establish, the costs of financial globalisation are increasingly apparent with recurrent global financial crises: ever increasing in magnitude and frequency. Rodrik and Subramanian (2009) have concluded that the sub-prime mortgage crisis in the United States and the subsequent global financial crisis and economic meltdown have resurfaced doubts about the economic benefits of recent advances in financial engineering.

The sceptical positions of Rodrik (1998) and Rodrik and Subramanian (2009) are broadly consistent with the conclusions of Asongu (2015) from a Meta analysis on the finance-growth nexus. The author argues that the theoretical justifications for 'allocation efficiency' in growing financial globalisation are increasingly becoming practically irrelevant because of the frequency of financial crisis. In essence, increasing financial instability bears an inverse relationship with conducive macroeconomic conditions for sustained economic growth, notably: quick mobilisation of productive savings, efficient resource allocation, and enhancement of risk sharing and mitigation of information asymmetry. According to Asongu (2015, p. 624), relative to Schumpeter's era, the appeals of finance to economic prosperity today are not apparent because of the increasing frequency of global financial crisis. This narrative is consistent with Eichengreen and Bordo (2002) and Buckle (2009): 'The modern era of globalisation has been associated with significant economic transformation around the world, but also an increasing frequency of financial crises. According to Eichengreen and Bordo (2002) there were 39 national or international financial crises between 1945 and 1973. Their frequency increased to 139 between 1973 and 1997, culminating in the Asian financial crisis. These crises occurred predominantly, but not exclusively, in emerging economies' (Buckle, 2009, p. 36).

Even before the 1997 Asian financial crisis, a consensus was already emerging among macroeconomists that developing countries needed to completely adopt capital account liberalisation policies. Some notable proponents included: (i) Dornbusch's (1996, 1998) advocacies and (ii) Stanley Fischer's famous speech during the International Monetary Fund (IMF)'s Annual Meeting in 1997 (Rodrik and Subramanian, 2009). Dornbusch (1996) considered capital controls as 'an idea whose time had past' and reaffirmed his position 2 years later – 'the correct answer to the question of capital mobility is that it ought to be unrestricted' (Dornbusch, 1998, p. 20). Fischer (1998), after presenting a solid case for financial globalisation, made recommendations for amendment to IMF's articles, which required an orderly openness of capital accounts. Although there are obvious risks associated with capital account openness, Fischer believed benefits far outweighed corresponding costs. Following Fischer's prophesy and Dornbusch's thesis, the plethora of works that have focused on the rewards of capital account openness have painted mixed and paradoxical pictures (Rodrik and Subramanian, 2009). To the best of our knowledge, one of the most exhaustive reviews of the literature has concluded that the cross-country evidence on positive development outcomes from financial liberalisation has been inconclusive on the one hand and lacking in robustness on the other (Kose *et al*, 2006).

An extensive literature has been surveyed by Kose *et al* (2006). The authors have provided an alternative framework to assessing the macroeconomic implications of capital account openness in order to reconcile available evidence and strands of the debate. Whereas these authors have confirmed documented theoretical underpinnings of financial globalisation (*inter alia*, financial market development, macroeconomic policy discipline and enhanced public and corporate governance), they have also sustained that indirect benefits are more relevant than traditional financial mechanisms articulated in previous studies. As an extension of the underlying study, Kose *et al* (2011) have revisited the issues in the post-crisis era to establish that developing countries that reflect greater openness to some categories of financial flows, but are overall less

dependent on foreign capital (because of greater reliance on domestic savings for investment purposes), have averagely enjoyed higher levels of economic growth performance. This position is consistent with recent discussions in policy making and scholarly circles on China being *de facto* open and *de jure* closed (Prasad and Wei, 2007; Aizenman and Glick, 2009; Shah and Patnaik, 2009; Asongu, 2013).[5] From a broader perspective, even beyond financial crisis, the rewards of financial globalisation are increasingly blur because it is *inter alia* increasing external debt flows that are worsening business cycles (Leung, 2003), not increasing efficiency and productivity (Mulwa *et al*, 2009) and fuelling inequality (Azzimonti *et al*, 2014).

In the light of the above, there has been a growing debate that certain initial conditions in financial and institutional development are essential for the financial development benefits from financial globalisation (Asongu, 2014). According to the narrative, advanced countries with better institutional development, deeper financial markets and more stable macroeconomic policies (relative to developing countries), have been the principal beneficiaries of financial globalisation. According to Rodrik and Subramanian (2009), this asymmetric benefit has motivated many authors to argue that developing countries ought to first concentrate on strengthening domestic financial markets and institutional capacity building, before completely liberalising their capital accounts. How to balance these considerations against potential rewards is the focus of the present line of enquiry.

This study aims to assess financial globalisation dynamic thresholds for financial development in developing countries. Although in the introduction we have clearly articulated how this line of enquiry contributes to the existing literature, it is important to engage how the positioning of the enquiry is consistent with the cautions of Rodrik and Subramanian (2009) engaged in this section. The authors have sustained that financial globalisation has not yielded increased investment and higher levels of economic prosperity in developing countries because emerging countries that have enjoyed substantial economic prosperity in recent decades have surprisingly been those that have been the least reliant on capital inflows. They further advocate that contemporary evidences on the economic rewards of financial globalisation are speculative, indirect and ultimately unpersuasive. According to these authors, it is high time for a new financial globalisation paradigm that recognises that more is not necessarily better. 'As long as the world economy remains politically divided among different sovereign and regulatory authorities, global finance is condemned to suffer from deformation far worse than those of domestic finance. Depending on the context and country, the appropriate role of policy will be as often to stem the tide of capital flows as to encourage them. Policymakers who view their challenges exclusively from the latter perspective will get it badly wrong' (Rodrik and Subramanian, 2009, pp. 16–17).

A direct policy syndrome from the above account is the pressing challenge of understanding as to what thresholds of financial globalisation are essential to materialise development benefits of financial globalisation. Given that the discussed theoretical underpinnings of capital account openness are consistent with the potential benefit of allocation efficiency, our study focuses on financial allocation efficiency. Financial allocation efficiency is also the ratio of financial activity (credit) and financial depth (deposits) when most dimensions of the Financial Development and Structure Database (FDSD) of the World Bank are incorporated. Hence, in order to avail room for more policy implications, we employ all financial intermediary dimensions identified by the FDSD. This study contributes to the engaged literature by putting some empirical structure on the concept of thresholds for the benefit of financial globalisation. It steers clear of the direct focus on domestic thresholds or initial conditions (i) hypothesised by Kose *et al* (2011) and Henry (2007) and (ii) empirically engaged by Asongu (2014).

We devote space to discussing the intuition for positive threshold effects. Whereas the engaged literature points towards effects going both ways, increasing returns to financial

development from financial globalisation may be expected from external economies in the financial intermediary sector. In essence, an expected increasing marginal effect could be the result of (i) financial development internalities (or internal economies) and (ii) financial development externalities (or external economies) from financial globalisation. Wen and Zhou (2012) have documented an interesting literature on increasing returns in the financial sector due to increasing globalisation. According to the authors, increasing returns from financial globalisation are traceable to increasing levels of technology, wages, interest paid to depositors and social welfare. Hence, as emphasised by McCombie and Spreafico (2014, p. 18), external economies to firms could result from increasing competition in the underlying industry. The position of Wen and Zhou (2012) and McCombie and Spreafico (2014) converge in the perspective that financial competition is a source of financial efficiency that ultimately increase financial development returns to financial globalisation.

Data and Methodology

Data

We investigate a panel of 53 African countries with data for the period 2000–2011 from African Development Indicators and the FDSD of the World Bank. Limiting the scope to Africa is consistent with Asongu (2014), which we are extending. In line with the underlying study, the dependent variables are financial development dynamics of depth (at overall economic and financial system levels),[6] efficiency (banking and financial system efficiency),[7] activity (banking and financial system activity)[8] and size.[9] Accordingly, with the exception of financial size for which an alternative variable with a high degree of substitution is not available in the FDSD (to the best of our knowledge), two measures are used for financial dynamics of depth, efficiency and activity, for robustness purposes.

Consistent with the engaged literature, financial globalisation is measured with net foreign direct investment (FDI) inflows (Henry, 2007; Rodrik and Subramanian, 2009; Asongu, 2014), and control variables entail: economic prosperity (GDP growth), inflation, public investment, foreign aid and trade openness. These control variables have been substantially documented in the financial development literature (Greenwood and Jovanovic, 1990; Saint-Paul, 1992; Fielding, 1994; Levine, 1997; Huybens and Smith, 1999; Boyd *et al*, 2001; Levine, 2003a, b; Do and Levchenko, 2004; Huang and Temple, 2005; Huang, 2011).

We devote space to engaging expected signs of the control variables in substantive detail. First, macroeconomic policies conducive to low and stable inflation, higher levels of investment and openness to trade have been documented to be associated with higher levels of financial development. Both theoretical (Huybens and Smith, 1999) and empirical (Boyd *et al*, 2001) perspectives sustain that higher levels inflation are linked to smaller, less-efficient and less-active equity markets and financial intermediary institutions. Huang (2011) has established the positive nexus between investment and financial development in an increasingly globalised world. There is some consensus on the view that policies that are favourable to openness in external trade attract financial development (Do and Levchenko, 2004; Huang and Temple, 2005). Hence, we expect public investment and trade to display positive signs, while inflation should reflect a negative relationship. Second, the positive nexus between economic growth and financial development has also been abundantly covered. As sustained by Greenwood and Jovanovic (1990) and Saint-Paul (1992), a growing economy is often linked with decreasing cost of financial intermediation due to more competition and availability of more funds for productive

investments. This direction of the relationship is consistent with Levine (1997, 2003a, b). Third, foreign aid has theoretical foundations in the need to reduce the investment-financing gap that less-developed counties face (Easterly, 2005). In accordance with the above narrative on investment, increasing foreign aid should be positively linked to financial development. The choice of the control variables is in line with Asongu (2014).

Definitions and sources of the variables are provided in Appendix A. The summary statistics is disclosed in Appendix B, whereas the correlation analysis is provided in Appendix C. The 'summary statistics' shows that (i) the variables are comparable in terms of means and (ii) corresponding variations exhibited by the standard deviations are substantial. The latter implies that we can be confident that reasonable estimated linkages would emerge. The purpose of the correlation matrix is to mitigate potential issues of multicollinearity. From a preliminary assessment, with the exceptions of financial development dynamics that are highly correlated, the independent variables are not characterised by high degrees of substitution. The concern of multicollinearity in the corresponding financial variables is not relevant because these are employed as dependent variables in distinct specifications. Moreover, as we have highlighted above, the choice of two variables within each financial category has been motivated by the need for robustness checks, notably: ensuring that findings in the banking sector are robust to those in financial sector, for the most part.

Methodology

We adopt an endogeneity-robust system GMM as empirical strategy for five main reasons: the first two are prime conditions for adoption of GMM, whereas the last three are advantages associated with the estimation technique. First, the methodology is appropriate when the dependent variables are persistent. To the best of our knowledge, for a system GMM technique to be adopted, a rule of thumb first-order autocorrelation threshold for evidence of persistence in the dependent variable is 0.800 (Asongu and Nwachukwu, 2015). As shown in Appendix D, the following are correlations between financial variables and their corresponding lagged values: for money supply (0.981), for financial system deposits (0.988), for banking system efficiency (0.928), financial system efficiency (0.971), banking system activity (0.991), financial system activity (0.994) and financial size (0.933). Second, the number of cross-sections (N=53) are higher than the number of years (T=12) in each time series. Hence, $T<N$. Third, the approach does not eliminate cross-country variations. Fourth, it controls for potential endogeneity in all regressions. Fifth, it mitigates potential small sample biases from the difference estimator. It is therefore for this fifth interest that, according to Bond *et al* (2001, pp. 3–4), the system GMM estimator (Arellano and Bover, 1995; Blundell and Bond, 1998) is preferred to the difference estimation proposed by Arellano and Bond (1991). In the system approach, the issue of reverse causation is addressed with an underlying instrumental variable approach: (i) lagged levels of the regressors are used as instruments in the difference equation and (ii) lagged differences of the regressors are used as instruments in the level equation. This enables the exploitation of all orthogonal or parallel conditions between the lagged endogenous variable and the error term.

It is important to note that the system GMM is built on some restrictions on the dynamic process because the difference estimator is associated with (i) poor precision in simulation studies and (ii) large finite sample bias (Blundell and Bond, 1998, pp. 115–116). Hence, restrictions on the initial conditions process are used in the *system* approach to improve properties of the *difference* estimator. The first restriction justifies the employment of lagged differences as instruments in the level equation, in addition to lagged levels as instruments in the difference

equation. 'The second type of restriction validates the use of the error components GLS estimator on an extended model that conditions on the observed initial values' (Blundell and Bond, 1998, pp. 116).

We adopt an extension of Arellano and Bover (1995) by Roodman (2009a, b). Hence, this study employs a *two-step* GMM with forward orthogonal deviations instead of differencing. Accordingly, whereas the *two-step* approach is preferred to the *one-step* approach because it is consistent with heteroscedasticity, the use of forward orthogonal deviations, which is an extension of Arellano and Bover (1995) by Roodman (2009a, b), has the advantages of accounting for cross-sectional dependence and limiting instrument proliferation (Love and Zicchino, 2006; Baltagi, 2008).

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

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

$$\begin{aligned} FD_{i,t} - FD_{i,t-\tau} =& \sigma_0 + \sigma_1 (FD_{i,t-\tau} - FD_{i,t-2\tau}) + \sigma_2 (FI_{i,t} - FI_{i,t-\tau}) \\ &+ \sigma_3 (FIFI_{i,t} - FIFI_{i,t-\tau}) + \sum_{h=1}^{5} \delta_h (W_{h,i,t-\tau} - W_{h,i,t-2\tau}) + (\xi_t - \xi_{t-\tau}) + \varepsilon_{i,t-\tau} \end{aligned} \quad (2)$$

where $FD_{i,t}$ is a financial development dynamic (depth, efficiency, activity or size) of country i at period t; α is a constant; τ represents tau; *FI*, Net FDI inflows; *FIFI*, interaction between Net FDI inflows (*FI*) and Net FDI inflows (*FI*); *W* is the vector of control variables (*GDP growth, inflation, public investment, foreign aid* and *trade openness*); η_i is the country-specific effect; ξ_t is the time-specific constant; and $\varepsilon_{i,t}$ the error term. In the specification, we prefer the *two-step* to the *one-step* procedure because it is heteroscedasticity-consistent. In accordance with Love and Zicchino (2006) and Dewan and Ramaprasad (2014) we treat all independent variables as suspected endogenous or predetermined variables. Hence, the *gmmstyle* is adopted for them. Only years are treated as exogenous, and the method for treating the *ivstyle* (years) is 'iv(years, eq(diff))' because it is not possible for the years to become endogenous in first difference (see Roodman, 2009b).

In order to address the concern about simultaneity, lagged regressors are employed as instruments for forward-differenced variables. Accordingly, in order to remove fixed effects that could influence the investigated relationships, Helmet transformations are performed for the regressors in accordance with Arellano and Bover (1995) and Love and Zicchino (2006). These transformations entail forward mean-differencing of the variables: instead of subtracting the pervious observation from the contemporaneous one (see Roodman, 2009b, p. 104), the mean of all future observations is subtracted from the variables. This transformation ensures orthogonal or parallel conditions between the lagged values and forward-differenced variables. Irrespective of the number of lags, in order to minimise data loss, the underlying transformations are computable for all observations with the exception of the last for each country. 'And because lagged observations do not enter the formula, they are valid as instruments' (Roodman (2009b, p. 104).

We further argue that years or instruments that are treated as strictly exogenous affect the outcome variable only through the endogenous explaining variables. The statistical validity of this exclusion restriction is assessed with the Difference in Hansen Test (DHT) for instrument exogeneity. In essence, the null hypothesis of the test should not be rejected for the instruments to explain the outcome variable exclusively through the endogenous explaining variables.

In a standard instrumental variable (IV) procedure, failure to reject the null hypothesis of the Sargan Over-identifying Restrictions (OIR) test is an indication that the instruments do not explain the outcome variable beyond engaged channels of explaining variables. Whereas this information criterion has been substantially used in the literature employing an IV estimation strategy (see Beck *et al*, 2003; Asongu and Nwachukwu, 2016), the DHT in a GMM procedure is used to assess whether years exhibit strict exogeneity, by not explaining financial development beyond the proposed channels (or endogenous explaining variables). Hence, reported findings should confirm the validity of the exclusion restriction if the null hypotheses of DHT corresponding to IV (year, eq(diff)) are not rejected.

Given that the estimation strategy entails interactive regressions, we devote some space to briefly engaging some pitfall of interaction regressions from Brambor *et al* (2006). In essence, all constitutive variables should enter into the specifications. In addition, for the estimations to make economic sense, estimated parameters corresponding to interactive terms should be interpreted as conditional marginal effects. Moreover, the modifying FDI variable should be within the range provided by the summary statistics for the underlying marginal impact to have economic meaning.

Empirical Results

Tables 1–3 reveal results corresponding to 'financial depth', 'financial efficiency' and 'financial activity and size', respectively. Each of the seven financial dynamics entails three specifications, namely, the full sample, sub-sample with below- (or equal-) median FDI inflows, (FDI$\leqslant M$) and sub-sample with above-median FDI inflows (FDI$>M$).[10] Four main information criteria are used to assess the validity of the estimated models. First, the null hypothesis of the second-order Arellano and Bond autocorrelation test (AR(2)) in difference for the absence of autocorrelation in the residuals should not be rejected. Second the Sargan and Hansen OIR tests should not be significant because their null hypotheses are the positions that instruments are valid or not correlated with the error terms. In essence, whereas the Sargan OIR test is not robust but not weakened by instruments, the Hansen OIR is robust but weakened by instruments. In order to restrict identification or limit the proliferation of instruments, we have ensured that instruments are lower than the number of cross-sections in most specifications. Third, the DHT for exogeneity of instruments is also employed to assess the validity of results from the Hansen OIR test. Fourth, a Fischer test for the joint validity of estimated coefficients is also provided.

The following can be established in Table 1 on 'financial globalisation dynamic thresholds for financial depth'. Whereas financial depth is in terms of 'overall money supply' in the left-hand-side (LHS), it is denoted in the right-hand-side (RHS) as liquid liabilities or financial system deposits. First, we notice that the financial globalisation variables of interest are not significant in the RHS or financial system deposit regressions. Second, in the LHS, there is positive threshold evidence in the second and third specifications corresponding, respectively, to below- and above-median FDI inflows. The positive modifying thresholds are within the range of FDI inflows (−4.578–91.007) provided by the summary statistics, notably: 20.500 (0.328/0.016) for FDI$\leqslant M$ and 16.00 (0.032/0.002) for FDI$>M$.[11] The former entails an increasing marginal effect to the positive threshold of 20.500, whereas the latter directly has a threshold effect of 16.00 because the underlying coefficient of 0.032 is not significant. It follows that relatively higher levels of FDI are required for the positive benefits of FDI in the below-median sub-sample. The interest of sub-dividing the full sample is apparent in the fact that estimated FDI coefficients are not significant in the full sample specification.

Table 1: Financial depth and financial globalisation

	Financial depth					
	Economic depth (Money supply)			*Financial system depth (Deposits)*		
	Full sample	*FDI⩽M*	*FDI>M*	*Full sample*	*FDI⩽M*	*FDI>M*
Constant	**−3.790*****	0.152	0.188	**−1.389***	1.239	**−6.265*****
	(0.002)	(0.907)	(0.947)	**(0.066)**	(0.205)	**(0.001)**
Money supply (−1)	**0.990*****	**1.072*****	**0.904*****	—	—	—
	(0.000)	**(0.000)**	**(0.000)**			
Financial system deposits (−1)	—	—	—	**1.035*****	**1.030*****	**1.037*****
				(0.000)	**(0.000)**	**(0.000)**
FDI	−0.001	**−0.328*****	−0.032	0.023	−0.076	−0.002
	(0.945)	**(0.000)**	(0.498)	(0.287)	(0.155)	(0.940)
FDI*FDI	−0.0003	**0.016*****	**0.002****	0.00007	0.006	0.0008
	(0.445)	**(0.005)**	**(0.036)**	(0.866)	(0.116)	(0.423)
GDP growth	**−0.182*****	**−0.217*****	**−0.145*****	**−0.135*****	**−0.160*****	**−0.085*****
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.003)**
Inflation	0.001	**−0.021*****	**−0.060*****	**−0.016****	**−0.018*****	**−0.039*****
	(0.848)	**(0.000)**	**(0.000)**	**(0.010)**	**(0.000)**	**(0.000)**
Public investment	**0.124*****	0.073	**0.139*****	**0.149*****	**0.087****	**0.175*****
	(0.001)	(0.242)	**(0.005)**	**(0.000)**	**(0.025)**	**(0.000)**
Foreign aid	**0.039*****	**0.071****	0.019	**0.025*****	0.001	**0.045*****
	(0.001)	**(0.020)**	(0.573)	**(0.003)**	(0.951)	**(0.000)**
Trade	**0.061*****	−0.001	**0.036****	**0.016****	−0.008	**0.056*****
	(0.000)	(0.843)	**(0.023)**	**(0.045)**	(0.120)	**(0.000)**
AR(1)	(0.004)	(0.005)	(0.002)	(0.000)	(0.000)	(0.001)
AR(2)	**(0.327)**	**(0.279)**	**(0.301)**	**(0.364)**	**(0.213)**	**(0.353)**
Sargan OIR	(0.010)	(0.000)	(0.094)	(0.002)	(0.000)	**(0.192)**
Hansen OIR	**(0.206)**	**(0.644)**	**(0.631)**	**(0.213)**	**(0.541)**	**(0.751)**
DHT for instruments						
(a)Instruments in levels						
H excluding group	**(0.106)**	**(0.518)**	**(0.118)**	(0.043)	**(0.711)**	**(0.555)**
Dif(null, *H*=exogenous)	**(0.431)**	**(0.615)**	**(0.935)**	**(0.642)**	**(0.376)**	**(0.728)**
(b) IV (years, eq(diff))						
H excluding group	**(0.330)**	**(0.229)**	**(0.320)**	**(0.417)**	**(0.325)**	**(0.394)**
Dif(null, *H*=exogenous)	**(0.192)**	**(0.892)**	**(0.853)**	**(0.148)**	**(0.721)**	**(0.919)**
Fisher	**2391.28*****	**9753.45*****	**15592.5*****	**3211.50*****	**20934.5*****	**252 518*****
Instruments	41	41	41	41	41	41
Countries	47	43	37	47	43	37
Observations	436	220	216	436	220	216

*, **, *** significance levels of 10, 5 and 1 per cent, respectively.

FDI: Foreign Direct Investment. *M*: Median of FDI (2.6702). DHT: Difference in Hansen Test for Exogeneity of Instruments' Subsets. Dif: Difference. OIR: Over-identifying Restrictions Test. The significance of bold values is twofold. (1) The significance of estimated coefficients, Hausman test and the Fisher statistics. (2) The failure to reject the null hypotheses of: (a) no autocorrelation in the AR(1) and AR(2) tests and; (b) the validity of the instruments in the Sargan OIR test.

Table 2: Banking efficiency and financial globalisation

	Financial efficiency					
	Banking system efficiency (BcBd)			*Financial system efficiency (FcFd)*		
	Full sample	*FDI≤M*	*FDI>M*	*Full sample*	*FDI≤M*	*FDI>M*
Constant	**15.439*****	**15.234*****	5.103	**7.573*****	**6.439***	**9.640*****
	(0.000)	**(0.003)**	(0.109)	**(0.006)**	**(0.085)**	**(0.002)**
Banking system efficiency (−1)	**0.889*****	**0.825*****	**0.901*****	—	—	—
	(0.000)	**(0.000)**	**(0.000)**			
Financial system efficiency (−1)	—	—	—	**0.900*****	**0.914*****	**0.966*****
				(0.000)	**(0.000)**	**(0.000)**
FDI	**−0.159***	0.622	−0.134	0.051	0.316	0.081
	(0.071)	(0.224)	(0.203)	(0.372)	(0.460)	(0.389)
FDI*FDI	0.003	−0.017	−0.00008	**−0.003****	−0.023	**−0.005*****
	(0.101)	(0.554)	(0.966)	**(0.020)**	(0.343)	**(0.005)**
GDP growth	0.096	0.021	0.039	**0.151*****	0.023	**0.280*****
	(0.045)**	(0.765)	(0.409)	**(0.007)**	(0.736)	**(0.000)**
Inflation	**0.0003*****	**0.0002*****	**0.068*****	**0.040*****	**−0.033*****	**0.145*****
	(0.000)	**(0.004)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Public investment	**−0.278*****	**−0.313****	**−0.333*****	**−0.196*****	−0.128	0.018
	(0.002)	**(0.016)**	**(0.000)**	**(0.000)**	(0.359)	(0.833)
Foreign aid	**−0.078*****	**−0.182****	−0.033	**−0.106*****	−0.324	**−0.026***
	(0.003)	**(0.011)**	(0.219)	**(0.000)**	(0.359)	**(0.095)**
Trade	−0.006	0.032	0.016	0.031	**0.054***	**−0.063****
	(0.816)	(0.323)	(0.412)	(0.160)	**(0.064)**	**(0.026)**
AR(1)	(0.002)	(0.004)	(0.004)	**(0.447)**	**(0.607)**	**(0.250)**
AR(2)	**(0.296)**	**(0.379)**	**(0.109)**	(0.005)	(0.006)	(0.013)
Sargan OIR	(0.065)	**(0.371)**	**(0.256)**	(0.000)	(0.000)	(0.000)
Hansen OIR	**(0.207)**	**(0.412)**	**(0.278)**	**(0.170)**	**(0.589)**	**(0.355)**
DHT for instruments						
(a) Instruments in levels						
H excluding group	**(0.154)**	**(0.396)**	**(0.846)**	(0.083)	**(0.755)**	**(0.652)**
Dif(null, *H*=exogenous)	**(0.354)**	**(0.416)**	**(0.108)**	**(0.410)**	**(0.402)**	**(0.223)**
(b) IV (years, eq(diff))						
H excluding group	(0.075)	**(0.710)**	**(0.283)**	(0.099)	**(0.381)**	(0.051)
Dif(null, *H*=exogenous)	**(0.677)**	**(0.177)**	**(0.348)**	**(0.476)**	**(0.718)**	**(0.983)**
Fisher	**1001.79*****	**594.43*****	**94 865*****	**839.86*****	**1137.81*****	**7673.05*****
Instruments	41	41	41	41	41	41
Countries	47	43	37	47	43	37
Observations	444	224	220	436	220	216

*, **, *** significance levels of 10, 5 and 1 per cent, respectively.

FDI: Foreign Direct Investment. *M*: Median of FDI (2.6702). DHT: Difference in Hansen Test for Exogeneity of Instruments' Subsets. Dif: Difference. OIR: Over-identifying Restrictions Test. The significance of bold values is twofold. (1) The significance of estimated coefficients, Hausman test and the Fisher statistics. (2) The failure to reject the null hypotheses of: (a) no autocorrelation in the AR(1) and AR(2) tests and; (b) the validity of the instruments in the Sargan OIR test.

Table 3: Financial activity, financial size and financial globalisation

	Financial activity						*Financial size*		
	Banking system activity (Pcrb)			*Financial system activity (Pcrbof)*					
	Full sample	*FDI⩽M*	*FDI>M*	*Full sample*	*FDI⩽M*	*FDI>M*	*Full sample*	*FDI⩽M*	*FDI>M*
Constant	**−2.991*****	−0.119	**−4.700*****	**−3.262*****	−0.502	**−6.125*****	**11.558*****	**17.073*****	0.241
	(0.001)	(0.871)	**(0.001)**	**(0.007)**	(0.597)	**(0.002)**	**(0.000)**	**(0.000)**	(0.898)
Banking sys. activity (−1)	**1.102*****	**1.081*****	**1.046*****	—	—	—	—	—	—
	(0.000)	**(0.000)**	**(0.000)**						
Financial sys. activity (−1)	—	—	—	**1.127*****	**1.100*****	**1.056*****	—	—	—
				(0.000)	**(0.000)**	**(0.000)**			
Financial size (−1)	—	—	—	—	—	—	**0.848*****	**0.754*****	**0.920*****
							(0.000)	**(0.000)**	**(0.000)**
FDI	0.026	**−0.152*****	0.001	0.030	**−0.226*****	−0.003	**−0.213*****	−0.107	**0.123***
	(0.139)	**(0.008)**	(0.970)	(0.171)	**(0.000)**	(0.944)	**(0.000)**	(0.651)	**(0.089)**
FDI*FDI	0.000005	**0.011*****	−0.00009	0.0005	**0.017*****	0.0006	**0.010*****	−0.001	**0.004***
	(0.987)	**(0.008)**	(0.897)	(0.128)	**(0.000)**	(0.392)	**(0.000)**	(0.916)	**(0.050)**
GDP growth	**−0.025****	−0.039	0.012	**−0.035*****	−0.047	0.045	**−0.063****	0.015	**−0.071***
	(0.046)	(0.170)	(0.504)	**(0.008)**	(0.118)	(0.101)	**(0.013)**	(0.792)	**(0.060)**
Inflation	**−0.016*****	**−0.016*****	−0.0004	**−0.028*****	**−0.026*****	0.009	**−0.032*****	0.002	0.002
	(0.000)	**(0.000)**	(0.947)	**(0.000)**	**(0.000)**	(0.228)	**(0.000)**	(0.828)	(0.863)
Public investment	**0.113*****	**0.088****	**0.101*****	**0.116*****	**0.105****	**0.156*****	**0.072***	**0.198****	0.025
	(0.000)	**(0.010)**	**(0.003)**	**(0.000)**	**(0.013)**	**(0.000)**	**(0.079)**	**(0.024)**	(0.505)
Foreign aid	**−0.010***	−0.016	**0.024****	**−0.024*****	−0.038	**0.027****	**−0.054*****	−0.050	−0.028
	(0.087)	(0.553)	**(0.027)**	**(0.004)**	(0.224)	**(0.013)**	**(0.005)**	(0.335)	(0.154)
Trade	**0.013****	−0.006	**0.030*****	0.005	−0.012	0.015	**0.037***	**0.048*****	**0.039*****
	(0.026)	(0.212)	**(0.005)**	(0.453)	(0.115)	(0.265)	**(0.060)**	**(0.001)**	**(0.002)**
AR(1)	(0.002)	(0.008)	(0.002)	(0.035)	(0.030)	(0.035)	(0.065)	(0.076)	(0.083)
AR(2)	(0.049)	**(0.199)**	**(0.150)**	(0.053)	**(0.262)**	**(0.143)**	**(0.311)**	**(0.346)**	**(0.377)**
Sargan OIR	(0.000)	(0.000)	(0.035)	(0.000)	(0.001)	(0.018)	(0.000)	(0.003)	(0.002)
Hansen OIR	**(0.231)**	**(0.372)**	**(0.529)**	**(0.314)**	**(0.428)**	**(0.611)**	**(0.396)**	**(0.711)**	**(0.611)**
DHT for instruments									
(a) Instruments in levels									
H excluding group	**(0.204)**	**(0.236)**	**(0.325)**	**(0.459)**	**(0.293)**	**(0.441)**	**(0.142)**	**(0.653)**	**(0.453)**
Dif(null, *H*=exogenous)	**(0.333)**	**(0.503)**	**(0.619)**	**(0.267)**	**(0.520)**	**(0.628)**	**(0.666)**	**(0.614)**	**(0.619)**
(b) IV (years, eq(diff))									
H excluding group	**(0.269)**	**(0.572)**	**(0.147)**	**(0.257)**	**(0.790)**	**(0.155)**	**(0.126)**	**(0.745)**	**(0.589)**
Dif(null, *H*=exogenous)	**(0.286)**	**(0.222)**	**(0.955)**	**(0.447)**	**(0.147)**	**(0.988)**	**(0.860)**	**(0.493)**	**(0.508)**
Fisher	**3296.52*****	**7544.6******	**9054.98*****	**893.60*****	**10728.2*****	**5042.97*****	**8791.1*****	**1790.5*****	**100 227*****
Instruments	41	41	41	41	41	41	41	41	41
Countries	47	43	37	47	43	37	47	42	37
Observations	436	220	216	438	220	218	438	220	218

*, **, *** significance levels of 10, 5 and 1 per cent, respectively.

FDI: Foreign Direct Investment. Syst: System. *M*: Median of FDI (2.6702). DHT: Difference in Hansen Test for Exogeneity of Instruments' Subsets. Dif: Difference. OIR: Over-identifying Restrictions Test. The significance of bold values is twofold. (1) The significance of estimated coefficients, Hausman test and the Fisher statistics. (2) The failure to reject the null hypotheses of: (a) no autocorrelation in the AR(1) and AR(2) tests and; (b) the validity of the instruments in the Sargan OIR test.

Third, with the exception of GDP growth, the control variables have the expected signs: inflation negatively affects financial development, whereas public investment, foreign aid and trade openness have positive effects. The unexpected sign from GDP growth may be traceable to the consequences of immiserizing growth in the continent. Accordingly, situations where growing output is accompanied by growing poverty levels are the result of unequal distribution of the fruits of economic prosperity. In such economic scenarios, most of the national wealth siphoned by the ruling elite is often hidden in safe tax havens abroad. Therefore, such schemes and/or processes of fraud evasion are very likely to negatively affect domestic financial deposits and money supply. Evidence of immiserizing growth is apparent in Africa because despite (i) over two decades of growth resurgence (Fosu, 2015, p. 44) and (ii) the continent hosting seven of the ten fastest growing economies in the world (Asongu and Rangan, 2015), an April 2015 World Bank report on Millennium Development Goals (MDGs) poverty targets has revealed that extreme poverty has been decreasing in all regions of the world with the exception of sub-Saharan Africa, where 45 per cent of countries in the sub-region are still substantially off the track from attaining the MDGs extreme poverty target (World Bank, 2015).

It is also important to discuss why the identified thresholds are statistically different. Within the framework of this study, the significance of marginal effects on which the thresholds are computed takes precedence over the numerical value of thresholds in the assessment of whether identified thresholds (for above and below medians) are statistically different from each other. On the underlying significance of marginal effects, four scenarios are note worthy: (i) the absence of significance implies that the argument for a positive threshold is weak; (ii) a 10 per cent (*) significance level means that the argument for a positive threshold is moderate; (iii) a 5 per cent (**) significance level implies that the argument for a positive threshold is strong, whereas (iv) a 1 per cent (***) significance level implies that the argument for a positive threshold is very strong. In the light of these significance values, above- and below-median positive marginal effects can be compared on two mutually exclusive counts: (i) where both are significant, the level and magnitude of significance enable a comprehensive comparison, whereas (ii) when one is not significant, the magnitude of significance of the significant marginal effect does not play a major comparative role.

The following findings can be established in Table 2 on 'financial globalisation dynamic thresholds for financial efficiency'. Whereas there is no evidence of thresholds in the LHS or banking system efficiency regressions, the negative thresholds in the RHS or financial system efficiency are not feasible because the corresponding three specifications are not valid. Accordingly, rejection of the null hypotheses of the AR(2) in these specifications implies that autocorrelations in the residuals have not been completely eliminated. Signs of significant control variables are consistent with those in Table 1. It is interesting to note that the signs of these control variables are opposite to those observed in the preceding table because financial efficiency is inversely related to financial depth. Accordingly, financial efficiency is the ability to transform mobilised domestic savings (or deposits) into credit for economic agents. Hence, increasing financial efficiency reflects decreasing financial depth or deposits.

Table 3 has three sets of specifications, namely, banking system activity, financial system activity and financial size. In the first two sets, positive threshold evidence is only apparent for 'FDI$\leqslant M$' sub-samples, with corresponding thresholds within the FDI range (−4.578–91.007) disclosed by the summary statistics, notably: 13.81 (0.152/0.011) for banking system activity and 13.29 (0.226/0.017) for financial system activity.

As for financial size, there is evidence of a positive threshold (which entails increasing marginal effect) in the full sample and only the presence of increasing marginal effect in the 'FDI>M' sub-sample. The threshold in the full sample is within range, notably: 21.30 (0.213/0.010).

Findings of the above-median sub-sample imply that (i) FDI initially increases financial size and (ii) further increasing FDI has positive marginal effects. Hence, in the latter, FDI does not require a specific threshold in order to increase financial size. This is contrary to the underpinning threshold hypothesis that the financial development benefits from FDI are questionable until certain thresholds (or levels) in FDI are attained. In other words, we now witness evidence of increasing marginal returns to financial size from an initially positive FDI effect. It is interesting to note that, so far, we have been establishing evidence of increasing financial (depth and activity) returns from initially negative FDI effects. The significance and signs of the control variables are consistent with the discourses of Tables 1 and 2.

Concluding Implications and Further Research Directions

As we have observed in the introduction, the policy debate has centred on either encouraging or discouraging capital flows into developing countries. We have motivated the present line of enquiry with the argument that engaging the debate exclusively from a bipolar perspective may be misleading in advancing scholarship on linkages between financial globalisation and development outcomes. Accordingly, the effect of financial globalisation may be positive or negative contingent on certain thresholds of financial globalisation. Building on this intuition, we have investigated whether the financial development benefits from financial globalisation are questionable until certain thresholds of financial globalisation are attained. We have employed all the financial intermediary development dimensions identified by the FDSD of the World Bank, namely, dynamics of depth (money supply and liquid liabilities), efficiency (at banking and financial system levels), activity (from banking and financial system perspectives) and size. Financial globalisation is measured with Net Foreign Direct Investment Inflows as a percentage of GDP (FDIgdp) and the empirical evidence is based on: (i) Interactive Generalised Method of Moments with forward orthogonal deviations and (ii) data from 53 African countries for the period 2000–2011.

The following findings have been established. First, thresholds of FDIgdp from which financial globalisation increases money supply are 20.50 and 16.00 for below- and above-median levels of financial globalisation, respectively. Second, thresholds of FDIgdp from which financial globalisation increases banking system activity and financial system activity for below-median sub-samples of financial globalisation are 13.81 and 13.29, respectively. Third, for financial size, there is a positive threshold evidence of 21.30 in the full sample and increasing returns without a modifying threshold for the above-median sub-sample. It is important to note that a financial globalisation threshold within the context of the study is a level of FDIgdp from which the initially negative effect of financial globalisation on financial development becomes positive.

The above findings reconcile the two streams of the debate discussed in the section ‘Views, conflicts and agenda’. Accordingly, below the identified thresholds of FDI, the position/caution of Rodrik (1998) and Rodrik and Subramanian (2009) on the questionable and/or negative relationship between financial globalisation and financial development is apparent. Conversely, above the identified thresholds, the notable optimistic stances of Fischer, Dornbusch (Fischer, 1998; Dornbusch, 1998) and plethora of authors in the stream are confirmed.

The main policy implication from the findings is that the effect of financial globalisation on financial development, although initially negative, is marginally positive with increasing financial globalisation. At certain thresholds of financial globalisation, the increasing financial development marginal returns from increasing FDIgdp change the overall effect from negative to positive. It follows that financial globalisation is both negative and positive for financial

development with a U-shaped nexus. Hence, consistent with the motivation of the enquiry, the appropriate role of policy should be neither to stem the tide of capital flows nor to encourage them but to understand what levels or thresholds of capital flows are needed to benefit domestic financial development. The underlying policy discussion needs to be understood in the light of evidence that established causal nexuses are not very strong.

The originality of this study is its extension of the debate on conditions for financial development benefits from financial globalisation. It attempts to provide policy makers with levels of FDI (as a percentage of GDP) that are needed to start materialising the financial development rewards of financial globalisation. Further research devoted to improving scholarship on the debate may assess effects of the recent financial crisis on the established relationship by engaging a comparative study with pre- and post-crisis samples. Moreover, in this study we have conditioned the effect on the mean of the financial development dynamics. Therefore, investigating the established linkages throughout the conditional distributions of the financial development dynamics would also substantially advance the debate.

Two main caveats are note worthy. First, reported Hansen tests for the exogeneity of instruments used may lead to biased parameter estimates because they may fail to inform if instruments are weak. Hence, using ARCHT/GARCHT estimators to ascertain established nexuses would improve the extant literature because the estimation technique explicitly articulates thresholds in the dependent indicators without further sub-sample specification requirements (Engle, 1982, 2002; Bollerslev, 1986). Second, because some variables like GDP and FDI may not be measured appropriately in developing countries experiencing low levels of financial development and financial globalisation, the significance of investigated relationships at underlying low levels may be hampered by noise rather than economically relevant factors. In essence, recent GDP revisions by Nigeria and Kenya attest to this caveat. Unfortunately, as far as we know, there are currently no better alternatives to the World Bank development indicators.

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Notes

1. We use the terms ‘financial development’ and ‘domestic financial development’ interchangeably throughout this study.
2. According to the theoretical underpinnings, less-developed countries are comparatively lacking in capital but rich in labour. Hence, access to foreign capital is a means to increasing investment and therefore economic prosperity. However, developed nations have less volatile output than have developing countries, which enhances potential gains from the latter (Kose *et al*, 2011).
3. ‘In this paper we develop a unified empirical framework for characterising such threshold conditions. We find that there are clearly identifiable thresholds in variables such as financial depth and institutional quality: the cost-benefit trade-off from financial openness improves significantly once these threshold conditions are satisfied’ (Kose *et al*, 2011, p. 147).
4. This notion of threshold is also consistent with Cummins (2000) on a minimum threshold/level in language proficiency before second-language speakers can start reaping the rewards from a given language. Moreover, our definition of threshold is also in accordance with the theory of critical mass that has been substantially documented in the economic development literature (see Roller and Waverman, 2001; Ashraf and Galor, 2013). A recent application of the critical mass or threshold theory based on interaction variables can be found in Batuo (2015). Hence, in our view, threshold effects can be obtained from interactive regressions. In essence, within the frame of this study, the notion of threshold is not different from: (i) critical mass for positive effects (Roller and Waverman,

2001; Batuo, 2015); (ii) minimum requirement for enjoying of positive effects (Cummins, 2000); and (iii) conditions for Kuznets and U shapes (Ashraf and Galor, 2013).

5. The *de facto* and *de jure* measures of financial globalisation are foreign direct investment and KAOPEN (from Chinn and Ito, 2002), respectively.
6. 'Borrowing from the FDSD, this paper measures financial depth both from overall-economic and financial system perspectives with indicators of broad money supply (M2/GDP) and financial system deposits (Fdgdp) respectively. While the former denotes the monetary base plus demand, saving and time deposits, the latter indicates liquid liabilities. Since we are dealing exclusively with developing countries, we distinguish liquid liabilities from money supply because a substantial chunk of the monetary base does not transit through the banking sector' (Asongu, 2014, p. 189). The two proxies, which are in ratios of GDP (see Appendix A) can robustly cross-check each other as either account for over 97.4 per cent of information in the other (see Appendix C).
7. 'By financial intermediation efficiency here, this study neither refers to the profitability-oriented concept nor to the production efficiency of decision making units in the financial sector (through Data Envelopment Analysis: DEA). What we seek to highlight is the ability of banks to effectively fulfil their fundamental role of transforming mobilized deposits into credit for economic operators (agents). We adopt proxies for banking-system-efficiency and financial-system-efficiency (respectively "bank credit on bank deposits: Bcbd" and "financial system credit on financial system deposits: Fcfd")' (Asongu, 2014, pp. 189–190). Like with financial depth, these two financial allocation efficiency indictors have a degree of substitution of 86.80 per cent (see Appendix C). Hence, one can be used to check the consistency of the other. According to Chen (1996), FDI location decisions are substantially determined by allocation efficiency.
8. 'By financial intermediary activity here, the work highlights the ability of banks to grant credit to economic operators. We proxy for both banking intermediary activity and financial intermediary activity with "private domestic credit by deposit banks: Pcrb" and "private credit by domestic banks and other financial institutions: Pcrbof" respectively' (Asongu, 2014, p. 190). In light of Appendix C, the two measures can be used to cross-check one another.
9. According to the FDSD, financial intermediary size is measured as the ratio of 'deposit bank assets' to 'total assets' (deposit bank assets on central bank assets plus deposit bank assets: *Dbacba*).
10. Hence, for the purpose of simplicity 'sub-sample with below-median FDI' is used to refer to the 'sub-sample with below (or equal) median FDI inflows.'
11. 20.500 is the rewarding threshold because it represents the point where the overall impact of FDI on money supply becomes positive. Accordingly: (20.50×0.016)+(−0.328)=0. Consistent with the definition of threshold provided in the introduction, a threshold is the inflexion point from which the underlying function is either U or Kuznets shape. In order words, 20.500 is the threshold at which the overall sign of FDI changes from negative to positive.

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Appendix A

Table A1: Variable definitions

Variables	*Signs*	*Variable definitions*	*Sources*
Economic financial depth	M2	Money Supply (% of GDP)	World Bank (FDSD)
Financial system depth	Fdgdp	Liquid Liabilities (% of GDP)	World Bank (FDSD)
Banking system efficiency	BcBd	Bank credit on Bank deposits	World Bank (FDSD)
Financial system efficiency	FcFd	Financial credit on Financial deposits	World Bank (FDSD)
Banking system activity	Prcb	Private domestic credit from deposit banks (% of GDP)	World Bank (FDSD)
Financial system activity	Prcbof	Private domestic credit from financial institutions (% of GDP)	World Bank (FDSD)
Financial size	Dbacba	Deposit bank assets on Central bank assets plus Deposit bank assets	World Bank (FDSD)
Financial globalisation	FDI	FDI Net Inflows (% of GDP)	World Bank (WDI)
Economic prosperity	GDPg	GDP Growth (annual %)	World Bank (WDI)
Inflation	Infl	Consumer Price Index (annual %)	World Bank (WDI)
Public investment	PubIvt	Gross Public Investment (% of GDP)	World Bank (WDI)
Development assistance	NODA	Total Net Official Development Assistance (% of GDP)	World Bank (WDI)
Trade openness	Trade	Imports plus Exports in commodities (% of GDP)	World Bank (WDI)

WDI: World Bank Development Indicators. FDSD: Financial Development and Structure Database.

Appendix B

Table B1: Summary statistics

	Variables	*Mean*	*SD*	*Min*	*Max*	*Observations*
Financial development	Economic financial depth (M2)	33.045	22.112	4.129	112.83	561
	Financial system depth (Fdgdp)	26.882	20.888	1.690	97.823	561
	Banking system efficiency (BcBd)	68.032	29.020	14.106	171.85	606
	Financial system efficiency (FcFd)	73.540	37.419	13.753	260.66	561
	Banking system activity (Pcrb)	18.763	17.452	0.551	86.720	561
	Financial system activity (Pcrbof)	20.635	23.495	0.010	149.77	563
	Financial size (Dbacba)	74.276	22.454	2.982	99.999	602
Financial globalisation	FDI net inflows	4.981	8.194	−4.578	91.007	617
Control variables	Economic prosperity (GDPg)	4.682	5.761	32.832	63.379	608
	Inflation	56.216	1020.10	−9.797	24 411	574
	Public investment	7.457	4.437	0	43.011	546
	Development assistance	10.576	12.608	−0.251	147.05	615
	Trade openness (Trade)	78.672	35.101	22.353	209.87	599

SD: Standard Deviation. Min: Minimum. Max: Maximum. M2: Money Supply. Fdgdp: Financial deposits(liquid liabilities). BcBd: Bank credit on Bank deposits. FcFd: Financial credit on Financial deposits. Pcrb: Private domestic credit from deposit banks. Pcrbof: Private domestic credit from deposit banks and other financial institutions. Dbacba: Deposit bank assets on central bank assets plus deposit bank assets. FDI: Foreign Direct Investment. GDPg: GDP growth.

Appendix C

Table C1: Correlation analysis (Uniform sample size: 475)

Financial development dynamics						
Financial depth		*Financial efficiency*		*Financial activity*		*Fin. size*
M2	*Fdgdp*	*BcBd*	*FcFd*	*Prcb*	*Pcrbof*	*Dbacba*
1.000	0.974	0.090	0.112	0.830	0.657	0.424
—	1.000	0.112	0.196	0.884	0.758	0.475
—	—	1.000	0.868	0.470	0.478	0.222
—	—	—	1.000	0.563	0.714	0.228
—	—	—	—	1.000	0.929	0.490
—	—	—	—	—	1.000	0.427
—	—	—	—	—	—	1.000
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—

Other variables						
FDIgdp	*GDPg*	*Inflation*	*PubIvt*	*NODA*	*Trade*	
–0.090	–0.093	–0.112	0.082	–0.248	0.085	M2
–0.086	–0.077	–0.088	0.088	–0.273	0.106	Fdgdp
–0.209	–0.079	–0.146	–0.238	–0.155	0.159	Bcbd
–0.195	–0.079	–0.129	–0.213	–0.167	–0.178	FcFd
–0.139	–0.076	–0.109	–0.058	–0.294	0.058	Pcrb
–0.135	–0.075	–0.087	–0.073	–0.280	–0.003	Pcrbof
–0.067	0.033	–0.125	0.118	–0.349	0.241	Dbacba
1.000	0.358	0.104	0.152	–0.013	0.355	FDIgdp
—	1.000	–0.211	0.184	0.048	0.161	GDPg
—	—	1.000	–0.117	–0.018	0.043	Inflation
—	—	—	1.000	0.089	0.166	PubIvt
—	—	—	—	1.000	–0.217	NODA
—	—	—	—	—	1.000	Trade

M2: Money Supply. Fdgdp: Financial deposits(liquid liabilities). BcBd: Bank credit on bank deposits. FcFd: Financial credit on Financial deposits. Pcrb: Private domestic credit from deposit banks. Pcrbof: Private domestic credit from deposit banks and other financial institutions. Dbacba: Deposit bank assets on central bank assets plus deposit bank assets. FDI: Foreign Direct Investment. GDPg: GDP growth. PubIvt: Public Investment. NODA: Net Official Development Assistance. Fin: Financial.

Appendix D

Table D1: Persistence of the dependent variables

	Financial depth		*Financial efficiency*		*Financial activity*		*Fin. size*
	M2	*Fdgdp*	*BcBd*	*FcFd*	*Pcrd*	*Pcrdof*	*Dbacba*
M2(−1)	0.9819	—	—	—	—	—	—
Fdgdp(−1)	—	0.9882	—	—	—	—	—
BcBd(−1)	—	—	0.9282	—	—	—	—
FcFd(−1)	—	—	—	0.9717	—	—	—
Pcrd (−1)	—	—	—	—	0.9912	—	—
Pcrdof(−1)	—	—	—	—	—	0.9940	—
Dbacba(−1)	—	—	—	—	—	—	0.9338

M2: Money Supply. Fdgdp: Financial deposits(liquid liabilities). BcBd: Bank credit on bank deposits. FcFd: Financial credit on Financial deposits. Pcrb: Private domestic credit from deposit banks. Pcrbof: Private domestic credit from deposit banks and other financial institutions. Dbacba: Deposit bank assets on central bank assets plus deposit bank assets. M2 (−1): Lagged value of Money Supply. Fin: Financial.