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REVISITING THE FINANCE-INEQUALITY NEXUS IN A PANEL OF AFRICAN COUNTRIES

Forthcoming: Research in International Business and Finance

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Abstract

The study assesses the role of financial development on income inequality in a panel of 48 African countries for the period 1996 to 2014. Financial development is defined in terms of depth (money supply and liquid liabilities), efficiency (from banking and financial system perspectives), activity (at banking and financial system levels) and stability while, three indicators of inequality are used, namely, the: Gini coefficient, Atkinson index and Palma ratio. The empirical evidence is based on Generalised Method of Moments. When financial sector development indicators are used exclusively as strictly exogenous variables in the identification process, it is broadly established that with the exception of financial stability, access to credit (or financial activity) and intermediation efficiency have favourable income redistributive effects. The findings are robust to the: control for unobserved heterogeneity in terms of time effects and inclusion of time invariant variables as strictly exogenous variables in the identification process. The findings are also robust to the Kuznets hypothesis: an inverted humped shaped nexus between increasing GDP per capita and inequality. Policy implications are discussed.

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1. Introduction

Does financial development lead to economic growth? This is a question that has sparked a lot of interest in the academic literature in past decades, and economists have now reached a consensus that a well-functioning and properly regulated financial sector induces growth (Calderón and Liu, 2003; Christopoulos and Tsionas, 2004; Greenwood et al. 2013). This is largely possible due to the capacity of the financial sector of being able to allocate funds to the greatest benefit of the economy. Consequently, financial markets alongside financial intermediaries are the best positioned to play this role, thanks to their momentous role of being able to move funds throughout the economy. Levine (2005) describes several channels through which financial development can foster economic growth. Firstly, by (i) enabling the exchange of goods and services via the delivery of payment services, (ii) allocating savings to their most productive use, (iii) monitoring investment and carrying out corporate governance, and (iv) diversifying, increasing liquidity and reducing intertemporal risk.

Africa witnessed a strong economic performance over the past two decades, which led to the eminent narrative of an "Africa rising". However, one could have taught of this growth to be more inclusive, leading to a significant reduction in poverty. Contrary to expectations, Africa's growth story has wretchedly not been pro-poor, and subsequently little impact felt on poverty reduction. Sadly, income inequality has also not ensued fast enough, and remains stubbornly high, suggesting that the strong growth has largely been enjoyed by the richest Africans, thereby causing the gap between the rich and the poor to become wider. This therefore stands as a major cause for concern. Additionally, the fact that income inequality remains stubbornly in Africa despite the strong economic performance leads us to think whether we have explored all strategies through which this problematic can be addressed. Albeit this study recognizes that there is a large body of literature dedicated on analyzing the causes and consequences of high-income inequality, it is however unfortunate to notice that the attention directed to the African context has been limited. It is against this background that this study derives its motivation, with this imminent question: Could financial development be a key component (albeit overlooked) in reducing income inequality in Africa?

There is a consensus that a developed financial sector can offer practicable answers to address economic crises. However, in a scenario where access to financial services is solely limited to individuals based on their level of income, there is a prospect that financial sector development could bring about uneven growth, which in turn may lead to a wider income gap. To this end, the trend of rising income inequality is one of the most central challenges for policymakers in both developed and developing countries alike, albeit more apparent and severe in the latter group. Income inequality carries several implications and is harmful for the macroeconomic stability of the overall economy. Explicitly, reducing income inequality will suggest an uneven increase in the income of the poor relative to that of the rich. How can this be

effectively attained without any detrimental effects? This is the puzzling question that continues to glow economic debates. However, the goal of this study is not focused on examining all routes and channels through which that can be attained but is mainly centred on the role played by financial development. Failure to address the inequality issue in Africa implies that many countries will remain exposed to political, social and economic upheaval.

Considering the above information, the main research question that this study attempts to answer is: what is the impact of financial development on income inequality in Africa? The literature has clearly established the link between financial development and economic growth, but it nevertheless does not give a conclusive answer to the finance-inequality nexus. At the current state of the literature, it is ambiguous, especially on the theoretical side, as to which part of the society profits from the growth brought about by financial development.

Faced with austere banking crises during the 1980s and 1990s, a great number of Sub-Saharan Africa (SSA) countries undertook several reforms to promote financial development and subsequently growth. They loosened interest rates, cancelled fixed credit, switch to indirect monetary policy instruments, restructured and privatized banks, strengthened banking sector supervision and microfinance (Singh et al. 2009). In general, the effects of these reforms were reckoned positive, albeit significant challenges remain, considering that access to appropriate financial services by the population together with small-and-medium sized enterprises (SMEs) remains meagre. Accordingly, SSA's financial sector remains amongst the least developed worldwide with limited outreach, with the situation relatively worse for Franc Zone countries.

According to the International Monetary Fund (IMF2016), although still shallow as opposed to other regions in the world, financial depth (measured by the private sector credit to GDP) has increased in SSA over the past decades. The region's median ratio of private sector credit to GDP has increased by almost 10 percentage points since 1995, to nearly 21% in 2014. It is commendable, but nevertheless remains well below the performance seen in the Middle East and North Africa (MENA). Adding to the aforesaid is the fact that income inequality in SSA remains remained obdurately high, despite the implementation of these financial reforms. The African Development Bank (AfDB, 2012) cites Africa as the world's second-most-unequal continent after Latin America, with high levels of inequality persisting over 60 years. This evidence underpins that rich Africans, who account for less than 5% of the total population, hold nearly 20% of total income, while the poor who accounts for more than half of the population owns just 36.5% of the continent's total income. These high inequality levels observed in Africa suggest that economic performance achieved thus far has not been robust enough to reduce the large income disparities, despite the implementation of financial reforms.

It is thus vital to investigate this nexus, as persistent rising income inequality can be detrimental to poverty reduction efforts. In fact, economic theory

does not provide a clear-cut hypothesis regarding the relationship between financial development and income inequality. While one strand of the literature posits that income inequality can be reduced by increasing the availability of financial services to the poor (Banerjee and Newman, 1993; Galorand Zeira, 1993), Greenwood and Jovanovic (1990) suggest a non-linear relationship between finance and inequality. Considering the above, this paper therefore seeks to gain further insights into the relationship between financial development and income inequality, with a special attention to the African context where research has been relatively scant, although growing. Undertaking this study is particularly relevant in this era dominated by financial crises (referring to the most recent 2008-2009 financial crisis) and economic headwinds.

The contributions of this paper are threefold. Firstly, whereas a large body of literature has explored the relationship between financial development and economic growth, some recent research has started to examine the finance-inequality nexus. Nevertheless, the results obtained from these studies are conflicting and ambiguous – both on the theoretical and empirical sides. For instance, on the theoretical front, while Greenwood and Javanovic (1990) predict an inverted U-shaped relationship between financial development and income inequality, where income inequality is expected to increase at the early stage of financial development, and later on decrease; Galor and Zeira (1993) and Banerjee and Newman (1993) hypothesize a linear negative nexus.

On the empirical side, the discrepancy is also evident. Whereas studies such as Clarke et al. (2006); Beck et al. (2007); Batuo et al. (2010) and Shahbaz and Islam (2011) found evidence that financial development helps to reduce income inequality, Tita and Aziakpono (2016) failed to find a significant negative nexus. In the same vein, while Kim and Lin (2011) argues that financial development helps reduce income inequality only if a country has reached a threshold level of financial development, Adams and Klobodu (2016) and de Haan and Sturm (2016) found that financial development has a positive impact on income inequality. In line with the above discussion, there is evidence of on going inconsistencies in this area of study, suggesting that this topic is still under debate and there is a need for further analysis to be conducted.

Secondly, this study seeks to examine the finance-inequality relationship in a panel data analysis, focusing exclusively on SSA countries. While acknowledging that this area of study is gaining more attention, scholarly interest has not been oriented towards the African context because of limited data. Consequently, many studies have mixed both developed and developing countries in their samples (see for instance, Beck et al.2004, 2007; Mookerjee and Kalipioni, 2010; Kappel, 2010; Jauchand Watzka, 2016), exposing the study to a sample heterogeneity bias This study will therefore attempt to fill this existing gap and while doing so, we are also able to deal with the heterogeneity problem which has been an issue in previous studies.

Thirdly, the extant literature indicates that the few studies that focused on Africa are the papers by Kai and Amori (2009), Batuo et al. (2010), Titaand

Aziakpono (2016) and Neaime and Gaysset (2018). However, these studies present some shortcomings. They used a strictly confined definition of financial development, which captures only one dimension – financial depth. These studies measured financial development using the proxies: private sector credit to GDP, M2 to GDP, liquid liabilities to GDP, and number of ATMs per 100,000.These proxies fall under the financial development dynamic of depth, neglecting other dimensions, which are; activity, efficiency, stability, despite their significance. Financial activity is important in reducing income inequality as it captures the capability of banks to grant credit to economic operators. Moreover, whereas an efficient financial system permits individuals and SMEs to afford financial services at the lowest available cost, which in turn is very beneficial for the poor, it is imperative to have a stable financial system as it encourages the poor to accumulate capital and make investments. Considering the above points, this study goes beyond the extant literature and examines the finance-inequality nexus, by integrating all the distinct dimensions of financial development.

The closest study in the literature to ours is by Asongu and Tchamyou (2014), who examined how investment-driven finance affects inequality in Africa using the Two-Stage Least Squares (2SLS) approach. To proxy financial development, the study used four dimensions of financial development, namely: depth, efficiency, activity and size. The main findings of this study suggest that except for foreign investment, financial dynamics of depth, efficiency, activity and size improve equalizing income-distribution through domestic, private and public investment channels. However, in the empirical estimation, the study did not account for the non-linear dynamic of the finance-inequality nexus as proposed by Kuznets (1955). We therefore go beyond the present study and investigate whether our findings would underpin the non-linear hypothesis of an inverted U-shaped hypothesis in Africa.

The organization of this paper is as follows. Section 2 examines the theoretical and empirical literature. Data and methodology are discussed and outlined in Section 3. While Section 4 is dedicated to the empirical analysis, Section 5 concludes with implications and future research directions.

2. Theoretical and Empirical Literature

2.1 Theoretical Literature

In this section, theoretical premises underpinning the relationship between financial development and income inequality are provided. The financial development-income inequality nexus draws its origin from the pioneer work of Kuznets (1955), who established the famous Kuznets curve, advocating a non-linear relationship between financial development and income inequality. Kuznets' argument supports that in the early stages of development; income disparities increase due to the rapid rate of urbanisation (as the population move from low agricultural productivity jobs to high productivity jobs in industries where average income is higher). In the

intermediate phase of development however, the relationship is expected to stabilise and should then start to decline in the advanced stage as a result of public redistribution policies.

Three main theories underpin the work on the relationship between financial development and income inequality. The first theory by Greenwood and Jovanovic (1990) postulates an inverted U-shaped nexus. The study built a model of financial development, growth and wage distribution where the use of financial intermediaries generally enhances trade, as it is well known that transacting through these intermediaries entails both greater and secure profits. Nonetheless, it was accentuated that transacting through intermediaries usually comes at a cost, which is often higher at the early phase of development. Due to constraints of high associated costs and low income, the poor population group might not be able to use the services; and this may only benefit the rich, causing income inequality to widen. As the economy approaches the intermediate phase, financial intermediaries begin to develop. Consequently, national savings rate will increase, causing the income disparity to widen given the poor capacity of the underprivileged to save. As the economy transitions to the intermediate phase and then to the advanced stage, income inequality will start to decline, as more agents will see their income grow given the easier access to financial intermediaries. The above reasoning, which concurs with that of Kuznets (1955), translates into an inverted U-shaped relationship, with income inequality increasing at the early stage of financial development and dropping at the advanced stage of financial development.

In later years, this school of thought was challenged by another strand of literature, which posits a negative linear relationship between financial development and income inequality. The model built by Banerjee and Newman (1993) is based on the initial assumption that finance can provide entrepreneurship opportunities. However, several financial market imperfections such as high transaction costs and contract enforcement hinder the low-income group from making investment and becoming entrepreneurs, as they often have no credit histories and lack the requisite collateral needed by financial institutions. Within this context, it goes without saying that the poor will have limited access to credit even if they are in the possession of high-profitability projects and are therefore most likely to work for better-off employers, earning much lesser than what they should. This in turn proposes that should financial markets become accessible, efficient and stable, regardless of the background, entrepreneurs will be able to gain access to capital, thus translating to a decrease in income inequality.

At the other end of the spectrum, the third strand of the literature, initiated by Galor and Zeira (1993) is based on the assertion that with imperfect credit markets, income inequalities prevent an efficient allocation of resources by reducing the ability of poor households to invest in human and physical capital. The model by Galor and Zeira (2003) is centered on the argument that individuals are on par in terms of their capacities or potential abilities yet tend to differ in terms of their inherited wealth. Due to imperfect information and high transaction costs, the poor are usually faced with lending constraints and are therefore likely to invest less in human capital as opposed to the rich.

In the model, the inheritance received by each individual defines whether he/she will invest in human capital (education) to become skilled. As such, the future of a household will consequently be defined by its initial wealth. Rich families will therefore tend to invest in human capital and become skilled, amass enough and leave large inheritances for the future while poor families, with little bequests will remain unskilled and amass little for the future generations. Even if it becomes possible for the poor to finance human capital, the hindrances related to financial market imperfections prevent them from doing so. Consequently, in the long run, the distribution of income will therefore be determined by the level of investment in human capital, with the latter being contingent on the initial wealth inheritance.

Considering the above theoretical discussions, it goes without saying that for each theory, there is a unique mechanism though which financial development impacts income inequality.

2.2 Empirical Literature

Owing to the contradictory theoretical views of the effects of financial development on income inequality, there has been a growing empirical literature that seeks to test these theories. However, it is noteworthy to underline that studies directed to the African-context are limited.

To examine the impact of financial development on income inequality, researchers have used several statistical techniques, ranging from basic Ordinary Least Squares (OLS) to more complex methods like general equilibrium models. The influential study by Li, Squire and Zou (1998) empirically assessed the international and intertemporal variations in income inequality. Using Pooled OLS panel regressions with data for 49 developed and developing countries, the empirical analysis revealed that financial development proxied by money supply (M2 to GDP) is strongly linked with lower income inequality, measured by the GINI coefficient. Similarly, Clarke et al (2006) investigated the impact of financial development on income inequality for 83 developed and developing countries from 1960 to 1985. Cognizant of endogeneity-related issues as pointed by Greenwood and Jovanovic (1990), the study used an instrumental variable approach. The results of the analysis suggested that there is negative relationship between financial development (proxied by private credit to GDP and claims on the non-financial domestic sector by deposit money banks to GDP) and income inequality. In other words, it is shown that greater financial development is linked to lower income inequality, which concurs with theoretical views from Galor and Zeira (1993).

In subsequent years, Beck, Demirguc-Kunt and Levine (2007) assessed the impact of financial development on income distribution and evidence confirms that greater financial development reduces income inequality, underpinning the theoretical prediction by Barnejee and Newman (1993). The results as well confirmed that financial development has a positive impact on the poor measured by the growth of the income share of the poorest group of the population. In the same vein, in a panel of developing and developed

countries over the period 1960 to 2005, Kim and Lin (2011) examined whether the extent of a nation's development in financial sectors induces nonlinearity in the nexus between financial development and income inequality. With the aid of an Instrumental variable threshold regression approach, the study found evidence that financial development improves income distribution, but this nevertheless depends on the stages of financial development that the country is undergoing. Similarly, using dynamic panel data methods, Seven and Coskun (2013) examined the impact of bank and stock market developments on income inequality and poverty in a set of 45 emerging countries. The findings indicate that financial development does not have a significant impact on the poorest segments of society in emerging countries. More recently, using an unbalanced dataset of 138 developed and developing countries over the years 1960 to 2008, Jauch and Watzka (2016) found that, unlike other studies, financial development has a positive effect on income inequality.

In a country-specific setting, Law and Tan (2009) examined the role of financial development and income inequality in Malaysia over the period 1980 to 2000. Supported by the autoregressive distributed lag (ARDL) technique, the empirical results found that financial development was insignificant towards reducing income inequality in Malaysia. In addition, Ang (2010) examined how finance impacts income inequality in India using annual data spanning from 1951 to 2004. With the aid of an ECM cointegration and ARDL techniques, the study found that financial development helps reduce income inequality, however, financial liberalization worsens it. Similarly, using the ARDL method with data spanning from 1971 to 2005, Shahbaz and Islam (2011) studied the relationship between financial development and income inequality, while at the same time exploring if the Greenwood and Jovanovic hypothesis applies to Pakistan. The study found that financial development lessens income inequality while financial instability aggravates it.

From an African perspective, Kai and Hamori (2009) examined the relationship between globalization, financial deepening, and inequality in a panel data setting of 29 sub-Saharan Africa countries between 1980 and 2002. The results confirmed that financial deepening helps to reduce inequality in Sub-Saharan Africa, albeit globalization was found to reduce the equalizing effects of financial deepening. As such, the study concluded that financial deepening through globalization leads to the formation of a financial system that benefits the rich. It was therefore recommended that domestic financial markets should be cultivated first in order to shape their development such that inequality is reduced. Similarly, with data covering 22 African countries for the period 1990 to 2004, Batuo et al. (2010) found that income inequality decreases as economies develop their financial sector, which is on par with evidence from previous research. The results also confirm that educational attainment play a significant role in making income distribution more equal.

Using a balanced panel of 15 African countries from 1985 to 2007, Tita and Aziakpono (2016) examined whether financial development in Africa has an effect on income inequality and whether this effect depends on the level of

financial development or economic development. The study found no evidence of a statistically significant negative linear relationship between finance and income inequality, apart from a weak evidence in Côte d'Ivoire. Nevertheless, there was evidence of the Greenwood and Jovanovic (1990) inverted U-shape hypothesis in Botswana, Lesotho and Rwanda, though the nexus was contingent on the measure of financial development.

A more recent study by Neaime and Gaysset (2018) established that financial inclusion reduces inequality (measured with the GINI coefficient) in the MENA. Results from the study suggested that MENA policymakers face two dilemmas – whether to focus on reforms to promote financial inclusion, innovation and financial access or concentrate on further improvements in financial stability.

3. Data and Methodology

3.1 Data description

Our sample contains an unbalanced panel of 48 countries in SSA, with data spanning from 1996 to 2014.The choice of countries as well as the selected time frame is largely influenced by the availability of data. The dependent variable of the study, income inequality is proxied by the commonly used Gini coefficient, which is a ratio of the areas on the Lorenz curve diagram. The major constraint encountered in this study is the lack of available data on income inequality. The Gini coefficient data used in this study is sourced from a newly created data set, the Global Consumption and Income Project (GCIP)[1] by Lahoti et al. (2016). The GCIP is itself based on a variety of common secondary sources such as the Luxembourg Income Study (LIS), UNU-WIDER World Income Inequality Database (WIID) and the World Bank's Povcalnet database, amongst others. Where applicable, for non-survey years, the values were estimated through either an interpolation or extrapolation[2] using growth rate figures from the World Development Indicators (WDI) and other sources where necessary. The coefficient is measured on a scale of 0 to 1, with the value of 0 corresponding to perfect income equality – implying everyone in the society receives the same level of income, while 1 here will mean perfect inequality – where one person receives all the income. Though the Gini coefficient, to some degree, reflects the distribution of income, it is unable to show the welfare of the low-income group (Naceur and Zhang, 2016). This study also uses two additional measures of income inequality notably the Atkinson index and Palma ratio, as a test for robustness. The Atkinson index is a popular measure of income inequality, which measures the percentage of total income that a given society would have to forego in order to have more equal shares of income between its citizens. On the other hand, the Palma ratio is the ratio of national income shares of the top 10 per cent of households to the bottom 40 per cent. These

[1] The GCIP constructs a consumption and income estimates for each country in each year as follows. In the first step, data on relative distributions and levels for each country from various existing sources are collected and a unique set of per capita surveys is selected. Next, the data is standardized and in the third step, consumption and income means are estimated. Using the mean and distributional data generated, a Lorenz curve is estimated for the survey years.

[2] Lahoti et al. (2016) noted that the estimates for survey years are not affected in any way by the interpolation/extrapolation.

measures complement the traditional Gini coefficient. The same justification has been provided for the use of these inequality indicators in recent literature (Tchamyou, 2018a, 2018b; Tchamyouet al. 2018).

The financial development indicators used in this study are sourced from the Financial Development and Structure Database (FDSD) of the World Bank. In accordance with Asongu (2013), this study uses complementary indicators to the existing FDSD. For each of the financial development dynamics (except for the stability dynamic) used in this study, two measures will be employed – this serves as a test of robustness to access the consistency of our results.

We measure financial deepening by the commonly used broad money supply and liquid liabilities, both expressed as a percentage of GDP. Higher values of these proxies will suggest deeper financial institutions. Contrary to conventional definitions of "bank efficiency", this study defines efficiency as the bank's ability to proficiently accomplish their essential role of converting deposits into credit. To proxy efficiency, we use indicators of both banking-system-efficiency (bank credit on bank deposits) and financial system efficiency (financial system credit on financial system deposits). Similarly, to proxy activity, we use indicators from both the banking and the financial sector, with respective proxies of "private domestic credit by deposit banks" and private credit by domestic banks and other financial institutions. Regarding the financial dynamic of stability, we used the Bank Z-score. A high Z-score will imply a lower probability of insolvency. The adoption of a multitude of financial development variables for robustness purposes departs from a recent strand of African financial development literature which is based on a few financial development indicators (Fowowe 2014; Daniel 2017; Wale and Makina 2017; Chikalipah 2017; Bocher et al. 2017; Osahand Kyobe 2017; Oben and Sakyi 2017; Ofori-Sasu et al. 2017; Chapoto and Aboagye 2017; Iykeand Odhiambo 2017; Boadi et al. 2017).

To control for other factors that may impact income inequality, we use a set of other variables as directed in the existing literature (see for example Greenwood and Jovanovic 1990; Beck et al. 2007). These include real GDP per capita, inflation rate, remittances and political stability. These control variables are sourced from the World Development Indicators (WDI), except for political stability, which is sourced from the World Governance Indicators (WGI). A complete definition and source of all variables are provided in Appendix 1 while summary statistics and sampled countries are disclosed respectively in Panel A and Panel B of Appendix 2. The correlation matrix is presented in Appendix 3. From the summary statistics, it is apparent that the variables are comparable in terms of means and from the corresponding standard deviations, we can be confident that reasonable estimated linkages will be derived. The purpose of the correlation matrix is to mitigate concerns about multicollinearity from the adoption of variables with a high degree of substitution in the conditioning information set.

Expected signs of Controls

The real GDP per capita is used as an indicative for the stage of development of a given economy. As posited by Kuznets (1955), the finance-inequality nexus follows an inverted U-shape pattern with inequality rising at the initial stage of development and falling at later phases. Accordingly, this coefficient could bear a positive or negative sign contingent on the level of economic development. Indeed, the fact that our sample mostly consists of countries that are in their early stages of development will mean that the coefficient of this variable is expected to be positive.

The inflation rate here captures the monetary stability of the economy. We expect this coefficient to bear a positive sign. Underpinned by Easterly and Fischer (2001) and Jeanneney and Kpodar (2011) arguments, a higher inflation rate is more likely to hurt the poor than the rich as the latter group is less exposed to macroeconomic shocks given that they have better access to financial instruments. We also used remittances and political stability as controls, and we expect both variables to decrease income inequality.

3.2 Empirical Model and Estimation Procedure

To examine the relationship between financial development and income inequality, this study relies on the following model specification:

$$Gini_{it} = \alpha + \beta_0 Gini_{i,t-1} + \beta_1 FD_{it} + \beta_2 GDP_{it} + \beta_3 GDP_{it}^2 + \gamma X_{it} + \mu_i + \varepsilon_{it} (1)$$

In Equation (1), i and t denote country and time period, respectively. The dependent variable $Gini_{it}$ captures to what degree income dispersion in an economy diverges from a perfectly equal distribution. The main explanatory variable, FD_{it} is the financial development which is captured by seven proxies covering distinct dimensions of financial development and GDP_{it} is the per capita GDP and $GDP_{it}^2$is its squared term which is introduced in the model to mainly control for the Kuznets hypothesis which suggest that at the initial stage of development, inequality will rise and then will start falling at later stages. X_{it} is a set of control variables as previously explained and it includes inflation rate, remittances and political stability. μ_i and ε_{it} correspondingly accounts for countries' specific effects and the error term. Following this specification, we expect the coefficient of financial development (β_1) to be negative and significant. Similarly, for the Kuznets curve to hold, we expect $\beta_2$to be positive and significant while $\beta_3$is projected to be negative.

Examining the effects of financial development on income inequality is not without hurdles. The main identification problem that may arise is if some of our exogeneous variables are correlated with the error term. As such, estimating the aforesaid equations using the OLS may lead to inconsistent and biased estimates, given that the lagged of Gini ($Gini_{i,t-1}$) is endogenous to the fixed effects (μ_i). Because of the strong likelihood of a correlation between the lagged term and the error term, OLS estimates even after

accounting for fixed and random effects may result to biased estimates. The Generalized Method of Moments (GMM) developed by Hansen (1982) may correct this endogeneity issue. In fact, first differencing equation (1) removes any unobserved time-invariant country specific effects, thus eliminating any potential source of bias. This method, which was developed by Arrelano and Bond (1991) assumes that time-varying disturbances in the original levels equation are not serially correlated. However, this difference-GMM has a shortcoming in that when variables that are not strictly exogenous are first differenced, they become endogenous, since the first difference will be correlated with the error term.

Addressing this endogeneity issue will require using an Instrumental Variable (IV) approach, which requires instrumenting the predetermined and endogenous variables in first differences with their appropriate lags in levels, while strictly exogenous regressors are first-differenced for use as instruments in the first-differenced equation. The main issue arising in the application of the difference-GMM is mainly in the efficiency of the estimates, as this approach has been proved to be relatively weak due to lagged levels often considered as relatively poor instruments for first differences. This can nevertheless be counteracted by using the system-GMM approach, which allows for the use of either lagged levels and lagged differences of the explanatory variables as instruments for endogenous variables. The instruments may however be valid only if there is no presence of serial correlation in the errors and only if the differences of the explanatory variables and errors are uncorrelated. As suggested by Arellano and Bover (1995) and Blundell and Bond (1998), two tests are necessary to ensure that estimates from the GMM are consistent. These tests are the over-identifying tests of Sargan and Hansen, with the latter being robust as opposed to the former, but more sensitive to the number of instruments. Both tests test the null hypothesis that instruments are exogeneous.

Based on its advantages, this study employs the GMM technique to investigate the finance-inequality nexus in Africa.

An in-depth discourse on identification, simultaneity and exclusion restrictions are essential for a robust GMM specification. The three points are substantiated in chronological order. First, whereas recent literature has identified time invariant variables as exclusively strictly exogenous variables (Tchamyou and Asongu, 2017), we complement the time invariant variables with other macroeconomic variables that are intuitively exogenous to the main independent variables of interest (or financial access).

The propositions (or complementary strictly exogenous variables) in Table 1 are financial sector development indicators, which are based on a rethinking of the IMF financial system definition. In essence, the existing definition is decomposed into the formal and semi-formal components of the financial system. Furthermore, the previously missing informal financial sector is incorporated into the conception and definition of the financial system because it is more adapted to sub-Saharan African countries. The connection between the mainstream financial access variables and propositions build on

at least three factors. (i) The propositions, which represent competition for shares in money supply between three financial sectors are connected to the mainstream financial development indicators because the conception and definition of mainstream financial system measures are based on financial sectors. (ii) It is intuitive and logical that financial sector competition measurements are more connected to financial access compared to their connection with inequality. (iii) The corresponding hypothesis of exclusion restriction (which is expanded below in the third strand) is also intuitive and logical, notably: financial sector development is very likely to affect inequality exclusively through financial access indicators.

Given that the study also aims to investigate the Kuznets hypothesis (i.e. the linkage between increasing income and inequality), it is also relevant to discuss how the acknowledged strictly exogenous variables are related to income levels on the one hand and affect inequality through financial development on the other. First, from a conceptual standpoint, the financial sector development variables are associated with income levels because the IMF financial system definition (motivating the new indicators) is more relevant to high-income countries compared to their low-income counterparts. Accordingly, the hypothesis underlying the IMF definition is more adapted to high income countries because the informal financial sector is more relevant to low income countries compared to high-income countries. Second, cognizant of the fact that financial sector indicators are based on competition for shares in money supply, high-income countries are more likely to be associated with higher levels of formal financial sector development. In essence, the notion that financial depth in the perspective of liquid liabilities equal to money supply is more relevant to developed countries because in low income countries, many citizens do not have access to bank accounts. Overall, considering the above arguments, our hypothesis of exclusion restriction can also hold for the income channel.

In the light of the above, the main suspected endogenous or endogenous explaining or predetermined variables are financial access and income channels while, the strictly exogenous variables are the proposed financial sector development indicators. In order to improve feasible conditions for identification, the propositions are complemented with time invariant variables. The motivation for also considering time invariant indicators (or years) as strictly exogenous is because Roodman (2009) has argued that it is not feasible for the time invariant variables to be endogenous after first difference. With these underpinnings clarified, in the GMM specification, the procedure employed for financial sector development and the time invariant omitted indicators (or *ivstyle*) is 'iv (propositions, years, eq (diff))' while the procedure for examining the predetermined variables is the *gmmstyle*. The economic interpretation of the exclusion restriction is that years and propositions affect income inequality exclusively through financial access and income levels (which are mechanisms or channels).

Secondly, instead of employing lagged explanatory indicators as instrumental variables, forward differenced indicators are used to address the issue of

simultaneity or reverse causality. Helmet transformations are used to purge fixed effects, given that country fixed effects are correlated with the error terms. The elimination of fixed effects with this strategy is consistent with recent literature (Arellano and Bover 1995; Love and Zicchino 2006). It is important to note that this process of instrumentation is different from the standard procedure of deducting non-contemporary observations from contemporary observations. Instead, forward mean-variations are used in place of first difference (see Roodman 2009). Such transformations enable parallel or orthogonal conditions between the forward-differenced observations and lagged observations. Within this framework, in order to maximise degrees of freedom or reduce loss in observations, the underlying transformations are executed for all observations with the exception of the last year in each cross section or country.

Thirdly, as far as exclusion restrictions are concerned, strictly exogenous variables (i.e. time invariant indicators and financial sector development variables) are expected to impact inequality exclusively via the suspected endogenous or predetermined variables (i.e. financial sector development and income levels). The statistical validity of the corresponding exclusion restriction is investigated with the Difference in Hansen Test (DHT) for the strict exogeneity of instruments or strictly exogenous variables. From a practical perspective, the null hypothesis associated with the DHT should not be rejected in order for the hypothesis of strictly exogenous variables to be confirmed. The intuition and theoretical basis for this inference is not different from the information criterion used to assess the validity of instruments in a standard Instrumental Variable estimation approach, notably: a rejection of the alternative hypothesis of the Sargan over identifying restrictions test. For instance, in Beck et al. (2003), the rejection of the alternative hypothesis in the Sargan test is an indication that the selected instruments explain the outcome variable exclusively via the proposed channels or endogenous variables 'mechanisms. In the same vein, within the framework of this study, the DHT is the information criterion employed to establish whether the acknowledged strictly exogenous variables exhibit strict exogeneity. In the light of these insights and clarifications, in the findings that are reported in the next section, the hypothesis of exclusive restriction holds, if and only if the DHT associated with instrumental variables (iv) (propositions, years, eq(diff)) is not rejected.

Table 1: Summary of propositions used for the identification

Panel A: GDP-based financial development indicators

Propositions	Name(s)	Formula	Interpretation
Proposition 1	Formal financial development	Bank deposits/GDP	Bank deposits[3] here refer to demand, time and savings deposits in deposit money banks.
Proposition 2	Semi-formal financial development	(Financial deposits – Bank deposits)/ GDP	Financial deposits[4] are demand, time and saving deposits in deposit money banks and other financial institutions.

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

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

Proposition 3	Informal financial development	(Money Supply – Financial deposits)/GDP	
Proposition 4	Informal and semi-formal financial development	(Money Supply – Bank deposits)/GDP	
Panel B: Measures of financial sector importance			
Proposition 5	Financial intermediary formalization	Bank deposits/ Money Supply (M2)	From 'informal and semi-formal' to *formal* financial development (formalization)[5].
Proposition 6	Financial intermediary 'semi-formalization'	(Financial deposits – Bank deposits)/ Money Supply	From 'informal and formal' to *semi-formal* financial development (Semi-formalization)[6].
Proposition 7	Financial intermediary 'informalization'	(Money Supply – Financial deposits)/ Money Supply	From 'formal and semi-formal' to *informal* financial development (Informalization)[7].
Proposition 8	Financial intermediary 'semi-formalization and informalization'	(Money Supply – Bank Deposits)/Money Supply	Formal to '*informal and semi-formal'* financial development: (Semi-formalization and informalization) [8]

N.B: Propositions 5, 6, 7 add up to unity (one) arithmetically spelling-out the underlying assumption of sector importance. Hence, when their time series properties are considered in empirical analysis, the evolution of one sector is to the detriment of other sectors and vice-versa. The propositions 5, 6, 7 and 8, which are elucidated further in footnotes, are all sourced from Asongu (2015).
Source: Asongu (2015).

4. Empirical Results

4.1 Presentation of results

The empirical results are presented in Table 2 and Table 3. Whereas in Table 2 the adopted strictly exogenous variables are financial sector development indicators, in Table 3 the strictly exogenous variables are years (or time invariant variables) and financial sector development variables. The intuition for defining the strictly exogenous variables in two phases is to limit the influence time invariant variables on the hypothesis of exclusive restriction. It is important to note that, only four of the eight propositions in Table 1 are

[5] *"Accordingly, in undeveloped countries money supply is not equal to liquid liabilities or bank deposits. While in undeveloped countries bank deposits as a ratio of money supply is less than one, in developed countries this ratio is almost equal to 1. This indicator appreciates the degree by which money in circulation is absorbed by the banking system. Here we define 'financial formalization' as the propensity of the formal banking system to absorb money in circulation".*
[6] *"This indicator measures the rate at which the semi-formal financial sector is evolving at the expense of formal and informal sectors".*
[7] *"This proposition appreciates the degree by which the informal financial sector is developing to the detriment of formal and semi-formal sectors".*
[8] *"The proposition measures the deterioration of the formal banking sector in the interest of other financial sectors (informal and semi-formal). From common sense, propositions 5 and 8 should be almost perfectly antagonistic, meaning the former (formal financial development at the cost of other financial sectors) and the latter (formal sector deterioration) should almost display a perfectly negative degree of substitution or correlation".*

employed because of issues in high degrees of substitution. While Table 2 and Table 3 are focused on the GINI coefficient, for robustness checks, we also use the Atkinson index and the Palma ratio, which are presented respectively in Panel A and Panel B of Appendix 4 and Appendix 5. Hence, Appendix 4 which discloses findings on robustness checks without time effects uses the Atkinson index in Panel A and the Palma ratio in Panel B while Appendix 5 which shows the results of robustness checks with time effects also uses the Atkinson index in Panel A and the Palma ratio in Panel B.

While Table 2 and Table 3 disclose estimated values of adopted control variables, owing to lack of space, the estimated coefficients corresponding to the control variables are not reported for results in Appendix 4 and Appendix 5. Each block of results is characterised by four sets of specifications, with each specification corresponding to a financial development category. With the exception of financial stability (or Z-score), each other financial development is composed of two variables, namely: (i) financial depth is composed on overall economic depth (or money supply) and liquid liabilities or financial system deposits; (ii) financial efficiency is appreciated from banking system and financial system perspectives and (iii) financial activity or domestic credit is also defined in terms of banking system activity and financial system activity. It is imperative to note that the three measurements of financial development are broadly connected in the perspective that financial efficiency is the ratio of financial activity (or credit) on financial depth (or deposit), namely: "banking system credit/bank system deposits" for banking system efficiency and "financial system credit/financial system deposits" for financial system efficiency. Hence, our conception and definition of financial efficiency is consistent with the fundamental mission of a bank, which is to transform mobilised deposits into credit for households and investors (public and private). Moreover, the traditional notion of bank efficiency with respect to profitability (both in terms of returns on equity and assets) is less consistent with theoretical underpinnings of mitigating inequality by means of enhanced financial access. It is important to note that the financial development variables are specified independently in order to mitigate concerns of multicollinearity.

Four statistical tests are used to evaluate the validity of the model. First, the null hypothesis corresponding to the second-order Arellano and Bond autocorrelation test (AR (2)) in difference, which is a position on the absence of autocorrelation in the residuals should not be rejected. It is also important to disclose one fundamental insight into this criterion. The second-order Arellano and Bond autocorrelation test in difference takes precedence over the corresponding first-order test because the literature has exclusively relied on the former test to assess the absence of autocorrelation in the residuals (see Narayan et al., 2011).

Second, the null hypotheses of the Hansen and Sargan over identification restrictions (OIR) tests should not be significant because their alternative hypotheses are the positions that instruments are invalid or correlated with the error terms. Accordingly, whereas the Sargan OIR test is not robust but not

weakened by instruments, the Hansen OIR is robust but weakened by instruments. Consistent with recent literature (Asongu and Nwachukwu, 2016), the concern is addressed by preferring the Hansen test and limiting instrument proliferation by ensuring that the number of instruments are not higher than the number of countries in each specification.

Third, the Difference in Hansen Test (DHT) for the exogeneity of instruments is also employed to assess the validity of results from the Hansen OIR test. Insights into the corresponding variables (dependent, endogenous explaining and strictly exogenous) have been disclosed in Section 3.2. Fourth, a Fisher test for the joint validity of estimated coefficients is also disclosed for the overall validity of models.

The following findings can be established from Table 2. (i) With the exception of financial depth (i.e. money supply and liquid liabilities) which reduces inequality, the other financial development variables have a positive effect. (ii) Conversely in Panel A and Panel B of Appendix 4, except for financial stability which consistently has a positive effect on inequality on the one hand and financial depth from which the effects are not significantly negative on the other hand, significant negative effects are apparent from financial efficiency and financial activity. When the findings are compared, and contrasted, it is reasonable to broadly establish that with the exception of financial stability, financial development in terms of access to credit and intermediation efficiency have positive income redistributive effects.

The findings in Table 3 and Appendix 5 are broadly consistent with those in Table 2and Appendix 4 for which time invariant omitted variables are defined in terms of time dummies and strictly exogenous variables. (iii) The Kuznets hypothesis is confirmed because the relationship between increasing GDP per capita and inequality has an inverted U shape. Accordingly, when the unconditional (or uninteracted) effect is significantly positive while the conditional (marginal or interacted) effect is significantly negative, the humped shape is apparent (Ashraf and Galor, 2013).

Most of the significant control variables have the expected signs. (i) Accordingly, high inflation fuels inequality (Albanesi, 2007) while low inflation has been opposite effect (Bulir, 1998; Lopez, 2004). The positive responsiveness of poverty to inflation is a decreasing function of income levels because the purchasing power of the population in the low-income strata is more negatively affected compared to their high-income counterparts. (ii) The effect of remittances is negative in the absence of time effects and positive otherwise. The positive effect, which is the more robust impact is consistent with Anyanwu (2011) who has argued that remittances generally increase inequality in Africa because migrants tend to originate from high and upper-middle income households. (iii) Political stability can improve income inequality if it provides favourable conditions for the governing elite to materialise practices that maintain and promote the unequal distribution of the fruits of economic prosperity across the population.

Table 2: Finance access, Income and Income Inequality (without time effects)

	Dependent variable: GINI coefficient						
	Financial Depth		**Financial Efficiency**		**Financial Activity**		**Fin. Stability**
	Money Supply	Liquid Liabilities	Banking sys. Efficiency	Financial sys. Efficiency	Banking sys. Activity	Financial sys. Activity	
	M2(llgdp)	Fdgdp	BcBd	FcFd	Pcrob	Pcrobof	Z-Score
Constant	**0.092*** **	**0.099*** **	**0.064*** **	**0.057*** **	**0.073*** **	**0.070*** **	0.021
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	(0.197)
GINI (-1)	**0.890*** **	**0.883*** **	**0.897*** **	**0.900*** **	**0.879*** **	**0.880*** **	**0.917*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
M2	**-0.00004*** **	---	---	---	---	---	---
	(0.002)						
Fdgdp	---	**-0.00007*** **	---	---	---	---	---
		(0.000)					
BcBd	---	---	**0.00008*** **	---	---	---	---
			(0.001)				
FcFd	---	---	---	**0.006** **	---	---	---
				(0.019)			
Pcrob	---	---	---	---	**0.00004***	---	---
					(0.067)		
Pcrobof	---	---	---	---	---	**0.00004** **	---
						(0.012)	
Z-Score	---	---	---	---	---	---	**0.0001*** **
							(0.000)
GDP per capita (GDPpc)	-0.006	**-0.007***	-0.0008	0.0005	0.0004	0.001	**0.009** **
	(0.113)	**(0.072)**	(0.828)	(0.862)	(0.925)	(0.712)	**(0.027)**
GDPpc×GDPpc	0.0003	0.0004	-0.00007	-0.0001	-0.0001	-0.0002	**-0.0008** **
	(0.199)	(0.120)	(0.780)	(0.521)	(0.645)	(0.410)	**(0.011)**
Inflation	-0.00002	**-0.00002***	0.00001	**0.00003***	0.000007	0.00001	0.00001
	(0.139)	**(0.051)**	(0.240)	**(0.054)**	(0.609)	(0.419)	(0.259)
Political Stability	**0.001*** **	**0.001*** **	**0.002*** **	**0.002*** **	**0.001*** **	**0.002*** **	**0.002*** **
	(0.000)	**(0.000)**	**(0.001)**	**(0.002)**	**(0.000)**	**(0.000)**	**(0.000)**
Remittances	**-0.00007*** **	**-0.00004***	0.00001	-0.00001	0.00003	0.00002	**-0.00005*** **
	(0.000)	**(0.060)**	(0.703)	(0.602)	(0.256)	(0.384)	**(0.006)**
Time Effects	No	No	No	No	No	No	No
AR(1)	**(0.110)**	**(0.110)**	**(0.111)**	**(0.111)**	**(0.111)**	**(0.110)**	**(0.106)**
AR(2)	**(0.309)**	**(0.305)**	**(0.313)**	**(0.312)**	**(0.327)**	**(0.327)**	**(0.282)**
Sargan OIR	**(0.604)**	**(0.540)**	**(0.468)**	**(0.522)**	**(0.086)**	**(0.104)**	**(0.823)**
Hansen OIR	**(0.471)**	**(0.572)**	**(0.888)**	**(0.793)**	**(0.758)**	**(0.679)**	**(0.614)**
DHT for instruments (a)Instruments in levels H excluding group	**(0.551)**	**(0.612)**	**(0.499)**	**(0.422)**	**(0.492)**	**(0.417)**	**(0.582)**

Dif(null, H=exogenous)	**(0.372)**	**(0.450)**	**(0.952)**	**(0.896)**	**(0.805)**	**(0.765)**	**(0.530)**
(b) IV (Propositions, eq (diff))							
H excluding group	**(0.338)**	**(0.403)**	**(0.866)**	**(0.756)**	**(0.644)**	**(0.633)**	**(0.471)**
Dif(null, H=exogenous)	**(0.762)**	**(0.866)**	**(0.600)**	**(0.583)**	**(0.771)**	**(0.553)**	**(0.795)**
Fisher	**8713.14*** **	**4933.67*** **	**2786.09*** **	**4001.71*** **	**4295.60*** **	**4905.08*** **	**15717.09*** **
Instruments	31	31	31	31	31	31	31
Countries	45	45	45	45	45	45	45
Observations	585	585	587	585	585	585	536

****,**,*: significance levels at 1%, 5% and 10% respectively. DHT: Difference in Hansen Test for Exogeneity of Instruments Subsets. Dif: Difference. OIR: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the AR(1) & AR(2) tests and; b) the validity of the instruments in the Sargan and Hansen OIR tests. Sys: system. Fin: financial.*

Table 3: Finance access, Income and Income Inequality (with time effects)

	Dependent variable : GINI coefficient						
	Financial Depth		**Financial Efficiency**		**Financial Activity**		**Fin. Stability**
	Money Supply	Liquid Liabilities	Banking sys. Efficiency	Financial sys. Efficiency	Banking sys. Activity	Financial sys. Activity	
	M2(llgdp)	Fdgdp	BcBd	FcFd	Pcrob	Pcrobof	Z-Score
Constant	**0.088*** ** **(0.000)**	**0.089*** ** **(0.000)**	**0.065*** ** **(0.000)**	**0.059*** ** **(0.000)**	**0.067*** ** **(0.000)**	**0.070*** ** **(0.000)**	**0.059*** ** **(0.000)**
GINI (-1)	**0.892*** ** **(0.000)**	**0.884*** ** **(0.000)**	**0.885*** ** **(0.000)**	**0.888*** ** **(0.000)**	**0.880*** ** **(0.000)**	**0.882*** ** **(0.000)**	**0.899*** ** **(0.000)**
M2	**-0.00003*** ** **(0.001)**	---	---	---	---	---	---
Fdgdp	---	**-0.00006*** ** **(0.000)**	---	---	---	---	---
BcBd	---	---	**0.0001*** ** **(0.000)**	---	---	---	---
FcFd	---	---	---	**0.009*** ** **(0.000)**	---	---	---
Pcrob	---	---	---	---	**0.00004** ** **(0.010)**	---	---
Pcrobof	---	---	---	---	---	**0.00003** ** **(0.010)**	---
Z-score	---	---	---	---	---	---	**0.0001*** ** **(0.000)**
GDP per capita (GDPpc)	**-0.004** ** **(0.012)**	**-0.004** ** **(0.030)**	-0.00002 (0.993)	0.001 (0.493)	0.002 (0.304)	0.001 (0.438)	0.001 (0.439)
GDPpc×GDPpc	**0.0002* ** **(0.092)**	0.0002 (0.103)	-0.0001 (0.431)	-0.0002 (0.171)	**-0.0003* ** **(0.056)**	**-0.0002* ** **(0.067)**	**-0.0002** ** **(0.049)**
Inflation	0.00001	0.000004	**0.00003*** **	**0.00004*** **	**0.00002** **	**0.00003*** **	0.000006

	(0.250)	(0.666)	**(0.006)**	**(0.000)**	**(0.018)**	**(0.006)**	(0.534)
Political Stability	**0.002*** **	**0.002*** **	**0.003*** **	**0.003*** **	**0.002*** **	**0.002*** **	**0.002*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Remittances	0.00001	**0.00004*** **	**0.00008*** **	**0.00004***	**0.0001*** **	**0.00008*** **	**0.00003*** **
	(0.190)	**(0.001)**	**(0.006)**	**(0.097)**	**(0.000)**	**(0.000)**	**(0.023)**
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AR(1)	**(0.108)**	**(0.253)**	**(0.111)**	**(0.111)**	**(0.111)**	**(0.110)**	**(0.108)**
AR(2)	**(0.300)**	**(0.519)**	**(0.303)**	**(0.301)**	**(0.321)**	**(0.316)**	**(0.277)**
Sargan OIR	**(0.302)**	**(0.714)**	**(0.201)**	**(0.143)**	(0.068)	(0.069)	**(0.470)**
Hansen OIR	**(0.258)**	**(0.264)**	**(0.542)**	**(0.438)**	**(0.682)**	**(0.590)**	**(0.505)**
DHT for instruments (a) GMM Instruments for levels							
H excluding group	**(0.637)**	**(0.714)**	**(0.733)**	**(0.587)**	**(0.507)**	**(0.494)**	**(0.736)**
Dif(null, H=exogenous)	(0.088)	**(0.264)**	**(0.272)**	**(0.279)**	**(0.730)**	**(0.596)**	**(0.231)**
(b) gmm (lagged values)							
H excluding group	**(0.426)**	**(0.438)**	**(0.452)**	**(0.471)**	**(0.372)**	**(0.404)**	**(0.514)**
Dif(null, H=exogenous)	**(0.238)**	**(0.511)**	**(0.529)**	**(0.410)**	**(0.720)**	**(0.596)**	**(0.464)**
(c) IV (Propositions, Years, eq (diff))							
H excluding group	**(0.318)**	**(0.338)**	**(0.743)**	**(0.660)**	**(0.469)**	**(0.412)**	**(0.502)**
Dif(null, H=exogenous)	**(0.287)**	**(0.631)**	**(0.325)**	**(0.272)**	**(0.724)**	**(0.653)**	**(0.460)**
Fisher	**68312.42*** **	**17281.41*** **	**66637.25*** **	**190317.97*** **	**50974.91*** **	**44479.86*** **	**189484.32*** **
Instruments	45	45	45	45	45	45	45
Countries	45	45	45	45	45	45	45
Observations	585	585	587	585	585	585	536

***,**,*: significance levels at 1%, 5% and 10% respectively. DHT: Difference in Hansen Test for Exogeneity of Instruments Subsets. Dif: Difference. OIR: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the AR(1) & AR(2) tests and; b) the validity of the instruments in the Sargan and Hansen OIR tests. Sys: system. Fin: financial.

4. 2 Further discussion of results

This section is engaged in four main strands, notably: nexus with the literature; emphasis on inequality indicators; specificities of financial development indicators and some discourse on convergence. The points are substantiated in chronological order.

First, on the nexus with existing literature, the narratives are first engaged in terms of African-specific literature before broadened in scope to more extended literature on developing countries. With respect to African specific literature, the findings are broadly consistent with Asongu and Tchamyou (2014) who have concluded that financial development in the perspectives of depth, activity, efficiency and size reduce income inequality through mechanisms of financial access such as aggregate investment dynamics.

While we have not used the dynamic of financial size in this study, it is important to note that the conceptions and definitions of financial intermediary dynamics of depth, efficiency and activity, are similar with the underlying studies. The difference with our results may arise from the fact that the periodicity used in this study differs from the underlying study (1980-2002 versus 1996-2014); sampled countries (13 versus 48 countries), definition of inequality (estimated household income inequality versus three measurements of income inequality) and the methodology approach (Two Stage Least Squares versus GMM) are different.

The fact that financial depth does broadly consistently reduce income inequality (measured by the Gini) aligns with other studies that have focused exclusively on Africa, notably: (i) Batuo et al. (2010) who have used a panel of 22 African countries for the period 1990-2004 to establish that financial development mitigates income inequality and (ii) Kai and Hamori (2009) who have used the same inequality indicators and periodicity as in the first study (i.e. Asongu and Tchamyou, 2014) to conclude that financial depth has a favorable income redistributive effect. The notion of financial intermediary efficiency has not been explored in the scant literature because; the concepts of financial development have been restricted to the notions of depth (Kai and Hamori, 2009; Batuo et al. 2010) and activity (Batuo et al. 2010).

Contrary with Naceur and Zhang (2016), which proxied financial stability by regulatory capital to risk-weighted assets and volatility of stock price index, our study used the commonly used Z-score and finds that there is a positive relationship between financial stability and income inequality – for all proxies of inequality measures used.

Comparing with other developing countries, our results are in contrast with Law and Tan (2009) who investigated the impact of financial development and income inequality in Malaysia using several measures of financial development and found that financial development is insignificant in reducing income inequality in Malaysia. However, our results go in line with that of Shahbaz and Islam (2011) who found that financial development measured by private sector credit reduces income inequality. Our findings are also broadly consistent with Neaime and Gaysset (2018) who have established that financial inclusion reduces inequality (measured with the GINI coefficient) in the MENA. We have focused on Africa, complemented the GINI coefficient with other inequality variables and used a multitude of financial development variables that are not exclusively associated with

financial depth. This is essentially because the number of banks and Automated Teller Machines (ATMs) used by Neaime and Gaysset (2018) are more linked to financial depth because they reflect the general proximity and usage of financial services.

Second, with regard to the specifics from inequality variables, it is very apparent cross specifications and panels that the Palma ratio and Atkinson index broadly have common responses to financial development, as opposed to the Gini index. Two main clarifications are worth engaging from policy and conceptual perspectives. On the policy front, our main findings have focused on estimations with the Palma ratio and Atkinson index because of their relevance in Sustainable Development Goals (SDGs). On a conceptual angle, a principal advantage in the Palma ratio and Atkinson index is that they capture the tails of the inequality distribution (i.e. the richest and poorest), which is different from the Gini index that fundamentally articulates the entire distribution (see Cobham et al., 2015). It follows that the response of inequality to financial development is more apparent when tails of the inequality distributions are emphasised in the specifications. By extension, from logic and common sense, inequality in access to finance (which is naturally a dimension of income inequality) affects the responsiveness of income inequality to financial development.

Third, we now turn to specificities in financial development indicators. Building on previous narratives in this section, financial depth does not significantly reduce inequality on both conceptual and empirical fronts. On the conceptual dimension, financial depth does not necessarily reflect access to finance; partly because of surplus liquidity issues; partly because money supply is not equivalent to formal financial sector development since a great chunk of the monetary base in African countries circulates outside the formal banking sector. Accordingly, financial deposits or liquid liabilities do not represent "access to finance" unless they are transformed into credit for households and economic operators (private and public). This is consistent with the substantially documented issues of surplus liquidity in African financial institutions (Saxegaard, 2006; Fouda, 2009). The narrative is also in accordance with competition indicators because financial intermediation efficiency in this study is measured as the ability of financial institutions to transform deposits (or depth) into credit (or activity). It logically follows that since financial dynamics of efficiency and activity significantly reduce inequality, the insignificant effects of financial depth are traceable to the underlying conceptual and practical insufficiencies.

Before we conclude, it is also important to emphasis that there is some evidence of convergence in income inequality. This is essentially because the absolute value of the estimated lagged inequality variables is within the interval of zero and one. This confirms the hysteresis hypothesis on income inequality, which supports the perspective that past observations of inequality determined future observations of inequality.

5. Concluding implications and future research directions

The study has assessed the role of financial development on income inequality in a panel of 48 African countries for the period 1996 to 2014. Financial development is defined in terms of depth (money supply and liquid liabilities), efficiency (from banking and financial system perspectives), activity (at banking and financial system levels) and stability while, three indicators of inequality are used, namely, the: Gini coefficient, Atkinson index and Palma ratio. The empirical evidence is based on Generalised Method of Moments. When financial sector development indicators are used exclusively as strictly exogenous variables in the identification process, it is broadly established that with the exception of financial stability, access to credit (or financial activity) and intermediation efficiency have positive income redistributive effects. The findings are robust to the: control for unobserved heterogeneity in terms of time effects and inclusion of time invariant variables as strictly exogenous variables in the identification process. The findings are also robust to the Kuznets hypothesis: an inverted humped shaped nexus between increasing GDP per capita and inequality. In what follows, we discuss policy implications.

Our study has clearly established that except for the dynamic of stability, financial development in terms of depth, efficiency and activity have positive income redistributive effects. Consequently, policies aimed at fostering financial deepening, as well as boosting financial efficiency and activity, should all be stimulated.

Surplus liquidity issues are inhibiting the favourable income redistributive effects of financial development. That said, policies geared towards reducing the excess liquidity should be intensified. The excess liquidity, which reflects limited private sector lending and weak interbank activity, could be limited by encouraging banks and financial institutions to invest the excess liquidity in stock and bond markets. Given that both markets are still at a nascent stage of development in most African countries, measures to promote growth in these markets should be encouraged as well. Adding to this, boosting competition in lending between financial institutions could limit cash surplus in Africa.

Future studies can improve the extant literature by assessing whether the established findings withstand empirical scrutiny within country-specific settings. Such is necessary for more targeted policy implications. Moreover, assessing the underlying linkages throughout the conditional distributions of income inequality could provide more insights into the investigated nexuses. This recommendation builds on the inference that inequality indicators that capture tails of the inequality distributions are more responsive to financial development. Hence, is it also worthwhile for future studies to tailor inequality specifications such that, they emphasize countries with high, intermediate and low levels of income inequality. In essence, blanket policies contingent on mean values of inequality may be ineffective unless they are aligned with initial/existing levels of inequality.

Appendices

Appendix 1: Definitions and sources of variables

Variables	Signs	Definitions	Sources
Income Inequality	Gini coefficient		GCIP
	Atkinson index		GCIP
	Palma ratio		GCIP
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	Pcrb	Private domestic credit from deposit banks (% of GDP)	World Bank (FDSD)
Financial System Activity	Pcrbof	Private domestic credit from financial institutions (% of GDP)	World Bank (FDSD)
Financial Stability	Z-Score	Prediction of the likelihood that a bank might survive and not go bankrupt.	World Bank (FDSD)
GDP per capita	GDPpc	Logarithm of Gross Domestic Product per capita	World Bank (WDI)
Inflation	Infl	Consumer Price Index (annual %)	World Bank (WDI)
Remittances	Remit	Remittance inflows to GDP (%)	World Bank (WDI)
Political Stability	PolS	"Political stability/no violence (estimate): measured as the perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional and violent means, including domestic violence and terrorism".	World Bank (WGI)

WDI: World Bank Development Indicators. WGI: World Bank Governance Indicators. FDSD: Financial Development and Structure Database. GCIP: Global Consumption and Income Project.

Appendix 2: Summary Statistics (1996-2014) and Presentation of countries

Panel A: Summary statistics

	Variables	Mean	S.D.	Min.	Max.	Obs.
Income Inequality	Gini Index	0.587	0.041	0.488	0.868	911
	Atkinson	0.701	0.060	0.509	0.895	911
	Palma ratio	6.454	1.749	3.016	21.790	911
Financial Development	Economic Financial Depth (M2)	32.680	21.779	4.129	108.90	861
	Financial System Depth (Fdgdp)	26.272	20.610	1.690	97.823	862
	Banking System Efficiency (BcBd)	71.340	29.189	13.754	186.72	876
	Financial System Efficiency (FcFd)	0.756	0.391	0.137	2.606	862
	Banking System Activity (Pcrb)	18.829	17.630	0.551	102.54	862
	Financial System Activity (Pcrbof)	20.707	23.575	0.551	150.21	862
	Financial Stability (Z-Score)	10.474	8.433	-12.024	89.931	782
Control variables	GDP per capita	6.706	1.098	4.286	9.660	907
	Inflation	15.818	144.139	-35.836	4145.10	873
	Political Stability	-0.511	0.904	-2.988	1.188	768
	Remittances	4.011	7.248	0.000	61.988	773

Panel B: Presentation of countries

Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Chad, Central African Republic, Comoros, Congo Democratic Republic, Congo Republic, Côte d'Ivoire, Djibouti, Egypt, Ethiopia, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Senegal, Sierra Leone, Sudan, Rwanda, Sao Tomé & Principe, Seychelles, South Africa, Swaziland, Tanzania, Togo, Tunisia, Uganda, Zambia.

S.D: Standard Deviation. Min : Minimum. Max: Maximum. Obs.: Observations. 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. ICT: Information and Communication Technology.

Appendix 3: Correlation matrix (uniform sample size: 539)

Income Inequality			Financial Development Dynamics							Control variables				
Gini-Inc.	Atkin-Inc	Palma-Inc.	M2	Fdgdp	BcBd	FcFd	Prcb	Pcrbof	Z-score	GDPpc	Infl	PolS	Remit	
1.000	0.833	0.939	-0.267	-0.241	0.111	0.067	-0.148	-0.095	0.018	0.004	-0.015	0.274	0.070	Gini-Inc
	1.000	0.878	-0.248	-0.215	-0.011	-0.049	0.782	-0.153	-0.071	0.014	0.069	0.303	0.221	Atkin-Inc
		1.000	-0.232	-0.207	0.015	-0.019	-0.148	-0.134	-0.011	0.054	0.035	0.294	0.130	Palma-Inc
			1.000	0.972	0.063	0.079	0.782	0.601	0.529	0.390	-0.055	0.197	0.077	M2
				1.000	0.123	0.204	0.835	0.722	0.511	0.389	-0.056	0.227	0.060	Fdgdp
					1.000	0.861	0.549	0.553	0.229	-0.006	-0.083	0.016	-0.156	BcBd
						1.000	0.599	0.775	0.259	-0.098	-0.060	-0.015	-0.160	FcFd
							1.000	0.918	0.528	0.340	-0.052	0.222	-0.029	Prcb
								1.000	0.463	0.179	-0.041	0.147	-0.063	Pcrbof
									1.000	0.280	-0.042	0.032	-0.027	Z-Score
										1.000	-0.031	0.396	-0.045	GDPpc
											1.000	-0.089	-0.023	Infl
												1.000	0.070	PolS
													1.000	Remit

Gini-Inc: Gini of Income Inequality. Atkin-Inc: Atkinson of Income Inequality. Palma-Inc: Palma ratio of Income Inequality. 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. Z-Score: Probability of the Bank not to go bankrupt. GDPpc: GDP per capita. Infl: Inflation. PolS: Political Stability. Remit: remittances.

Appendix 4: Robustness checks without time effects

Panel A: Atkinson index

	Financial Depth		Financial Efficiency		Financial Activity		Fin. Stability
	Money Supply	Liquid Liabilities	Banking sys. Efficiency		Banking sys. Activity	Financial sys. Activity	
	M2	Fdgdp	BcBd	FcFd	Pcrob	Pcrobof	Z-Score
Constant	**0.040***	**0.050****	0.029	0.019	0.022	0.026	-0.013
	(0.071)	**(0.030)**	(0.234)	(0.470)	(0.365)	(0.308)	(0.652)
Inequality (-1)	**0.985*****	**0.974*****	**0.985*****	**0.974*****	**0.963*****	**0.956*****	**0.979*****
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Finance	-0.00001	-0.00005	**-0.0001*****	**-0.008*****	-0.00003	**-0.00005***	**0.0001*****
	(0.718)	(0.256)	**(0.001)**	**(0.000)**	(0.494)	**(0.060)**	**(0.005)**
GDP per capita (GDPpc)	-0.006	-0.006	-0.001	0.003	0.003	0.003	0.009
	(0.262)	(0.224)	(0.838)	(0.644)	(0.654)	(0.596)	(0.215)
GDPpc×GDPpc	0.0003	0.0003	-0.00001	-0.0003	-0.0003	-0.0003	-0.0007
	(0.409)	(0.359)	(0.981)	(0.458)	(0.474)	(0.378)	(0.144)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	No	No	No	No	No	No	No
AR(1)	(0.094)	(0.094)	(0.094)	(0.095)	(0.093)	(0.094)	(0.095)
AR(2)	**(0.532)**	**(0.703)**	**(0.152)**	**(0.170)**	**(0.737)**	**(0.903)**	**(0.530)**
Sargan OIR	(0.001)	(0.000)	(0.001)	(0.002)	(0.000)	(0.000)	(0.002)
Hansen OIR	**(0.446)**	**(0.418)**	**(0.747)**	**(0.618)**	**(0.292)**	**(0.255)**	**(0.308)**
DHT for instruments							
(a)Instruments in levels							
H excluding group	**(0.689)**	**(0.698)**	**(0.484)**	**(0.516)**	**(0.634)**	**(0.479)**	**(0.799)**
Dif(null, H=exogenous)	**(0.256)**	**(0.226)**	**(0.797)**	**(0.592)**	**(0.148)**	**(0.179)**	**(0.104)**
(b) IV (Propositions, eq (diff))							
H excluding group	**(0.283)**	**(0.276)**	**(0.599)**	**(0.390)**	**(0.175)**	**(0.143)**	**(0.286)**
Dif(null, H=exogenous)	**(0.872)**	**(0.815)**	**(0.857)**	**(0.989)**	**(0.805)**	**(0.832)**	**(0.422)**
Fisher	**3611.71*****	**5131.49*****	**5776.02*****	**7869.04*****	**2782.11*****	**3152.97*****	**9846.74*****
Instruments	31	31	31	31	31	31	31
Countries	45	45	45	45	45	45	45
Observations	585	585	587	585	585	585	536

Panel B: Palma ratio

	Financial Depth		Financial Efficiency		Financial Activity		Fin. Stability
	Money Supply	Liquid Liabilities	Banking sys. Efficiency	Financial sys. Efficiency	Banking sys. Activity	Financial sys. Activity	
	M2	Fdgdp	BcBd	FcFd	Pcrob	Pcrobof	Z-Score
Constant	0.141	0.291	-0.549	-0.836	0.017	0.041	**-1.342***
	(0.737)	(0.487)	(0.538)	(0.353)	(0.974)	(0.942)	**(0.053)**
Inequality (-1)	**0.900*****	**0.897*****	**0.925*****	**0.918*****	**0.893*****	**0.896*****	**0.918*****

	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Finance	-0.0001	-0.0009	**-0.002****	**-0.221****	0.0002	-0.0003	**0.003*****
	(0.762)	(0.181)	**(0.027)**	**(0.041)**	(0.673)	(0.486)	**(0.008)**
GDP per capita (GDPpc)	0.166	0.128	0.373	**0.463***	0.208	0.203	**0.570*****
	(0.189)	(0.296)	(0.157)	**(0.073)**	(0.216)	(0.228)	**(0.007)**
GDPpc×GDPpc	-0.013	-0.010	-0.028	**-0.034***	-0.016	-0.016	**-0.043*****
	(0.152)	(0.255)	(0.130)	**(0.062)**	(0.177)	(0.185)	**(0.005)**
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	No	No	No	No	No	No	No
AR(1)	(0.097)	(0.098)	(0.097)	(0.098)	(0.098)	(0.098)	(0.097)
AR(2)	**(0.320)**	**(0.322)**	**(0.310)**	**(0.308)**	**(0.321)**	**(0.325)**	**(0.326)**
Sargan OIR	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hansen OIR	**(0.399)**	**(0.434)**	**(0.594)**	**(0.662)**	**(0.478)**	**(0.424)**	**(0.507)**
DHT for instruments							
(a)Instruments in levels							
H excluding group	**(0.801)**	**(0.802)**	**(0.687)**	**(0.688)**	**(0.718)**	**(0.559)**	**(0.684)**
Dif(null, H=exogenous)	**(0.399)**	**(0.185)**	**(0.418)**	**(0.505)**	**(0.270)**	**(0.313)**	**(0.321)**
(b) IV (Propositions, eq (diff))							
H excluding group	**(0.271)**	**(0.300)**	**(0.449)**	**(0.518)**	**(0.260)**	**(0.224)**	**(0.405)**
Dif(null, H=exogenous)	**(0.769)**	**(0.777)**	**(0.797)**	**(0.808)**	**(0.995)**	**(0.988)**	**(0.664)**
Fisher	**3580.73*****	**5983.94*****	**2212.38*****	**5617.98*****	**5061.04*****	**6500.68*****	**4128.94*****
Instruments	31	31	31	31	31	31	31
Countries	45	45	45	45	45	45	45
Observations	585	585	587	585	585	585	536

***,**,*: significance levels at 1%, 5% and 10% respectively. DHT: Difference in Hansen Test for Exogeneity of Instruments Subsets. Dif: Difference. OIR: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the AR (1) & AR (2) tests and; b) the validity of the instruments in the Sargan and Hansen OIR tests. Sys: system. Fin: financial.

Appendix 5: Robustness check with time effects

Panel A: Atkinson index

	Financial Depth		**Financial Efficiency**		**Financial Activity**		**Fin. Stability**
	Money Supply	Liquid Liabilities	Banking sys. Efficiency		Banking sys. Activity	Financial sys. Activity	
	M2	Fdgdp	BcBd	FcFd	Pcrob	Pcrobof	Z-Score
Constant	0.021	**0.040***	0.005	-0.001	0.019	0.022	-0.038
	(0.263)	**(0.055)**	(0.793)	(0.942)	(0.346)	(0.276)	(0.133)
Inequality (-1)	**0.967*****	**0.952*****	**0.968*****	**0.956*****	**0.942*****	**0.942*****	**0.975*****
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Finance	-0.000004	-0.00004	**-0.00007*****	**-0.007*****	0.00002	-0.00002	**0.00009*****
	(0.884)	(0.162)	**(0.004)**	**(0.000)**	(0.344)	(0.252)	**(0.005)**
GDP per capita (GDPpc)	0.001	-0.0008	0.007	**0.012****	0.007	0.006	**0.017****
	(0.791)	(0.874)	(0.180)	**(0.034)**	(0.182)	(0.173)	**(0.013)**
GDPpc×GDPpc	-0.0001	-0.00002	-0.0006	0.000002	-0.0006	**-0.0006***	**-0.001*****

	(0.613)	(0.952)	(0.122)	(0.914)	(0.102)	**(0.075)**	**(0.007)**
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AR(1)	(0.090)	(0.092)	(0.092)	(0.093)	(0.091)	(0.091)	(0.092)
AR(2)	**(0.301)**	**(0.524)**	**(0.137)**	**(0.248)**	**(0.442)**	**(0.674)**	**(0.535)**
Sargan OIR	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hansen OIR	**(0.686)**	**(0.614)**	**(0.745)**	**(0.472)**	**(0.539)**	**(0.437)**	**(0.280)**
DHT for instruments							
(a) GMM Instruments for levels							
H excluding group	**(0.777)**	**(0.779)**	**(0.702)**	**(0.771)**	**(0.698)**	**(0.696)**	**(0.946)**
Dif(null, H=exogenous)	**(0.410)**	**(0.312)**	**(0.603)**	**(0.176)**	**(0.300)**	**(0.195)**	**(0.019)**
(b) gmm (lagged values)							
H excluding group	**(0.445)**	**(0.456)**	**(0.467)**	**(0.444)**	**(0.423)**	**(0.440)**	**(0.398)**
Dif(null, H=exogenous)	**(0.691)**	**(0.606)**	**(0.747)**	**(0.457)**	**(0.539)**	**(0.421)**	**(0.269)**
(c) IV (Propositions, Years, eq (diff))							
H excluding group	**(0.175)**	**(0.179)**	**(0.363)**	**(0.242)**	**(0.100)**	**(0.087)**	**(0.402)**
Dif(null, H=exogenous)	**(0.955)**	**(0.908)**	**(0.879)**	**(0.679)**	**(0.939)**	**(0.883)**	**(0.225)**
Fisher	**35700.93*****	**56786.91*****	**5554.89*****	**22467.35*****	**7790.56*****	**17734.15*****	**7642.91*****
Instruments	45	45	45	45	45	45	45
Countries	45	45	45	45	45	45	45
Observations	585	585	587	585	585	585	536

Panel B: Palma ratio

	Financial Depth		**Financial Efficiency**		**Financial Activity**		**Fin. Stability**
	Money Supply	Liquid Liabilities	Banking sys. Efficiency	Financial sys. Efficiency	Banking sys. Activity	Financial sys. Activity	
	M2	Fdgdp	BcBd	FcFd	Pcrob	Pcrobof	Z-Score
Constant	-0.262	0.080	-0.856	**-1.209****	-0.728	-0.765	**-1.442*****
	(0.444)	(0.847)	(0.214)	**(0.036)**	(0.136)	(0.122)	**(0.005)**
Inequality (-1)	**0.888*****	**0.889*****	**0.912*****	**0.911*****	**0.885*****	**0.887*****	**0.905*****
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Finance	0.0004	-0.0006	**-0.001****	**-0.264*****	0.0009	0.0001	0.001
	(0.266)	(0.180)	**(0.016)**	**(0.000)**	(0.143)	(0.799)	(0.180)
GDP per capita	**0.282*****	0.186	**0.467****	**0.586*****	**0.431*****	**0.445*****	**0.599*****

(GDPpc)							
	(0.007)	(0.120)	**(0.025)**	**(0.001)**	**(0.003)**	**(0.003)**	**(0.000)**
GDPpc×GDPpc	**-0.021*** **	-0.013	**-0.034** **	**-0.042*** **	**-0.032*** **	**-0.033*** **	**-0.043*** **
	(0.006)	(0.110)	**(0.021)**	**(0.001)**	**(0.001)**	**(0.001)**	**(0.000)**
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AR(1)	(0.098)	(0.098)	(0.098)	(0.098)	(0.099)	(0.098)	(0.099)
AR(2)	**(0.319)**	**(0.326)**	**(0.317)**	**(0.310)**	**(0.320)**	**(0.326)**	**(0.325)**
Sargan OIR	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Hansen OIR	**(0.590)**	**(0.674)**	**(0.793)**	**(0.812)**	**(0.732)**	**(0.667)**	**(0.816)**
DHT for instruments							
(a) GMM Instruments for levels							
H excluding group	**(0.800)**	**(0.815)**	**(0.561)**	**(0.608)**	**(0.762)**	**(0.758)**	**(0.886)**
Dif(null, H=exogenous)	**(0.263)**	**(0.348)**	**(0.845)**	**(0.832)**	**(0.503)**	**(0.406)**	**(0.474)**
(b) gmm (lagged values)							
H excluding group	**(0.420)**	**(0.447)**	**(0.487)**	**(0.491)**	**(0.415)**	**(0.452)**	**(0.368)**
Dif(null, H=exogenous)	**(0.597)**	**(0.677)**	**(0.793)**	**(0.813)**	**(0.753)**	**(0.667)**	**(0.859)**
(c) IV (Propositions, Years, eq (diff))							
H excluding group	**(0.777)**	**(0.786)**	**(0.723)**	**(0.648)**	**(0.710)**	**(0.744)**	**(0.445)**
Dif(null, H=exogenous)	**(0.353)**	**(0.446)**	**(0.677)**	**(0.767)**	**(0.594)**	**(0.474)**	**(0.902)**
Fisher	**54786.82*** **	**18945.32*** **	**143361.64*** **	**28361.38*** **	**30832.20*** **	**38732.89*** **	**75821.87*** **
Instruments	45	45	45	45	45	45	45
Countries	45	45	45	45	45	45	45
Observations	585	585	587	585	585	585	536

***,**,*: significance levels at 1%, 5% and 10% respectively. DHT: Difference in Hansen Test for Exogeneity of Instruments Subsets. Dif: Difference. OIR: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients and the Wald statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the AR(1) & AR(2) tests and; b) the validity of the instruments in the Sargan and Hansen OIR tests. Sys: system. Fin: financial.

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