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Investment and Inequality in Africa: which financial channels are good for the poor?

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AGDI Working Paper

Research Department

Investment and Inequality in Africa: which financial channels are good for the poor?

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Abstract

This paper examines how domestic, foreign, private and public investments affect income-inequality through financial intermediary dynamics. With the exception of financial allocation efficiency, financial channels of depth and activity are good for the poor as they diminish estimated household income-inequality. Financial size does not have a significant income-redistributive effect. Financial efficiency has a disequalizing effect, implying policies designed to improve the allocation of mobilized funds only benefit the rich to the detriment of the poor. The use of financial and investment dimensions previously missing in the literature provide new insights into the finance-inequality nexus. Policy implications are discussed.

JEL Classification: D60; E25; G20; I30; O55

Keywords: Finance; Investment; Poverty; Inequality; Africa

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1. INTRODUCTION

Poverty and inequality undoubtedly remain important challenges to economic and human developments. Over the past three decades, investment rates have fallen considerably in majority of African countries (Ndikumana, 2002). This decrease in investment is a major cause for worry, given the close connection between the level of investment and the rate of economic growth (Barro, 1991; Ben-David, 1998). Financial repression and its pervasiveness of stifling economic growth have been elaborately covered by a substantial bulk of the literature (McKinnon, 1973; Shaw, 1973). In the 1980s and 1990s, most African countries embarked on a series of structural and policy adjustments in the financial sector as part of economic reforms with the goal of given impetus to economic growth as well as improving overall economic and financial efficiency (Janine & Elbadawi, 1992). Hitherto, owing to scarcity and lack of relevant data on income-inequality for Africa, only two studies to the best of our knowledge have addressed the finance-inequality nexus in the continent (Kai & Hamori, 2009; Batuo et al., 2010). A common drawback of these two works is the very limited application of the concept of financial development. Limiting the concept of finance to only its dynamics of depth (Kai & Hamori, 2009; Batuo et al., 2010) and activity (Batuo et al., 2010) does not paint a full picture of the African inequality-finance nexus for the following reasons. Firstly, a distinction between money supply and liquid liabilities in the conception of financial depth is very important in separating the income redistributive effect of 'bank mobilized funds' from that of overall money supply[2]. Secondly, owing the surplus liquidity problems in the African banking industry (Owoundi, 2009), integrating a previously missing 'financial allocation efficiency' component into the debate could lead to relevant policies implications.

[2] This is because, a great chunk of the monetary base in the African continent circulates outside the banking sector, and hence an increase in money supply may reflect the increase in the use of currency rather than a strengthening of financial system deposits.

In light of the above points, drawing from the experience of a continent that has been implementing development financial reforms, this study aims to assess the income-redistributive effect of investment through financial intermediary channels of depth, efficiency, activity and size in Africa. In particular, the paper seeks to investigate how financial development impacts income-inequality, conditional on domestic, foreign, private and public investments. The contribution of this study to the literature is threefold. (1) We restrict our sample to African countries (which is important) because income-inequality in the continent has remained stubbornly high, in spite of more than two decades of economic and financial reforms. (2) Contrary to mainstream finance-growth literature (Batuo et al., 2010), this work improves the employment of financial indicators by using financial intermediary dynamics of depth, efficiency, activity and size in the assessment of the impact of finance on income-inequality. (3) We improve the income-finance literature by introducing a previously missing investment dimension into the debate, so that the inequality-finance nexus is contingent on aggregate domestic, foreign, private and public investment dynamics. In other words, the logic is to examine how 'investment targeted reforms' are instrumental in the 'income redistributive effects' of financial dynamics. Hence, this study also methodologically distinguishes itself from existing African finance-inequality literature (Kai & Hamori, 2009; Batuo et al., 2010)[3].

The remainder of this paper is organized in the following manner. Section 2 examines existing literature. Data and methodology are discussed and outlined in Section 3 respectively. Empirical analysis and discussion of results are reported in Section 4. We conclude with Section 5.

2. EXISTING LITERATURE

2.1 Theoretical highlights

[3] In summary, the current paper steers clear of existing literature (Kai and Hamori, 2009; Batuo et al., 2010) on the African inequality-finance nexus from two standpoints: (1) difference in variables employed (with the introduction of previously missing financial components into the debate); (2) methodological innovations, with the finance-inequality nexus contingent on the instrumentality of aggregate investment dynamics.

A bulk of empirical research has given substantial support to the view that financial development has a significant effect on the pattern of income distribution. More precisely that it either reduces or enhances inequality depending on theoretical postulations. Hence two strands of theories have been developed that provide contrasting views on the income-redistributive impact of finance (Greenwood & Jovanovic, 1990; Banerjee & Newman, 1993; Galor & Zeira, 1993).

Some protagonists posit an inverted U-shaped link between financial development and inequality. For instance, Greenwood and Jovanovic (1990) study on the finance-growth-inequality nexus predicts a Kuznets curve relationship between finance and inequality. In the early stages of development, when the financial sector is underdeveloped, inequality augments with financial development. Conversely, this positive impact on inequality reduces as the economy develops; moving to the intermediate phase and then to the mature phase of development where-in agents would see their incomes increase as they gain access to the financial intermediary sector. In plainer terms, in the transition from a primitive slow-growing economy to a developed fast-growing one, a nation passes via a stage in which the distribution of wealth across the rich and poor stretches.

On the other hand some authors suggest a linear link between financial development and income-inequality (Banerjee & Newman, 1993; Galor & Zeira, 1993). Their basic theoretical assumption is that financial market imperfections such as financial asymmetries, transaction and contract enforcement costs could be very binding on the poor who are deficient of the collaterals, credit histories and relational networks. Thus, even when the poor have projects with high returns, they may still be credit rationed, which infringes on the efficiency of capital allocation and limits the social mobility of the poor. Under these circumstances, income inequality rises with financial development. Conversely, increasing capital allocation efficiency would reduce income-inequality by facilitating funding to the poor individuals with productive investment.

2.2 Finance and inequality

The relationship between finance and inequality can be classified into three main strands.

The first strand explores the link among financial development, growth and inequality. Undernourishment (Claessens & Feijen, 2006) and population with lower income (Beck et al., 2007) decrease with financial development. One particular interesting characteristic in this category is the debate on the benefits of financial development. Some proponents assert that financial imperfections such as information and transaction costs are binding on the poor (who lack collaterals and credit histories) and thus a relaxation of these credit constraints will disproportionately benefit the poor. Hence, improvement of capital allocation efficiency would reduce income-inequality by facilitating funding to poor individuals with productive investment (Galor & Zeira, 1993; Aghion & Bolton, 1997; Galor & Moay, 2004). In contrasts, some theories postulate that financial development primarily helps the rich. In a non linear relationship between finance, income-inequality and economic growth developed by Greenwood and Javanovic (1990), financial development does not benefit the poor at the tender stage of development.

In the second strand, we find literature that addresses unequal access to and usage of finance[4]. Whereas in developed countries, more than 90% of households have access to financial services, access to retail banking services is minimal in the poorer segments of the population in undeveloped countries, with fewer than one-quarter of households having access to even basic banking services (Honohan, 2006). Low usage in lower income countries derives in part from low banking sector outreach. As regards the second dimension of this strand (access to finance), it is important here to distinguish between financial depth and access to finance. As pointed out by Claessens & Perotti (2007), numbers on the size of loans and deposits per capita are substantially

[4] Motives for unequal access to finance could be naturally economic or due to political influences. Natural economic reasons like natural high fixed cost in offering financial services or walls created by entry regulations that serve a valid public good (e.g. identification requirements for opening up a bank account to maintain financial integrity). It is due to financial market frictions that the poor cannot invest in their education despite their high marginal productivity of investment (Galor & Zeira, 1993; Banerjee & Newman, 1993).Unequal access can also results from political influence which creates regulatory obstacles to protect established rents (Rajan & Zingales, 2003; Acemoglu et al., 2005). This implies countries with poor political institutions, naturally lead to unequal political influence. Powerful groups will impact the regulatory and judicial environment and frequently control the allocation of finance (directly via bank ownership or through political networking).

higher in lower income countries than in their higher income counterparts. The higher average loan and deposit values in lower income countries suggest that usage of formal banking services is limited to firms and the relatively rich households.

In the third strand, we find papers on the effects of inequality in access to finance. Absence of equal opportunities in access to finance may result in corruption (Berger & Udell, 1998), slower firm growth (Ayyagari et al., 2006; Beck et al., 2005), reduction in entrepreneurial activities and lack of convergence in growth rates between rich and poor countries (Banerjee & Duflo, 2005), diminish individual welfare gains such as reduction in the prevalence of hunger, poor health, low education and gender inequality (Claessens & Feijen, 2007).

We have analyzed available evidence that financial access is quite skewed and affects competition, individual welfare and enterprise growth. The absence of diffused access can undermine growth, reduce welfare and create vulnerability to financial meltdown. It is interesting to discuss the experience and lessons of financial reforms.

2.3 The experience and lessons of financial reforms

For clarity of purpose, it is worthwhile classifying literature on financial reforms (in the context of inequality and resulting lessons) into three main strands.

In the first strand, studies focused on the timing and experience of financial liberalization in developing and developed countries over the past two decades (Henry, 2003; Chinn & Ito, 2006). We find evidence especially at individual firm level that, domestic deregulation and liberalization have augmented the supply of domestic capital, attracted foreign capital, led to more relaxed financial constraints…etc. All these have led to increased investment and growth. Capital market liberalization specifically has been found to averagely appeal to growth, asset allocation and efficiency (Levine & Zervros, 1996; Henry, 2000a; Henry, 2000b; Henry, 2006).

The second strand focuses on literature pertaining to asset allocation, rents and growth opportunities. Here, we find works substantiating that reforms often benefit insiders through

preferential allocation of assets, rents and growth opportunities. The cases of Chile in the 1970s (Velasco, 1988; Valdes-Prieto, 1992), Mexico in the 1980s (Haber & Kantor, 2004; La Porta et al., 2003; Haber et al., 2003) and Russia in the 1990s (Claessens & Pohl, 1995; Perotti, 2002) point to the fact that privatization of state owned banks benefit groups of insiders. We also find evidence of preferential allocation of licenses to a few insiders (Clarke et al., 2003), benefits of stock market liberalization that have been directed only to the top quintile of the income distribution (Das and Mohapatra, 2003), listing and corporate governance rules often designed to help insiders (Khwaja & Mian, 2005) and last but not the least, poor regulation and weak enforcement in the liberalization markets allowed insiders ample space for the expropriation of minority shareholders (La Porta et al., 2000; Claessens et al., 2002). In this strand we also find evidence that, while financial openness generally improves capital allocation and investment at the micro level (Henry, 2003), it does not necessarily translate into higher economic growth at the aggregate level.

In the third strand, we find literature on allocation of risks created by financial reforms. Bank crises can be socialized (Dooley, 2000) and typically increase inequality (Galbraith & Lu, 1999). Financial crises also benefit the lower-income strata through looting by the poor who have nothing to lose (Akerlof & Romer, 1993). In the redistributive impact of crisis via politics, Glaeser et al. (2003) argue that in many countries, the political response to institutional subversion by the rich is not institutional reform, but rather a form of massive Robin Hood redistribution. In some cases, this backlash slows economic and social progress on the one hand and on the other hand, the effect could simply be a change in the elite. In many cases reforms are often opportunistic, geared towards political ends especially during elections (Dinc, 2004; Brown & Dinc, 2004).

2.4 Scope and positioning of the paper: finance and inequality in Africa

Studies on the finance-inequality nexus are relatively absent in the context of Africa owing to scarcity and lack of relevant data on inequality. In a first detailed econometric analysis, Kai and Hamori (2009) examine the relationship between financial deepening and inequality in sub-

Saharan Africa between 1980 and 2002 and find that financial depth helped reduced inequality. Batuo et al. (2010) assess how financial development is related to income distribution in a panel of 22 African countries for the period 1990-2004. Using a dynamic panel estimation technique (GMM), findings indicate that income-inequality decreases as economies develop their financial sectors. They are consistent with the bulk of theoretical and empirical research and find no evidence supporting the Greenwood-Javanovic (1990) hypothesis of an inverted U-Shaped relationship between financial development and income-inequality.

The current paper deviates from the two studies above from two substantial standpoints and has a threefold contribution to the literature (already covered in the introduction). In light of the motivations, the following testable hypotheses will guide the empirical section. *Hypothesis 1*: Financial depth (in terms of money supply and liquid liabilities) is good for the poor. *Hypothesis 2*: Financial allocation efficiency (at banking and financial system levels) is good for the poor[5]. *Hypothesis 3*: Financial activity (from banking and financial system perspectives) helps the poor. *Hypothesis 4*: Financial size decreases income-inequality.

We expect the relationship between financial depth (and activity) and inequality to be negative. This is because the impact of first and second generational reforms on the financial sector has generally been positive in terms of income redistribution. Financial depth has improved, interest rates are largely market determined and entry restrictions into the financial sector have been relaxed (Batuo et al., 2010). However challenges remain to this nexus, especially with respect to access to finance by the majority of the population and by Small and Medium size Enterprises (SMEs). Also, the depth and breadth of the financial sector in Africa still substantially lags behind in comparison to other regions. Hence the impact of these reforms on the economy has been

[5] Some proponents in the literature assert that financial imperfections such as information and transaction cost are binding on the poor (who lack collateral and credit histories) and thus a relaxation of these credit constraints will disproportionately benefit the poor. It follows that improvement of capital allocation efficiency would reduce income-inequality by facilitating funding to poor individuals with productive investment (Galor & Zeira, 1993; Aghion & Bolton, 1997; Galor & Moay, 2004).

mixed; with the incidence on poverty and income distribution being very controversial, as we have discussed in the literature above.

The effect of financial allocation efficiency on income-distribution could either be positive or negative. A positive effect will imply the presence of market imperfections in the banking industry, such as financial asymmetries, transaction and contract enforcement costs which are generally very biding to the poor who are deficient of collaterals, credit histories and relational networks. On the other hand, increasing allocation efficiency could reduce income-inequality by facilitating funding to poor individuals with productive investments.

As to what concerns the projected redistributive effect of financial size, the incidence could either be positive or negative. When financial institutions are mostly concentrated in urban areas, this uneven distribution may positively affect inequality since a greater chunk of the population in rural areas will not have access to financial services and the poverty reduction opportunities they bring. Conversely, when the financial institutions are quasi-equally distributed across the country, even if the financial size is small, the quasi-equal distribution would negatively affect inequality.

3. METHODOLOY AND DATA

3.1 Methodology

3.1.1 Endogeneity

Though the lack of financial access has long been recognized as the leading cause of persisting inequality, Claessens & Perotti (2007) have urged the need to also recognize the reverse effect. They borrow from Acemoglu & Robison (2005) in highlighting that inequality affects financial development and in particular the distribution of access, because unequal access to resources affects de facto political power. Consistent with the literature (Rajan & Zingales, 2003; and Perotti & Volpin, 2007), in a weak institutional framework where de facto political influence

dominates de jure political representation, inequality renders it easy for established interests to influence access to finance by direct control or regulatory 'kidnapping' of the financial system.

3.1.2 Estimation technique

Borrowing from Beck et al. (2003) we employ the Two-Stage-Least Squares (TSLS) with investment dynamics as instrumental variables. As we have highlighted earlier, the paper requires an estimation technique that takes account of endogeneity. The Instrumental Variable (IV) estimator can avoid the bias that Ordinary Least Squares (OLS) estimates suffer-from (absence of consistency) when independent variables in the regression are correlated with the error term in the equation of interest. Another important aspect worth pointing-out is the close relation between investment and finance in effects of financial reforms, which provides another justification for the use of aggregate investment dynamics as instruments. Thus, the IV model investigates if domestic, foreign, private and public investments affect income-inequality through financial channels of depth, efficiency, activity and size. In line with Asongu (2011bd) the TSLS process involves the following steps: justify the use of a TSLS over an OLS estimation technique with the Hausman-test for endogeneity; show that instrumental variables (aggregate investment dynamics) are exogenous to the endogenous components of explaining variables (financial channels), conditional on other covariates (control variables); verify if the investment-instruments are valid and not correlated with the error-term in the equation of interest through an Over-identifying restrictions (OIR) test. Thus our methodology will include the following models:

First-stage regression:

$$FinancialChannel_{it} = \gamma_0 + \gamma_1(Domestic)_{it} + \gamma_2(Foreign)_{it} + \gamma_3(\mathrm{Pr}ivate)_{it} \gamma_4(Public)_{it} + \alpha_i X_{it} + \upsilon \quad (1)$$

Second-stage regression:

$$Inequality_{it} = \gamma_0 + \gamma_1(FinancialChannel)_{it} + \beta_i X_{it} + \mu \quad (2)$$

In the two equations, X is a set of exogenous variables that are included in first-stage regressions. For the first and second equations, v and u, respectively denote the error terms. Instrumental variables are the four investment variables. $FinancialChannel$ includes financial intermediary dynamics of depth (money supply and liquid liabilities), efficiency (at banking and financial system levels), activity(from banking and financial system perspectives) and size.

For robustness purposes we: (1) use Heteroscedasticity and Autocorrelation Consistent (HAC) standard error regressions in every model; (2) control for the consistency of financial channels with alternative indicators; and (3) check restricted with unrestricted regressions.

3.2 Data

We examine a sample of 13 African countries (Algeria, Botswana, Cameroon, Egypt, Kenya, Malawi, Mauritius, Morocco, Senegal, South Africa, Swaziland, Tanzania and Uganda) with data from African Development Indicators (ADI) and the Financial Development and Structure Database (FDSD) of the World Bank (WB). Owing to scarce inequality data for the African continent from the WDI, we borrow from Kai and Hamori (2009) in using estimated household income inequality data obtained from the University of Texas Inequality Project (UTIP). The sample of countries is those for which data is available from the UTIP and those that have not experienced a civil war during the period 1980-2002. The UTIP is a research project that estimates the inequality of household income using a statistical approach that creates a dense and consistent global dataset. The UTIP has the particular advantage of making the worldwide inequality data comparable[6]. The time interval also coincides with two decades of financial and economic reforms in the African continent. A synthesis of selected variables is found in Appendix 2. For the purpose of clarity, data is classified into the following categories.

[6] For instance, is the low inequality registered for Indonesia and India comparable to Europe and Canada? The fact that South Asia uses 'expenditure surveys' while Europe uses 'income surveys' is clearly relevant, but how can an adjustment be made? Elementary economics suggests these differences in inequality are not plausible. For example Europe has an integrated economy with free trade, free capital flow, nearly equal average incomes (between say, France and Germany) and factor mobility. Indonesia and India have substantially *unequal* manufacturing pay.

3.2.1 Financial development indicators

a) Financial depth

While recent finance-inequality literature has either not used financial depth (Beck et al., 2004; Beck et al., 2007) or focused only on a single measure of finance (Kai & Hamori, 2009; Batuo et al., 2010), we borrow from Beck et al. (1999) and Asongu (2011a) and proxy for 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 first represents the monetary base plus demand, saving and time deposits, the second denotes liquid liabilities. The two variables are in ratios of GDP (see Appendix 2) and should robustly check each other as either account for over 97% of information in the other (see Appendix 3).

b) Financial efficiency

The concept of efficiency here is neither profitability-oriented, nor guided by the production efficiency of decision making units in the financial sector (via Data Envelopment Analysis: DEA). What this paper is concerned with, is the ability of banks to effectively fulfill their fundamental role of transforming mobilized deposits into credit for economic operators. We use measures for banking-system-efficiency and financial-system-efficiency (respectively 'bank credit on bank deposits: *Bcbd'* and 'financial system credit on financial system deposits: *Fcfd'*). Like in the case of financial depth, these two financial allocation efficiency proxies can check each other as they represent more than 88% of variability in one another (see Appendix 3).

c) Financial size

Consistent with the FDSD, we measure financial intermediary size as the ratio of "deposit bank assets" to the "total assets" (deposit bank assets on 'central bank assets plus deposit bank assets': *Dbacba*). Unfortunately, we could not find another indicator of financial size despite a thorough search, numerous computations and deepened correlation analyses.

d) Financial activity

Financial intermediary activity here refers to the ability of banks to grant credit to economic operators: consistent with some motives of financial reforms which sought to stimulate investment. While past works highlighted in the literature have focused only on a single measure (Beck et al., 2004; Beck et al., 2007; Batuo et al., 2010) we proxy for both bank-sector-activity and financial-sector-activity with "private domestic credit by deposit banks: *Pcrb*" and "private credit by domestic banks and other financial institutions: *Pcrbof*" respectively. The latter indicator checks the former as it represents more than 91% of information in the former (see Appendix 3).

3.2.2 Investment instrumental and control variables

The paper uses Gross Domestic Investment (GDI), Foreign Direct Investment (FDI), Gross Public Investment (Pub.I) and Gross Private Investment (Priv.I) as instrumental variables. The choice of these instrumental variables is premised on the finance-inequality literature, where-in financial reforms were investment-targeted. In line with the finance-growth (Levine & King, 1993; Hassan et al., 2011) and finance-inequality (Dollar & Kraay, 2002; Beck et al., 2007; Kai and Hamori, 2009) literature, we control for trade, inflation, population growth, government expenditure and GDP growth.

3.2.3 Descriptive statistics and correlation analysis

Descriptive statistics and correlation analysis are presented in Appendix 1 and Appendix 3 respectively. From the descriptive statistics, it could be noted that an estimation approach that directly assumes a particular form of distribution is inappropriate and would produce biased and inconsistent estimates. As for the correlation analysis, it has two main objectives. On the one hand it enables us avoid issues linked to multicolinearity and overparametization. On the other hand, it provides us with a foresight on possible linkage-signs between various indicators. Among them, it is worth noting that all correlations with the variable of interest have the right signs. While *inflation* and *population growth* are positively correlated with *inequality*, the remaining variables

are negatively correlated with it. These negative relations are consistent with theory in the perspective that, aggregate investment (domestic, foreign, private and public) measures (designed to improve services in the financial sector: depth, efficiency, activity and size), and control variables (trade and government expenditure) all have an appealing redistributive impact on household income. As for inflation and population growth, they decrease purchasing power and household income per capita respectively; hence their positive association with the variable of interest.

4. EMPIRICAL ANALYSIS

This section presents the results from cross-country regressions to assess: the ability of aggregate investment dynamics to explain the endogenous components of financial channels and; the ability of the exogenous components of financial channels to explain cross-country differences in income-inequality conditional on investment dynamics (instruments).

4.1 Finance and Investment

In Table 1, we regress the financial indicators on domestic, foreign, private and public investments (conditional on control variables) and then test for the joint significance of estimated coefficients[7]. After controlling for trade, inflation, population growth, general government expenditure and GDP growth, we find that investment dynamics enter jointly significantly in all regressions at the 1% level. This Fisher test results also reflect the strength of the instruments. We avoid introducing domestic and private investments in the same regression because both reflect the same information or variability at the height of over 58%.

4.2 Inequality and Finance

Table 2 addresses two main issues: (1) the concern of whether the exogenous components of financial channels explain inequality conditional on investment dynamics and; (2) whether *only*

[7] It is worth noting that, this is the first-step of the TSLS approach where-in, the instruments must explain the endogenous components of the financial channels, conditional on other covariates (control variables).

the exogenous components of financial channels explain inequality conditional on aggregate investment dynamics. In other words, the second concern seeks to assess if the income-redistributive impact of investment goes beyond financial channels.

Table 1: First-stage regressions

		Dependent Variables: Financial Development Channels							
		Financial Depth		**Financial Efficiency**		**Financial Activity**		**Financial Size**	
		M2	Fdgdp	BcBd	FcFd	Pcrb	Pcrbof	Dbacba	Dbacba
		Model 1	**Model 1***	Model 2	**Model 2***	Model 3	**Model 3***	Model 4	**Model 4***
	Constant	**0.476*** (8.566)**	**0.411*** (8.311)**	**1.049*** (13.19)**	**1.166*** (10.91)**	**0.308*** (7.121)**	**0.430*** (6.125)**	**0.563*** (15.00)**	**0.605*** (9.272)**
	Domestic	**0.008*** (4.571)**	---	0.003 (0.990)	---	**0.006*** (4.034)**	---	**0.006*** (3.363)**	---
	Foreign	**-0.010** (-2.057)**	**-0.009** (-2.132)**	**-0.032*** (-2.926)**	**-0.038*** (-2.737)**	**-0.011** (-2.516)**	**-0.015** (-2.241)**	-0.002 (-0.511)	**0.010* (1.848)**
Instruments	Private	---	**0.005*** (2.631)**	---	0.008 (1.475)	---	**0.007** (2.473)**	---	**0.007*** (3.492)**
	Public	**0.008*** (2.811)**	**0.010*** (4.036)**	**-0.021*** (-3.399)**	**-0.029*** (-4.033)**	-0.003 (-1.223)	-0.004 (-1.291)	**-0.008*** (-3.069)**	-0.003 (-1.148)
	Trade	---	---	---	---	---	---	**0.002*** (8.588)**	---
	Inflation	**-0.001** (-2.369)**	**-0.0009** (-2.100)**	**-0.003*** (-3.550)**	**-0.003*** (-2.848)**	**-0.001*** (-2.835)**	**-0.001** (-2.019)**	**-0.002*** (-4.903)**	---
Control Variables	Popg	**-0.084*** (-6.747)**	**-0.085*** (-7.609)**	---	---	**-0.048*** (-4.621)**	**-0.054*** (-3.404)**	---	**-0.069*** (-5.659)**
	G.E	**-0.006** (-2.457)**	---	---	---	---	---	---	**0.014*** (5.038)**
	GDPg	---	---	**-0.016*** (-2.901)**	**-0.022*** (-3.166)**	**-0.007*** (-3.052)**	**-0.009*** (-2.683)**	**-0.006** (-2.497)**	---
Fisher-test		**21.652***	**22.173***	**10.187***	**11.394***	**13.714***	**8.814***	**25.675***	**17.951***
Adjusted R^2		0.324	0.292	0.154	0.169	0.233	0.154	0.390	0.266
Number of Observations		259	257	253	256	251	258	232	234

Dbacba: Deposit bank assets on Central bank assets plus Deposit bank assets. Popg: Population growth rate. GDPg: GDP growth rate. G.E: Government Expenditure. *,**,***: Significance levels of 10%, 5%, and 1% respectively. M2: Money Supply. Fdgdp: Liquid liabilities. BcBd: Bank credit on Bank deposits. FcFd: Financial credit on Financial deposits. Dbacba: Deposit bank assets on (Central bank asset plus Deposit bank assets).

While the first issue is addressed by the significance of estimated coefficients, the second is investigated by the overidentifying restrictions (OIR) test whose null hypothesis is the position that, the instruments are not correlated with the error term of the equation of interest (Eq. 2). Therefore, a rejection of the null hypothesis of the OIR test is a rejection of the position that, only financial channels explain inequality conditional on investment. Robustness checks are done at three stages: (1) use of alternative indicators of each financial dynamic; (2) application of models robust to Heteroscedasticity and Autocorrelation Consistent (HAC) standard errors, distinguished with the "*" sign; (3) introduction of an (a) autonomous (constant) financial development measure

in the regressions when the null hypothesis of the OIR test is rejected (that is, when the instruments are invalid).

Table 2 shows restricted TSLS inequality regressions. We first and foremost justify our choice of a TSLS estimation method with a Hausman test for model specification. The null hypothesis of this test is the position that estimated coefficients by OLS are consistent; implying they do not suffer from endogeneity because the explaining variables in the equation of interest are not correlated with the error term. Where the Hausman test fails to reject the null hypothesis (absence of endogeneity) we do not consider the TSLS estimation method appropriate because estimates by OLS are efficient and consistent. OLS regressions show strong evidence of endogeneity in all eight models. Cragg-Donald statistics of weak instrument test (for first stage regressions) are only reported for models without HAC standard errors[8].

Table 2: Restricted Two-Stage Least Squares with HAC standard errors

		Dependent Variables: Estimated Household Income Inequality							
		Model 5	**Model 5***	Model 6	**Model 6***	Model 7	**Model 7***	Model 8	**Model 8***
Financial Depth	Monetary Base(M2)	**39.58*** (4.00)**	39.584 (1.29)	---	---	---	---	---	---
	Liquid liabilities(Fdgdp)	---	---	**63.74*** (5.059)**	**63.748* (1.685)**	---	---	---	---
Financial Efficiency	Banking System Efficiency (BcBd)	**35.46*** (7.918)**	**35.46*** (2.602)**	---	---	**21.09*** (3.353)**	21.09 (1.291)	---	---
	Financial System Efficiency (FcFd)	---	---	**27.06*** (6.368)**	**27.06** (1.964)**	---	---	**30.13*** (3.149)**	30.13 (1.249)
Financial Activity	Banking System Activity (Pcrb)	---	---	---	---	**-83.74*** (-4.585)**	**-83.74*** (-3.570)**	---	---
	Financial System Activity (Pcrbof)	---	---	---	---	---	---	**-140*** (-3.06)**	**-140.8** (-2.025)**
Financial Size	Dbacba	---	---	---	---	**64.19*** (7.504)**	**64.19*** (3.251)**	**80.00*** (5.201)**	**80.00** (2.284)**
	Hausman test	**595.00*** **	**595.00*** **	**898.07*** **	**898.0*** **	**399.14** **	**399.14*** **	**626.46*** **	**626.4*** **
	OIR(Sargan) test	36.64***	36.64***	25.78***	25.78***	27.07***	27.07***	4.683*	4.683*
	P-value	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.096]	[0.096]
	Cragg-Donald	9.285	---	10.88	---	6.478	---	1.343	---
	Adjusted R^2	0.093	0.093	0.084	0.084	0.086	0.086	0.091	0.091
	F-Statistics	---	---	---	---	**763.3*** **	**107.56*** **	**258.50*** **	**25.70*** **
	Observations	213	213	216	216	191	191	196	196
	Instruments	Constant; Private Investment; Public Investment; Domestic Investment; Foreign Investment							

(): z-statistics. Chi-square statistics for Hausman test. LM statistics for Sargan test. [ ]:p-values. Cragg-Donald Weak Instrument test. *, **, ***: significance levels of 10%, 5% and 1% respectively. Dbacba: Deposit bank assets on Central bank assets plus Deposit bank assets. Models with the "*" are in Heteroscedasticity and Autocorrelation Consistent (HAC) standard errors.

The first issue is addressed by the significance of financial channel estimated coefficients. Financial depth from overall economic (money supply) and financial system (liquid liabilities)

[8] This is standard in all software applications.

perspectives is a significant determinant of inequality in estimated household income: Model 5 and Model 6(6*) respectively. This significance also applies to financial efficiency from the banking system (Models 5,5* & 7) and financial system (Models 6,6* & 8) standpoints. Financial intermediary activity through banking system activity (Models 7 & 7*) and financial system activity (Models 8 & 8*) also has an income-redistributive effect. The added significance of the financial size channel (Model 7,7*,8, & 8*) shows that all financial intermediary dynamics under consideration address the first issue.

With regard to the second concern, rejection of the null hypothesis of the OIR test in all eight regressions demonstrates that, not only financial channels explain income-inequality conditional on investment aggregates. In other words, investment dynamics exert an influence on income-inequality through other mechanisms beyond financial channels. In a nutshell, the instruments are correlated with the error term in the equation of interest: implying investment dynamics do not address the issue of endogeneity. In plainer terms, the investment instruments are invalid. The presence of biased estimates owing to endogeneity could further be confirmed by the signs of estimated coefficients. At least judging from empirical literature, we expected negative signs for the financial depth channel (Kai & Hamori, 2009; Batuo et al., 2010); as is the case of financial activity (Beck et al., 2004; Beck et al., 2007; Batuo et al., 2010). As for financial efficiency and size, we cannot establish with certainty which sign is right as this paper is the first to use them in finance-inequality literature. However, borrowing from initial correlation analysis we expected their corresponding estimates to display negative signs. Given the invalidity of the instruments, biased estimated coefficients and, absence of additional financial channels to consider, we relax the restricted assumption of the TSLS approach in Table 2 and assume the presence of a (an) constant (autonomous) finance. Hence, an unrestricted TSLS approach presented in Table 3.

Table 3: Unrestricted Two-Stage Least Squares with HAC standard errors

		Dependent Variables: Estimated Household Income Inequality							
		Model 9	**Model 9***	Model 10	**Model 10***	Model 11	**Model 11***	Model 12	**Model 12***
	Constant	**56.78*** **	**56.78*** **	**55.95*** **	**55.95*** **	**46.40*** **	**46.40*** **	**41.04*** **	**41.04*** **
		(17.33)	**(9.093)**	**(15.15)**	**(7.155)**	**(12.03)**	**(8.026)**	**(5.265)**	**(3.076)**
Financial Depth	Monetary Base	**-18.71*** **	**-18.71*** **	---	---	---	---	---	---
		(-4.661)	**(-3.081)**						
	Liquid liabilities	---	---	**-26.86*** **	**-26.86** **	---	---	---	---
				(-3.885)	**(-2.560)**				
Financial Efficiency	Banking System Efficiency	-3.43	-3.431	---	---	**6.980** **	6.980	---	---
		(-1.20)	(-0.973)			**(2.367)**	(0.996)		
	Financial System Efficiency	---	---	-3.036	-3.036	---	---	**12.148** **	12.14
				(-1.165)	(-0.784)			**(2.378)**	(0.908)
Financial Activity	Banking System Activity	---	---	---	---	**-37.75*** **	**-37.75*** **	---	-53.86
						(-4.321)	**(-3.920)**		(-1.485)
	Financial System Activity	---	---	---	---	---	---	**-53.86** **	
								(-2.192)	
Financial Size	Dbacba	-1.79	-1.79	1.171	1.171	3.075	3.075	12.211	12.21
		(-0.348)	(-0.204)	(0.190)	(0.102)	(0.490)	(0.343)	(0.857)	(0.560)
	Hausman test	**15.33*** **	**15.33*** **	**22.18*** **	**22.185*** **	**22.856*** **	**22.85*** **	**28.64*** **	**28.64*** **
	OIR(Sargan) test	**1.20**	**1.20**	**1.91**	**1.915**	**0.683**	**0.683**	**1.774**	**1.774**
	P-value	**[0.272]**	**[0.272]**	**[0.166]**	**[0.166]**	**[0.408]**	**[0.408]**	**[0.182]**	**[0.182]**
	Cragg-Donald	7.167	---	4.568	---	7.413	---	1.101	---
	Adjusted R^2	0.174	0.174	0.149	0.149	0.177	0.177	0.096	0.096
	F-Statistics	**10.64*** **	**5.385*** **	**8.505*** **	**3.767** **	**9.212*** **	**13.88*** **	**2.94** **	**2.339***
	Observations	193	193	196	196	191	191	196	196
	Instruments	Constant; Private Investment; Public Investment; Domestic Investment; Foreign Investment							

(): z-statistics. Chi-square statistics for Hausman test. LM statistics for Sargan test. [ ]:p-values. Cragg-Donald Weak Instrument test. *, **, ***: significance levels of 10%, 5% and 1% respectively. Dbacba: Deposit bank assets on Central bank assets plus Deposit bank assets. Models with the "*" are in Heteroscedasticity and Autocorrelation Consistent (HAC) standard errors.

Consistent with the analytical approach employed for Table 2, Table 3 addresses the two main issues. Firstly, rejection of the null hypothesis of the Hausman test in all eight regressions validates the TSLS estimation technique. While the significance of estimated coefficients addresses the first issue, the second concern is examined by the OIR test. Failure to reject the null hypothesis in all eight regressions shows that only financial channels (in the presence of a constant) explain the redistributive effect of household income conditional on aggregate investment dynamics. In plainer terms, investment contributes to explaining income inequality through no other mechanisms than financial channels. This implies the instruments are valid and the issue of endogeneity is no longer relevant, as the investment dynamics are not correlated with the error term in the unrestricted equation of interest. The signs of estimated coefficients are expected and in accordance with the literature: financial depth (Kai & Hamori, 2009; Batuo et al., 2010) and financial activity (Beck et al., 2004; Beck et al., 2007; Batuo et al., 2010). As for other

financial parameters, while those corresponding to financial size are insignificant at the 10% level, financial efficiency substantially increases household income-inequality. An in-depth account of this new finding in the finance-inequality nexus is provided as we revisit tested hypotheses below.

In revisiting the hypotheses, we can assert the following. (1) Financial depth is good for the poor, in line with theoretical (Galor & Zeira, 1993; Banerjee & Newman, 1993) and empirical (Beck et al., 2004; Beck et al., 2007; Kai & Hamori, 2009; Batuo et al., 2010) literature. We therefore confirm *Hypothesis 1*. (2) Financial allocation efficiency has a disequalizing effect on income-distribution; implying policies designed to improve the allocation of mobilized funds to economic agents only benefit the rich to the detriment of the poor. Thus, this finding confirms the Greenwood & Javanovic (1990) inverted U-shape hypothesis owing to the relatively undeveloped state of most countries in the sample. Drawing from Claessens & Perotti (2007), this disequalizing effect could be understood from the numbers on the size of loans and deposits per capita; which are substantially higher in lower income countries than in their higher income counterparts. This suggests 'higher average loans' and deposit values benefit only the wealthy and firms for the most part. In other words, formal banking services are limited to firms and relatively rich households of countries in the sample. This finding also supports Asongu (2011c) who postulates that financial allocation efficiency significantly undermines inequality adjusted-welfare in the African continent. We therefore reject *Hypothesis 2*. This rejection lends substance to the presence of market imperfections in the banking industry, such as financial asymmetries, transaction and contract enforcement costs which are generally very biding to the poor who are deficient of collaterals, credit histories and relational networks. Thus, even when the poor have projects with high returns, they may still be credit rationed, which infringes on the efficiency of capital allocation and limits the social mobility of the poor. (3) Financial activity helps the poor. We confirm *Hypothesis 3*, that is consistent with theoretical (Galor & Zeira, 1993; Banerjee & Newman, 1993) and empirical (Beck et al., 2004; Beck et al., 2007; Batuo et al., 2010) literature. (4) The fourth hypothesis is that

financial size helps the poor. The estimated coefficients are insignificant with the wrong signs. Therefore we conclude that financial size is not significantly anti-poor.

5. CONCLUSION

Owing to lack of data on income-inequality for Africa, there are presently only two studies dedicated to the continent in the finance-inequality literature (Kai & Hamori, 2009; Batuo et al., 2010). While these papers have limited their analysis to few financial development indicators, the present work has contributed to this literature by: (1) integrating previously missing financial components into the nexus and; (2) introducing a methodological innovation in the assessment of how investment targeted reforms are instrumental in the income-redistributive effects of financial dynamics. The results broadly indicate financial development does not help the poor from all dimensions. While financial channels of depth and activity are good for the poor (as they diminish estimated household inequality), financial intermediary allocation efficiency appears to be anti-poor. The findings on financial depth and activity are broadly consistent with empirical (Beck et al., 2004; Beck et al., 2007; Kai & Hamori, 2009; Batuo et al., 2010) and theoretical (Galor & Zeira,1993; Banerjee & Newman,1993) literature which postulate a negative and linear relationship between financial development and income-inequality. On the other hand, findings on financial efficiency are in line with the Greenwood & Jovanovic (1990) inverted U-shaped hypothesis since most countries in the sample are still undeveloped.

As a policy implication, not all financial intermediary development dynamics are pro-poor. (1) Financial sector reforms aimed at curbing poverty and income-inequality should focus on financial channels of depth and activity. (2) From a financial depth perspective, the redistributive effect of 'liquid liabilities' is greater than that of 'money supply', supporting a more substantial income-equalizing role of 'part of the monetary base' that transits through the banking system. By the same token, it implies the chunk of the monetary base not deposited in the banking sector has a less positive income redistributive effect. Hence, the need for policy makers to encourage

measures geared towards opening formal bank accounts. (3) The disequalizing effect of financial allocation efficiency on income-distribution has four main implications: firstly, policies designed to improve the allocation of mobilized funds to economic agents only benefit the rich to the detriment of the poor; secondly, improvements in the investment climate (foreign, domestic, private and public investments) only facilitate credit facilities that directly or indirectly benefit the rich; thirdly, measures designed to tackle surplus liquidity in African banks in a bid to curb inequality should not rely solely on the markets (market intervention such as strengthening safety nets and financial access to the poor should be considered) and; fourthly, numbers on the size of loans and deposits per capita are substantially high, suggesting that usage of formal banking services is limited to firms and the relatively rich households.

The insignificant negative redistributive effect of financial size implies that, financial institutions are mostly concentrated in urban areas. Hence, depriving the population in rural areas access to financial services and the poverty reduction opportunities they bring. As a policy implication, one avenue for improving the access of financial services to the poor would include measures that favor increasing microfinance institutions or cooperative banks. Microfinance is a form of financial development that, at least at its initial stages can thrive without relying heavily on government regulation, support or strong legal institutions.

The main limitation of this study is that, the income redistributive impact of financial channels is contingent on domestic, foreign, private and public investment dynamics. Beside this plethora of investments, other factors are also instrumental in the redistributive effect of financial development. Hence, further research within the framework of the inequality-finance nexus could focus on the instrumentality of other macroeconomic factors. Another interesting future research direction could be the assessment of the income-redistributive effect of the untapped burgeoning phenomenon of mobile banking.

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Appendices

Appendix 1: Summary Statistics

Variables	Mean	S.D	Min.	Max.	Skewness	Kurtosis	Obser.
Income Inequality(EHII)	45.128	5.140	29.033	64.360	-0.224	0.905	247
Domestic Investment(GDI)	21.829	7.069	5.608	43.406	0.399	-0.003	288
Foreign Investment(FDI)	1.213	2.067	-7.125	10.294	1.338	4.383	275
Private. Investment(Priv.I)	13.607	5.234	2.303	34.516	0.146	0.301	281
Public Investment (Pub. I)	6.840	3.900	0.000	22.149	0.825	0.587	276
Openness(Trade)	69.245	36.366	22.303	205.13	1.409	1.312	289
Inflation	15.065	22.831	-4.140	200.03	5.570	37.228	297
Government Expenditure(G.E)	16.101	4.501	6.971	31.554	0.554	0.438	287
Population growth(Popg)	2.603	0.867	0.670	6.238	0.253	1.673	299
GDP growth(GDPg)	3.978	4.181	-10.240	19.450	0.109	1.399	286
Money Supply(M2)	0.377	0.212	0.046	0.830	0.589	-0.836	288
Liquid Liabilities(Fdgdp)	0.305	0.182	0.026	0.742	0.574	-0.840	286
Banking Efficiency(BcBd)	0.766	0.407	0.070	2.259	1.070	1.274	294
Financial Efficiency(FcFd)	0.855	0.492	0.139	2.606	1.514	2.201	286
Banking Activity(Pcrb)	0.227	0.167	0.011	0.698	0.975	0.143	281
Financial Activity (Pcrbof)	0.269	0.238	0.011	1.325	1.996	4.844	288
Financial Size(Dbacba)	0.741	0.198	0.110	0.999	-0.702	0.238	273

S.D: Standard Deviation. Min : Minimum. Max : Maximum. Obser : Number of observations

Appendix 2: Variables definitions

Variables	Sign	Variable Definitions	Sources
Income Inequality	EHII	Estimated Household Income Inequality	UTIP, Kai and Hamori (2009)
Domestic Investment	GDI	Gross Domestic Investment (% of GDP)	World Bank(WDI)
Foreign Investment	FDI	Foreign Direct Investment (% of GDP)	World Bank(WDI)
Private Investment	Priv.I	Gross Private Investment (% of GDP)	World Bank(WDI)
Public Investment	Pub.I	Gross Public Investment (% of GDP)	World Bank(WDI)
Openness	Trade	Imports(of goods and services) plus Exports(of goods and services) on GDP	World Bank(WDI)
Government Expenditure	G. E	General Government Final Consumption Expenditure (% of GDP)	World Bank(WDI)
Population growth	Popg	Average annual population growth rate	World Bank(WDI)
Growth of GDP	GDPg	Average annual GDP growth rate	World Bank(WDI)
Inflation	Inflation	Consumer prices (annual %)	World Bank(WDI)
Economic financial depth(Money Supply)	M2	Monetary Base plus demand, saving and time deposits	World Bank(FDSD)
Financial system depth(Liquid liabilities)	Fdgdp	Financial system deposits	World Bank(FDSD)
Banking system allocation efficiency	BcBd	Bank credit on Bank deposits	World Bank(FDSD)
Financial system allocation efficiency	FcFd	Financial system credit on Financial system deposits	World Bank(FDSD)
Banking system activity	Pcrb	Private credit by deposit banks	World Bank(FDSD)
Financial system activity	Pcrbof	Private credit by deposit banks and other financial institutions	World Bank(FDSD)
Financial size	Dbacba	Deposit bank assets on Central banks assets plus deposit bank assets	World Bank(FDSD)

GDI: Gross Domestic Investment. FDI: Foreign Direct Investment. Priv.I: Private Investment. Pub.I: Public Investment. Trade: Openness. G.E: Government Final Expenditure. Popg: Population growth rate. GDPg: GDP growth rate. M2: Money Supply. Fdgdp: Liquid liabilities. BcBd: Bank credit on Bank deposits. FcFd: Financial system credit on Financial system deposits. Pcrb: Private domestic credit by deposit banks. Pcrbof: Private domestic credit by deposit banks and other financial institutions. Dbacba: Deposit bank assets on Central bank assets plus deposit bank assets. EHII: Estimated Household Income Inequality. WDI: World Development Indicators. FDSD: Financial Development and Structure Database. UTIP: University of Texas Inequality Project.

Appendix 3 : Correlation Matrix

Instrumantal Investment Variables				Control Variables					Financial Development Variables							Income Inequality	
									Fin. Depth		Fin. Efficiency		Fin. Activity		F. Size		
GDI	FDI	Priv.I	Pub. I	Trade	G.E	Popg	Infl.	GDPg	M2	Fdgdp	BcBd	FcFd	Pcrb	Pcrbof	Dbacba	EHII	
1.000	0.090	0.587	0.430	0.338	0.391	-0.154	-0.22	0.226	0.402	0.354	-0.074	-0.148	0.225	0.075	0.316	-0.297	GDI
	1.000	0.089	0.024	0.358	0.057	0.007	-0.09	0.318	-0.047	-0.060	-0.208	-0.198	-0.158	-0.153	0.123	-0.022	FDI
		1.000	-0.168	0.313	0.208	-0.217	-0.25	0.120	0.218	0.200	0.134	0.107	0.296	0.189	0.365	-0.271	Priv. I
			1.000	0.085	0.210	-0.001	0.021	0.055	0.251	0.185	-0.202	-0.270	0.011	-0.125	-0.104	-0.161	Pub. I
				1.000	0.392	-0.215	-0.14	0.308	0.026	0.074	-0.072	-0.129	0.001	-0.084	0.502	-0.041	Trade
					1.000	0.084	-0.14	0.077	0.017	0.004	0.084	0.132	0.087	0.145	0.271	-0.021	G.E
						1.000	0.237	0.041	-0.420	-0.458	0.096	0.068	-0.286	-0.231	-0.357	0.211	Popg
							1.000	-0.026	-0.234	-0.244	-0.231	-0.180	-0.258	-0.202	-0.352	0.157	Infl.
								1.000	-0.042	-0.053	-0.195	-0.208	-0.146	-0.170	0.031	-0.041	GDPg
									1.000	**0.976***	-0.081	-0.011	0.693	0.563	0.306	-0.413	M2
										1.000	-0.054	0.052	0.744	0.642	0.391	-0.375	Fdgdp
											1.000	**0.883***	0.507	0.455	0.343	-0.060	BcBd
												1.000	0.621	0.716	0.370	-0.055	FcFd
													1.000	**0.915***	0.527	-0.366	Pcrb
														1.000	0.494	-0.242	Pcrbof
															1.000	-0.073	Dbacba
																1.000	EHII

GDI: Gross Domestic Investment. FDI: Foreign Direct Investment. Priv.I: Private Investment. Pub.I: Public Investment. Trade: Openness. G.E: Government Final Expenditure. Popg: Population growth rate. GDPg: GDP growth rate. M2: Money Supply. Fdgdp: Liquid liabilities. BcBd: Bank credit on Bank deposits. FcFd: Financial system credit on Financial system deposits. Pcrb: Private domestic credit by deposit banks. Pcrbof: Private domestic credit by deposit banks and other financial institutions. Dbacba: Deposit bank assets on Central bank assets plus deposit bank assets. EHII: Estimated Household Income Inequality. Fin: Financial. *: represent issues of multicolinearity taken into account in the modeling approaches.

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