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Finance and Inequality: Exploring Pro-Poor Investment Channels in Africa

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Finance and Inequality: Exploring Pro-Poor Investment Channels in Africa

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AGDI Working Paper

Research Department

Finance and Inequality: Exploring Pro-Poor Investment Channels in Africa

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Abstract

Hitherto very few studies on the inequality-finance(investment) nexus have focused on the African continent owing to lack of relevant data. This paper integrates previously missing investment and financial components in the assessment of how finance affects pro-poor investment channels. Findings reveal, but for the case of foreign investment, financial development dynamics of depth, efficiency, activity and size have an equalizing effect on income distribution through private, public and domestic investment channels. As a policy implication investment-targeted financial reforms that aim to curb poverty should take account of the disequalizing income-effect of foreign investment in undeveloped countries.

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

Keywords: Finance; Investment; Poverty; Inequality; Africa

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1. Introduction

Poverty remains stubbornly high in Africa and very few studies in the finance-inequality nexus have been dedicated to it, owing to scares and irrelevant data(Kai & Hamori,2009; Batuo et al.,2010). Poverty and inequality remain crucial challenges to economic growth and human development in the continent. In the 1980s and 1990s most African countries embarked on a series of structural and policy adjustments in the financial sector as part of overall economic reforms, which sort to improve overall economic and financial sector efficiency(Janine & Elbadawi, 1992). For over three decades investment rates have fallen substantially in majority of African countries(Ndikumana, 2002). Given the close connection between the level of investment and economic growth(Barro,1991; Ben-David, 1998) and the pervasiveness of financial repression in stifling economic growth (McKinnon, 1973; Shaw,1973), this paper adds to the literature by investigating how finance affects income-inequality through investment channels. In plainer terms, it seeks to take stock of the income-redistributive effect of investment targeted financial reforms in the African continent.

The rest of this paper is organized in the following manner. Section 2 reviews existing literature. Data and Methodology are described and outlined respectively in Section 3. Empirical analysis and discussion of results are presented in Section 4. Section 5 concludes.

2. Literature review

2.1 Theoretical outline

A bulk of empirical research presents two contrasting views on the impact of finance on income-inequality(hence inequality). Some papers posit an inverted U-shaped link between financial development and inequality. For instance, the Greenwood and Jovanovic(1990) finding on the finance-growth-inequality nexus predicts a Kuznets curve relationship between finance

and inequality. Plainly put, in the early stages of development when the financial sector is underdeveloped, inequality augments with financial development. However, this disequalizing impact reduces as the economy develops ; progressing 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 other words, 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.

Another strand of authors suggest a linear relationship 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, credit histories, transaction and contract enforcement costs could be very binding on the poor who are deficient of the collaterals, and relational networks. Therefore, 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 scenarios, income-inequality rises with financial development. Conversely, improvement of capital allocation efficiency would reduce income inequality by facilitating funding to poor individuals with productive investment.

2.2 Inequality and finance

For clarity of purpose, the relationship between finance and inequality can be classified into three main strands.

The first strand investigates 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 worth noting characteristic in this category is the debate on the benefits of financial development. Some

authors asserts 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. It follows that amelioration of capital allocation efficiency would reduce income-inequality by facilitating funding to poor individuals with productive investments(Galor & Zeira, 1993; Aghion & Bolton, 1997; Galor & Moay, 2004). On the contrary, 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 looks at unequal access to and usage of finance. Whereas in developed countries, more than 90% of households gain 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 proceeds in part from low banking sector outreach. As regards the second dimension of this strand(access), it is important here to distinguish between financial depth and access to finance. As highlighted by Claessens & Perotti (2007), numbers on the size of loans and deposits per capita are substantially 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 restricted to firms and the relatively rich households.

The third strand focuses on the effects of inequality in access to finance. Absence of equal opportunities in access to finance may prompt 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 income-inequality(Claessens & Feijen, 2007).

We have seen from available evidence that financial access is quite skewed and affects competition, individual welfare and enterprise growth. The lack of diffused access can undermine growth, reduce welfare and create vulnerability to financial meltdown. It is worth investigating why financial sector reforms have not been targeted at improving access to financing. The second category of the literature assesses this concern with natural and political perspectives.

2.3 Why inequality in access to finance?

Hitherto, we have observed that financial systems provide unequal access to households and firms. For organizational purposes unequal access to finance could be naturally economic or due to political influences.

Natural economic reasons include high fixed cost in offering financial services and barriers 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 as a result of 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 could be the result of political influence which creates regulatory obstacles to protect established rents(Rajan & Zingales, 2003; Acemoglu et al.,2005). This means countries with poor political institutions, naturally leads to unequal political influence. Powerful groups will affect the regulatory and judicial environment and frequently control the allocation of finance(directly through bank ownership or via political networking).

2.4 The experience and lessons of financial reform

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

In the first strand, we find papers 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 see 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 growth at investment and economic levels. Capital market liberalization specifically on average, have appealing effects on growth, asset allocation and efficiency(Levine and Zervros,1996; Henry,2000a; Henry,2000b; Henry,2006).

The second strand concerns literature pertaining to asset allocation, rents and growth opportunities. Here, we find works substantiating that reforms often profit 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) attest how privatization of state owned banks benefits groups of insiders. We also find evidence of preferential allocation of licenses to a few insiders(Clarke et al.,2003), profits 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 lastly, evidence suggesting that 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 always translate into higher economic growth at the aggregate level.

Literature on allocation of risks created by financial reforms constitute the third strand. Bank crises typically increase inequality(Galbraith & Lu, 1999) because turmoil can be socialized(Dooley,2000). Financial crises also profit the lower-income strata through looting by the poor who have nothing to lose(Akerlof & Romer, 1993). In the redistributive impact of crisis through politics, Glaeser et al.(2003) argue that in many countries, the political answer to institutional subversion by the rich is not institutional reform, but rather a form of massive Robin Hood redistribution. In some circumstances, 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; most notably during elections(Dinc,2004; Brown & Dinc,2004).

2.5 Finance and Inequality in Africa

Studies on the finance-inequality nexus are relatively absent in the context of Africa due to scares and lack of relevant data on inequality. In a first detailed econometric analysis, Kai and Hamori(2009) examine the link between financial deepening and inequality in sub-Saharan Africa between 1980 and 2002 and find that financial depth helps mitigate inequality.

Batuo et al.(2010) investigate the manner in which financial development is related to income distribution in a panel of 22 African countries for the period between 1990 and 2004. Using a dynamic panel estimation technique(GMM), results indicate that income inequality decreases as economies develop their financial sectors. They are consistent with the bulk of theoretical(Galor & Zeira, 1993; Banerjee & Newman, 1993) and empirical(Beck et al.,2004;

Beck et al.,2007; Kai & Hamori, 2009) research in finding no evidence confirming the Greenwood-Javanovic(1990) hypothesis of an inverted U-Shaped relationship between financial development and inequality.

The main contribution of this paper to the finance-inequality literature is the introduction of previously missing investment and financial components, such that financial development(reform) is used fundamentally as an instrument. This will enable the analysis to capture the effects of financial dynamics of depth, efficiency, activity and size on income-inequality through domestic, foreign, public and private investment channels. This innovation with an instrumental variable approach to the analysis has the advantage of assessing how the first and second generation investment-targeted financial reforms in the African continent have influenced income-distribution.

3. Data and Methodology

3.1 Data

We examine a sample of thirteen African countries(Algeria, Botswana, Cameroon, Egypt, Kenya, Malawi, Mauritius, Morocco, Senegal, South Africa, Swaziland, Tanzania and Uganda) with data obtained from African Development Indicators(ADI) and the Financial Development and Structure Database(FDSD) of the World Bank(WB). Due to scarcity of inequality data in ADI of the WB, we borrow from Kai and Hamori (2009) and use estimated household income inequality data obtained from the University of Texas Inequality Project(UTIP). The sample of countries are those for which data is available from the UTIP and which have not experienced a civil war during the period 1980-2002. The time interval also coincides with the two decades of structural adjustment and policy reforms in the African

continent. The variables as summarized in Appendix 3 could be classified into the following categories.

3.1.1 Financial development instrumental indicators

a) Financial depth

Whereas 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 financial development(Kai & Hamori, 2009;Batuo et al.,2010), we borrow from Beck et al.(1999) and Asongu(2011a), and proxy financial depth both from overall-economic and financial system perspectives by indicators of broad money supply ($M2/GDP$) and financial system deposits ($Fdgdgdp$) respectively. The former represents the monetary base plus demand, saving and time deposits, while the later denotes liquid liabilities. The two indicators are in ratios of GDP(see Appendix 3) and should robustly check each other as either accounts for over 97% of information in the other (see Appendix 2).

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 (through Data Envelopment Analysis: DEA). What this paper seeks to address is the ability of banks to effectively fulfill their fundamental role of transforming mobilized deposits into credit for economic operators. We use indicators of banking-system-efficiency and financial-system-efficiency (respectively ‘bank credit on bank deposits: $Bcbd$ ’ and ‘financial system credit on financial system deposits: $Fcfd$ ’). Like for 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 2).

c) Financial size

In accordance 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 measure 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 first and second generation African reforms of the 1980s and 1990s respectively which were aimed at stimulating investment. Whereas 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 later measure checks the former as it represents more than 91% of information in the former (see Appendix 2).

3.1.2 Investment variables

The study uses Gross Domestic Investment, Foreign Direct Investment, Gross Public Investment and Gross Private Investment as instrumental variables. The choice of these variables is based on the finance-inequality literature, where-in financial reforms were investment-targeted.

3.1.3 Control Variables

In accordance with the finance-growth(Levine & King, 1993; Hassan et al., 2011) and finance-inequality(Dollar & Kraay ;Beck et al.,2007; Kai and Hamori, 2009) literature, we control for trade, population growth, government expenditure and GDP growth.

3.1.4 Descriptive statistics and correlation analysis

Descriptive statistics and correlation analysis are covered in Appendix 1 and Appendix 2 respectively. From the descriptive statistics, it could be observed 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 principal objectives. On the one hand it enables the paper avoid issues linked to multicollinearity and overparametization. On the other hand, it provides the work with a foresight on possible relationship-signs between various indicators. Among them, it is worth noting that all correlations with the variable of interest(income-inequality) have the right signs. While *population growth* is positively correlated with *inequality*, the remaining variables are negatively correlated with it. These negative correlations are in accordance with theory in the perspective that financial sector reforms (depth, efficiency, activity and size) are designed to reduce income-inequality through aggregate investments(domestic, foreign, private and public). As for population growth, its positive association with the variable of interest results from its diminishing impact on household per capita income.

3.2 Methodology

3.2.1 Endogeneity

Although the lack of financial access has long been recognized as the leading cause of persisting inequality, Claessens & Perotti(2007) have urged the need to recognize the reverse effect as well. They borrow from Acemoglu & Robison (2005) and highlight that inequality affects financial development and in particular the distribution of access because unequal access to resources affects de facto political power. In accordance 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 capture of the financial system.

3.2.2 Estimation technique

Siding with Beck et al.(2003) we employ the Two-Stage-Least Squares(TSLS) with financial dynamics as instrumental variables. As we have emphasized 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 are correlated with the error term in the equation of interest. Another appeal worth pointing-out is the close relation between investment and finance in effects of financial reforms; which provides another justification for the use of financial dynamics as instrumental variables. Thus the IV model assesses if financial dynamics of depth, efficiency, activity and size affect income-inequality through domestic, foreign, private and public investment channels. Borrowing from Asongu(2011bd) the TSLS process of the paper shall adopt the following steps:

-justify the use of a TSLS over an OLS estimation technique via the Hausman-test for endogeneity;

-show that instrumental variables (financial intermediary dynamics) are exogenous to the endogenous components of explaining variables (investment channels), conditional on other covariates(control variables);

-verify if the financial instruments are valid and not correlated with the error-term in the equation of interest through an Over-identifying restrictions (OIR) test.

Thus the above methodology will include the following models:

First-stage regression:

$$InvestmentChannel_{it} = \gamma_0 + \gamma_1(FinDepth)_{it} + \gamma_2(FinEfficiency)_{it} + \gamma_3(Finactivity)_{it} + \gamma_4(Finsize)_{it} + \alpha_i X_{it} + v \quad (1)$$

Second-stage regression:

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

In the two equations, X is a set of independent variables that are included in first-stage regressions. For the first and second equations, v and u , respectively represent the error terms. Instrumental variables are the four financial intermediary dynamics.

3.2.3 Robustness of results

To assess the robustness of our results we: (1) use Heteroscedasticity and Autocorrelation Consistent(HAC) standard error regressions to check every model; (2) control for the consistency of financial channels with alternative instrumental indicators; (3) check restricted with unrestricted regressions at the Second-stage of the TSLS approach.

4. Empirical Analysis

This section presents results from cross-country regressions to assess the importance of financial dynamics in explaining cross-country variances in income-inequality, the ability of financial dynamics to explain cross-country differences in aggregate investments and the ability of the exogenous components of investment to account for cross-country differences in income distribution.

4.1 Inequality and Finance

In Table 1, we regress the estimated household income inequality indicator on financial intermediary dynamics of depth, efficiency, activity and size and also test for their joint significance. We avoid simultaneous involvement of financial aspects of depth and activity in the same regression due to issues of multicollinearity and overparametization. Our use of alternative indicators in each financial channel(but for financial size) provides a robust account of the validity in ‘significance and sign’ of estimated coefficients. The results in Table 1 show that distinguishing countries by financial dynamics helps explain cross-country differences in income-inequality. These findings have been documented by an extensive literature (Beck et al.,2004; Beck et al.,2007; Kai & Hamori, 2009;Batuo et al.,2010) and recently confirmed from an inequality adjusted human development perspective by Asongu(2011c). Even after controlling for population and GDP growths, financial intermediary dynamics enter jointly significantly in all regressions(see third to the last line of Table 1 on Fisher-test significance). At least judging from empirical literature, we expected negative signs for the channels of 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 financial efficiency and size, we cannot firmly establish with certainty the

right signs as this work is the first to use them in finance-inequality literature. However, by virtue of correlation analysis we expected their estimated coefficients to have negative signs.

Table 1: Inequality and Finance regressions

		Dependent Variable: Estimated Household Income Inequality								
		Mod. 1	Mod.1*	Mod.2	Mod.2*	Mod.3	Mod.3*	Mod.4	Mod.4*	
Instruments	Constant	48.88*** (38.15)	47.16*** (37.94)	43.47*** (32.92)	43.93*** (31.78)	45.86*** (23.18)	44.53*** (22.66)	40.37*** (21.66)	40.50*** (20.80)	
	Financial Depth	Monetary	-13.2***	---	---	---	-12.4***	---	---	---
		Base	(-7.828)	---	---	---	(-7.130)	---	---	---
		Liquid liabilities	---	-13.9*** (-6.815)	---	---	---	-12.7*** (-5.938)	---	---
	Financial Efficiency	Banking S. Efficiency	-2.68*** (-3.039)	---	2.148** (2.359)	---	-3.40*** (-3.717)	---	1.100 (1.149)	---
		Financial S. Efficiency	---	-1.282* (-1.829)	---	2.806*** (3.009)	---	-1.692** (-2.335)	---	1.862* (1.900)
		Banking S. Activity	---	---	-19.5*** (-7.286)	---	---	---	-18.4*** (-6.76)	-9.087*** (-4.169)
	Financial Activity	Financial S. Activity	---	---	---	-10.4*** (-4.888)	---	---	---	---
		Dbacba	4.885** (2.579)	4.92** (2.419)	6.175*** (3.028)	2.216 (1.088)	6.661*** (3.389)	6.210*** (2.971)	8.189*** (3.917)	4.094* (1.947)
	Control Variables	Popg	---	---	---	---	0.968** (2.443)	0.822** (2.024)	1.079*** (2.708)	1.125*** (2.710)
GDPg		---	---	---	---	-0.154* (-1.939)	-0.129 (-1.588)	-0.173** (-2.132)	-0.118 (-1.396)	
Fisher test		20.83***	15.87***	18.06***	8.32***	14.49***	10.75***	13.41***	6.90***	
Adjusted R²		0.219	0.171	0.196	0.092	0.243	0.186	0.229	0.121	
Number of Observations		213	216	211	216	211	214	209	214	

Dba_{cb}a: Deposit bank assets on Central bank assets plus Deposit bank assets. Pop_g: Population growth rate. GDP_g: GDP growth rate. *, **, ***: Significance levels of 10%, 5%, and 1% respectively. Mod: Model. S: system.

4.2 Investment and Finance

Table 2 assesses whether financial dynamics explain cross-country differences in the indicators which characterize the investment channel. We regress proxies of domestic, foreign, private and public investments on the financial instrumental dynamic variables. While Panel A concerns domestic and foreign investments, Panel B focuses on private and public investments. We report the Fisher-test of whether the instruments taken together explain significantly cross-country variations in the investment channels. Clearly, financial dynamics help explain cross-country variations in the investment channels, as the F-test for the joint significance of these instruments is significant at the 1% level in all regressions.

Table 2: First-Stage Investment-Finance regressions

Panel A: Domestic and Foreign Investments									
		Domestic Investment				Foreign Investment			
		Mod.5	Mod.5*	Mod.6	Mod.6*	Mod.7	Mod.7*	Mod.8	Mod.8*
Instruments	Constant	8.790*** (3.883)	10.13*** (4.576)	11.08*** (5.575)	10.65*** (5.446)	0.701 (1.458)	0.333 (0.733)	0.471 (0.991)	-0.032 (-0.050)
	Monetary	13.29***	---	---	---	-1.37**	---	---	---
	Base	(7.216)	---	---	---	(-2.31)	---	---	---
	Liquid	---	13.04***	---	---	---	-1.76**	---	---
	liabilities	---	(5.859)	---	---	---	(-2.51)	---	---
	Banking S.	-1.481	---	-4.70***	---	-1.21***	---	-0.89**	---
	Efficiency	(-1.499)	---	(-4.534)	---	(-3.388)	---	(-2.55)	---
	Financial S.	---	-3.09***	---	-6.12***	---	-0.89***	---	-0.969***
	Efficiency	---	(-3.924)	---	(-6.165)	---	(-3.029)	---	(-2.88)
	Banking S.	---	---	12.05***	---	---	---	-2.31**	---
Control Variables	Financial	---	---	(4.338)	---	---	---	(-2.44)	---
	Activity	---	---	---	7.518***	---	---	---	-1.23*
	Financial S.	---	---	---	(3.410)	---	---	---	(-1.661)
	Activity	---	---	---	---	---	---	---	---
	Dbacba	7.520***	9.333***	5.59**	8.800***	1.262 (1.463)	1.653*	1.63*	2.77***
	Size	(3.493)	(4.268)	(2.538)	(4.262)	---	(1.790)	(1.75)	(3.948)
	Trade	---	---	---	---	0.010***	0.009**	0.012***	---
		---	---	---	---	(2.615)	(2.267)	(2.983)	---
	G.E	---	---	0.393***	0.439***	---	---	---	0.028 (0.821)
		---	---	(3.782)	(4.289)	---	---	---	---
	Popg	0.832*	0.899*	---	---	---	---	---	---
		(1.816)	(1.963)	---	---	---	---	---	---
	GDPg	0.255***	0.192**	0.286***	0.220**	0.106***	0.102***	---	---
		(2.797)	(2.120)	(3.020)	(2.412)	(3.532)	(3.438)	---	---
	Fisher test	20.35***	19.03***	16.20***	18.62***	12.88***	12.368***	12.28***	7.674***
	Adjusted R ²	0.277	0.261	0.233	0.256	0.200	0.191	0.159	0.099
	Number of Observations	253	256	251	256	238	241	238	243

Panel B: Private and Public Investments								
		Private Investment				Public Investment		
		Mod. 9	Mod. 9*	Mod.10	Mod.10*	Mod. 11	Mod.11*	Mod.12*
Instruments	Constant	4.684*** (3.626)	5.831*** (4.683)	6.362*** (4.911)	6.676*** (5.101)	6.165*** (4.284)	6.253*** (4.414)	7.923*** (5.193)
	Monetary	4.082***	---	---	---	7.819***	---	---
	Base	(2.611)	---	---	---	(6.495)	---	---
	Liquid	---	3.194*	---	---	---	7.646***	---
	liabilities	---	(1.728)	---	---	---	(5.374)	---
	Banking S.	1.563*	---	0.091	---	-0.898	---	-2.764***
	Efficiency	(1.865)	---	(0.107)	---	(-1.493)	---	(-4.159)
	Financial S.	---	0.510	---	-0.499	---	-1.58***	-3.085***
	Efficiency	---	(0.724)	---	(-0.588)	---	(-3.287)	(-4.482)
	Banking S.	---	---	7.01***	---	---	---	6.852***
Control Variables	Financial	---	---	(2.993)	---	---	---	(3.848)
	Activity	---	---	---	2.840	---	---	3.928***
	Financial S.	---	---	---	(1.471)	---	---	(2.612)
	Activity	---	---	---	---	---	---	---
	Dbacba	5.57***	6.383***	4.625**	6.753***	-3.92***	-2.626*	-3.822**
	Size	(2.584)	(2.754)	(2.057)	(2.951)	(-2.798)	(-1.842)	(-2.578)
		---	---	---	---	---	---	---
	Trade	0.025**	0.020**	0.026***	0.020*	---	---	---
		(2.498)	(1.973)	(2.640)	(1.947)	---	---	---
	G.E	---	---	---	---	---	0.059 (0.884)	0.078 (1.140)
	Popg	---	---	---	---	0.407 (1.430)	0.473*	0.120 (0.399)
		---	---	---	---	(1.660)	---	---
	GDPg	---	---	---	---	---	-0.046 (-0.764)	---
	Fisher test	13.49***	11.38***	14.25***	11.14***	13.44***	11.58***	5.035***
	Adjusted R ²	0.167	0.141	0.176	0.138	0.169	0.146	0.075
	Number of Observations	250	253	248	253	245	248	248

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. Mod:Model. S:system.

It is worth noting this is the first-step of the TSLS approach where-in, the instruments must be exogenous to the endogenous components of the investment channels, conditional on other covariates(control variables). The signs of estimated coefficients are broadly consistent with recent findings(Asongu,2011d). All significant control variables also have the right signs.

4.3 Restricted TSLS regressions

Table 3 addresses two main issues: (1) the concern of whether the exogenous components of investment channels explain income-inequality conditional on financial dynamics and; (2) whether financial dynamics explain income-inequality beyond investment channels. To make these investigations we use the TSLS regressions with financial instrumental variables . Thus we integrate equation (2) into the first-stage regressions (first equation). Whereas the first issue is addressed by the significance of estimated coefficients, the second is investigated by the overidentifying restrictions (OIR) test whose null hypothesis posits that, the instruments (financial channels) are not correlated with the error term of the equation of interest (equation 2).Therefore, a rejection of the null hypothesis of the OIR test is a rejection of the position that financial dynamics explain income-inequality only through investment channels. Robustness checks are done at three stages: (1) the use of alternative indicators of each financial instrumental dynamic as expressed by the last two columns of tables 3 and 4; (2) the application of alternative models with Heteroscedasticity and Autocorrelation Consistent Standard Errors(HAC) captured by models with the “*” indication; (3) introduction of an(a) autonomous(constant) investment measure in the regressions when the OIR test rejects its null hypothesis.

Table 3 reveals restricted TSLS inequality regressions. We first justify our choice of a TSLS estimation method with a Hausman test for model specification. The null hypothesis of this test is the view that estimated coefficients by OLS are consistent; implying do not suffer

from endogeneity because the exogenous variables in the equation of interest are not correlated with the error term. Should the Hausman test fail 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. With OLS, we find strong evidence of endogeneity in all eight regressions. Conditional on the nature of identification (difference between instruments and endogenous regressors) we report the weak instrument test of first-stage regressions with Cragg-Donald statistics. Owing to issues of multicollinearity and overparametrization we do not simultaneously use domestic and private investments in the same regression.

The first issue is addressed by the significance of investment channel estimated coefficients. With regards to the second concern, rejection of the null hypothesis of the OIR test in all eight regressions shows that, financial channels do not explain income-inequality only through investment channels. Therefore the instruments are correlated with the error term in the equation of interest; indicating the financial dynamics do not address the concern of endogeneity (which affect investment channels). The presence of biased estimates due to endogeneity can be further confirmed by the signs of estimated coefficients. At least judging from theoretical postulations (Galor & Zeira, 1993; Banerjee & Newman, 1993), empirical literature (Beck et al., 2004; Beck et al., 2007; Kai & Hamori, 2009; Batuo et al., 2010) and to some extent common-sense, we expect financial dynamics (instruments) to diminish income-inequality through aggregate investment channels. Indeed this was the vision of first and second generation financial reforms in sampled countries. The findings in Table 3 are also antagonistic with our initial expectations from correlation analysis; where-in all investment channels are negatively correlated with income distribution. Given the invalidity of these instruments under a restricted TSLS hypothesis, we relax the restriction assumption and suppose the presence of an(a)

autonomous(constant) level of investment. Therefore we replicate the regressions in Table 3 with an unrestricted TSLS approach presented in Table 4.

Table 3: Finance, Inequality and Restricted Investment with HAC

		Dependent Variable: Estimated Household Income Inequality							
		Model 13	Model 13*	Model 14	Model 14*	Model 15	Model 15*	Model 16	Model 16*
Investment Channels	Domestic	---	---	1.775*** (12.26)	1.775*** (4.480)	1.988*** (6.585)	1.988*** (3.321)	---	---
	Foreign	---	---	6.488** (2.342)	6.488*** (0.873)	6.826** (2.493)	6.826 (0.949)	9.463*** (3.273)	9.463 (1.233)
	Private	2.644*** (11.15)	2.644*** (13.24)	---	---	---	---	2.188*** (6.201)	2.188*** (4.669)
	Public	1.301*** (2.649)	1.301*** (2.717)	---	---	-0.625 (-0.776)	-0.625 (-0.441)	1.023 (1.559)	1.023 (0.852)
	Hausman test	370.782***	370.782***	322.413***	322.41***	390.22***	390.22***	522.58***	522.58***
OIR(Sargan) test		49.050***	49.050***	44.388***	44.388***	33.484***	33.484***	18.336***	18.336***
P-value		[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Weak Instrument test(F)		---	---	---	---	---	---	---	---
Cragg-Donald		12.017	---	3.106	---	3.017	---	4.017	---
Adjusted R ²		0.156	0.156	0.058	0.058	0.028	0.028	0.020	0.020
F-Statistics		---	---	---	---	367.62***	69.718***	273.38***	56.220***
Observations		202	202	199	199	191	191	191	191
Instruments		Constant, Money Supply, Banking System activity, Banking system Efficiency, Financial size							
Robustness Instruments		Constant, Liquid Liability, Financial System Activity, Financial System Efficiency, Financial size							

(): 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. Models with the “*” are in Heteroscedasticity and Autocorrelation Consistent(HAC) standard errors(HAC).

4.4 Unrestricted TSLS regressions

Borrowing from the analytical approach expressed for Table 3, Table 4 addresses the two main issues. Firstly, the rejection of the null hypothesis of the Hausman test in all eight regressions validates the TSLS estimation method. While the significance of estimated coefficients address the first concern, the second issue is fully addressed by the OIR test in six of the eight regressions. Failure to reject its null hypothesis in models 18 to 20 shows that financial channels do not explain the redistributive effect of income beyond aggregate investment mechanisms in the presence of autonomous investment(constant). This confirms the instruments are valid and the issue of endogeneity is no longer relevant as the instrumental financial dynamics are not correlated with the error term in the unrestricted equation of interest. Results indicate, while domestic, public and private investments have a redistributive impact of reducing

income-inequality, foreign investment does the contrary. This finding on foreign direct investment is consistent with the investment-inequality literature(Pan-Long,1995; Basu & Guariglia,2007). In a recent study where foreign direct investment is the proxy for globalization(Kai & Hamori,2009), its disequalizing effect depends on the level of development in the country; in line with theoretical postulations(Greenwood and Jovanovic ,1990).

Table 4: Finance, Inequality and Unrestricted Investment with HAC

		Dependent Variable: Estimated Household Income Inequality							
		Model 17	Model 17*	Model 18	Model 18*	Model 19	Model 19*	Model20	Model 20*
Investment Channels	Constant	58.682*** (21.68)	58.682*** (12.97)	54.429*** (13.82)	54.429*** (8.928)	52.449*** (12.70)	52.449*** (8.260)	54.697*** (13.23)	54.697*** (9.718)
	Domestic	---	---	-0.640*** (-3.404)	-0.640** (-2.293)	-0.438* (-1.864)	-0.438 (-1.278)	---	---
	Foreign	---	---	4.146*** (3.084)	4.146* (1.849)	3.926*** (3.111)	3.926* (1.822)	2.931*** (2.788)	2.931** (2.076)
	Private	-0.591*** (-3.537)	-0.591** (-2.263)	---	---	---	---	-0.553** (-2.343)	-0.553* (-1.830)
	Public	-0.902*** (-4.840)	-0.902** (-2.295)	---	---	-0.307 (-0.840)	-0.307 (-0.640)	-0.803*** (-3.190)	-0.803*** (-2.861)
	Hausman test	14.928***	14.928***	48.567***	48.567***	49.072***	49.072***	39.059***	39.059***
OIR(Sargan) test		16.775	16.775	2.376	2.376	1.952	1.952	2.479	2.479
P-value		[0.000]	[0.000]	[0.304]	[0.304]	[0.162]	[0.162]	[0.115]	[0.115]
Weak Instrument test(F)		---	---	---	---	---	---	---	---
Cragg-Donald		11.45	---	3.869	---	3.749	---	3.666	---
Adjusted R ²		0.160	0.160	0.026	0.026	0.020	0.020	0.059	0.059
F-Statistics		15.972***	4.651**	8.687***	3.464***	6.059***	2.283*	9.038***	4.592***
Observations		202	202	199	199	191	191	191	191
Instruments		Constant, Money Supply, Banking System activity, Banking system Efficiency, Financial size							
Robustness Instruments		Constant, Liquid Liability, Financial System Activity, Financial System Efficiency, Financial size							

(): 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. Models with the “*” are in Heteroscedasticity and Autocorrelation Consistent standard errors(HAC).

5. Conclusion

Due to lack of data on income-inequality in Africa, very few studies on the inequality-finance(investment) nexus have focused on the continent(Kai & Hamori, 2009;Batuo et al.,2010). While these papers have limited their analysis to a few financial development and investment indicators, the need for a more detailed analysis motivated this paper. Thus the present work has contributed to existing literature by integrating previously missing investment and financial components in analyzing the inequality-finance nexus for the African continent. In

order to assess the income-redistributive effects of first and second generation investment-targeted financial reforms of the 1980s and 1990s respectively, we investigate how financial dynamics of depth, efficiency, activity and size have affected income-inequality through domestic, foreign, private and public investment channels. But for the case of foreign investment, financial development has an equalizing effect on income distribution through investment channels. This is broadly consistent 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. The disequalizing effect of foreign investment also respects theoretical postulations(Greenwood and Jovanovic ,1990) and depends on the level of development in the country(Kai & Hamori, 2009) with respect to the hypothesis of an inverted U-shaped relationship.

As a policy implication financial reforms that target poverty reduction at the early development stage in a country should focus on private, public and domestic investments. However when a country is mature in development terms, then financial reforms favoring globalization through foreign direct investment will be pro-poor.

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
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(Fdgdg)	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: Correlation Matrix

Investment Variables				Control Variables				Instrumental Variables							Income Inequality	
								Fin. Depth		Fin. Efficiency		Fin. Activity		F. Size		
GDI	FDI	Priv.I	Pub. I	Trade	G.E	Popg	GDPg	M2	Fdgdg	BcBd	FcFd	Pcrb	Pcrbof	Dbacba	EHII	
1.000	0.090	0.587	0.430	0.338	0.391	-0.154	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	0.318	-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	0.120	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	0.055	0.251	0.185	-0.202	-0.270	0.011	-0.125	-0.104	-0.161	Pub. I
				1.000	0.392	-0.215	0.308	0.026	0.074	-0.072	-0.129	0.001	-0.084	0.502	-0.041	Trade
					1.000	0.084	0.077	0.017	0.004	0.084	0.132	0.087	0.145	0.271	-0.021	G.E
						1.000	0.041	-0.420	-0.458	0.096	0.068	-0.286	-0.231	-0.357	0.211	Popg
							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	Fdgdg
										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. Fdgdg: 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.

Appendix 3: 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)
Economic financial depth(Money Supply)	M2	Monetary Base plus demand, saving and time deposits	World Bank(FDSD)
Financial system depth(Liquid liabilities)	Fdgdg	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. Fdgdg: 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.

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