Economics Bulletin

Volume 33, Issue 1

How do financial reforms affect inequality through financial sector competition? Evidence from Africa

Simplice A Asongu
African Governance and Development Institute

Abstract

In the first empirical study on how financial reforms have been instrumental in mitigating inequality through financial sector competition, we contribute at the same time to the macroeconomic literature on measuring financial development and respond to the growing field of economic development by means of informal sector promotion. Hitherto, unexplored financial sector concepts of formalization, semi-formalization and informalization are introduced. Four main findings are established: (1) while formal financial development decreases inequality, financial sector formalization increases it; (2) whereas semi-formal financial development increases inequality, the effect of financial semi-formalization is unclear; (3) both informal financial development and financial informalization have an income equalizing effect and; (4) non-formal financial development is pro-poor. Policy implications are discussed.

Citation: Simplice A Asongu, (2013) "How do financial reforms affect inequality through financial sector competition? Evidence from Africa", *Economics Bulletin*, Vol. 33 No. 1 pp. 401-414.
Contact: Simplice A Asongu - asongusimplice@yahoo.com.
Submitted: January 01, 2013.   **Published:** February 15, 2013.

1. Introduction

After over two decades of financial reforms, poverty and inequality undoubtedly remain important challenges to economic and human developments in Africa. Despite this important policy concern, hitherto owing to the scarcity and lack of relevant data on income-inequality, very little scholarly focus has been devoted to the continent (Kai & Hamori, 2009; Batuo et al., 2010; Asongu, 2012a). 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 ultimate goal of given impetus to economic growth as well as improving financial and economic efficiency (Janine & Elbadawi, 1991). Surprisingly, as far as we have reviewed, there is currently no study that has investigated how financial reforms intended to address African dire needs have affected inequality through financial sector competition.

In light of the above, drawing from the experience of a continent that has been implementing development financial reforms, this study aims to investigate the income-redistributive effects of financial reforms through financial sector competition. The contribution of the study to the literature is sixfold. Firstly, we restrict our sample to African countries because of their stubbornly high inequality levels despite over two decades of reforms (Asongu, 2012a). Secondly, we steer clear of past literature that has failed to address the instrumentality of financial reforms and financial sector competition in investigating the finance-inequality nexus (Kai & Hamori, 2009; Batuo et al., 2010; Asongu, 2012a). Thirdly, while past studies have assessed the inequality-finance nexus from a formal financial sector standpoint, we argue that failure to introduce the informal financial sector that captures most pro-poor financial activities is a substantial missing link in the literature (Kai & Hamori, 2009; Batuo et al., 2010; Asongu, 2012a). Hence, we introduce measures of absolute and relative informal finance. Fourthly, two of the three studies in the literature identified above (Kai & Hamori, 2009; Asongu, 2012a) are based on data of the same time span (1980-2002). Therefore, it could be argued that the studies have captured first generation financial reforms for the most part. Hence, the need for updated findings on second generational reforms for focused policy implications. Our data spans from 1996-2010. Fifthly, a motivation for this study also draws from the burgeoning phenomenon of knowledge economy (Asongu, 2012b) and soaring mobile banking activities (Asongu, 2012c) that are captured by the informal financial sector for the most part. Sixthly, the present study unites two streams of research by contributing at the same time to the macroeconomic literature on measuring financial development and responding to the growing field of economic development by means of informal sector promotion, microfinance, mobile banking, knowledge economy (KE)…etc, in suggesting a practicable way to disentangle the effects of various financial sectors on inequality. Ultimately, this study steers clear of existing African finance-inequality literature both from theoretical and methodological standpoints[1].

The remainder of this paper is organized in the following manner. Data and methodology are discussed and outlined respectively in Section 2. Empirical analysis and discussion of results are reported in Section 3. Section 4 concludes.

---

[1] In summary, the current paper steers clear of existing literature (Kai and Hamori, 2009; Batuo et al., 2010; Asongu, 2012a) on the African inequality-finance nexus from three standpoints: (1) difference in variables with the introduction of previously missing financial (informal and semi-formal) components into the debate; (2) methodological innovations, with the finance-inequality nexus contingent on the instrumentality of financial sector reforms and; (3) the introduction of absolute and relative measures of financial sector competition that take account of the formal, semi-formal and informal financial sectors.

2. Data and Methodology

2.1 Data

We examine a panel of 28 African countries with data from the World Development Indicators (WDI) and the Financial Development and Structure Database (FDSD) of the World Bank (WB) for the period 1996-2010. Limitations to the number of countries and periodicity of analysis has a threefold justification: (1) constraints in data availability on inequality; (2) the imperative to capture burgeoning phenomena (of mobile banking, mobile phone penetration, KE...etc) that have improved the informal financial sector over the past decade and; (3) the motivation to steer clear of past studies by capturing the effects of second generational financial reforms for more updated and focused policy implications.

The dependent variable is the GINI index that measures income-inequality. The independent variables are absolute and relatively measures of financial sector competition recently documented in the financial development literature (Asongu, 2012b). These variables, as defined in Appendix 3, are the result of a rethinking of the IFS (2008) financial system definition that does not incorporate the informal financial sector into its definition of the financial system[2]. More so, since a great chunk of the monetary base in developing countries does not transit through formal financial institutions, the equation of financial depth in the perspective money supply to liquid liabilities has substantially hallowed financial development literature (Asongu, 2012b). Hence, by relaxing the IFS (2008) definition and introducing a previously missing informal financial sector (as well as disentangling the pre-existing measurement into its constituent components), absolute and relative financial development indicators have been theoretically proposed and empirically validated in recent financial development literatures (Asongu, 2012bc).

The instrumental variables include measures of financial allocation efficiency (from banking system and financial system standpoints), financial activity (from banking system and financial system perspectives) and financial depth (from overall economic and financial system views). Three justifications could be provided for the choice of the three instrumental variables: (1) financial reforms sought to improve the transformation of mobilize financial resources into credit for economic operators (financial allocation efficiency); (2) the reforms also sought to improve financial activity through the granting of credit (financial activity), especially owing to the substantially documented issues of surplus liquidity in African financial institutions (Saxegaard, 2006) and; (3) the reforms were also intended to promote the creation of bank accounts so that a considerable chunk of the monetary base could transit via formal financial institutions (financial depth) so as to enhance monetary policy efficiency.

In the finance-inequality regressions, we control for economic prosperity (GDP growth), population growth, foreign aid, human development and trade. The effect of GDP growth on inequality is conditional on the even-distribution of fruits of economic prosperity; hence the expected sign can be positive or negative. The impact of foreign aid on inequality is contingent on the quality of institutions. However, most foreign aid is channeled by locally based NGOs which directly affect the targeted population. Therefore we expect a negative sign. Population growth should increase inequality because the burden of demographic change in African countries is borne by the faction of the population in the low-income strata. This expected sign is consistent with recent African inequality literature (AfDB, 2012, p.3). The effect of trade on inequality is ambiguous and depends on many factors. However from intuition, trade can either increase or decrease inequality depending on the proportion of the poor relying on agricultural exports. Cheap imports could increase savings and hence, indirectly improve the income-distribution of the poor. In the same line of thinking, too much imports of 'substitution goods'

[2] Lines 24, 25 and 45 of the IFS, October, 2008.

produced by domestic industries could fuel income-inequality if majority of the population in the lower-income brackets depend substantially on the affected industries for subsistence income. The impact of human development on inequality depends on the proportion of the poor in the following three dimensions (with respect to national average): GDP per capita, life expectancy and, literacy rate.

The summary statistics (with presentation of countries), correlation analysis (showing the relationships between key variables used in the paper), and variable definitions are detailed in the appendices. The 'summary statistics' (Panel A of Appendix 1) of the variables used in the panel regressions shows that, there is quite some variation in the data utilized so that one should be confident that reasonable estimated nexuses should emerge. Panel B of Appendix 1 presents the 28 countries of the panel. The purpose of the correlation matrix (Appendix 2) is to avoid issues resulting from overparametization and multicolinearity. From a preliminary assessment of the correlation coefficients, there do not appear to be any serious issues in terms of the relationships to be estimated. Appendix 3 provides definitions and corresponding sources of the variables.

2.2 Methodology

2.2.1 Endogeneity

We are concerned with endogeneity for three main reasons: (1) we might have omitted some variables of financial sector reforms not incorporated in the FDSD; (2) while financial development affects inequality, it cannot be ruled-out that the state of inequality shapes financial policies (especially in the informal sector), hence an issue of reverse causality and; (3) the problem statement by definition presupposes the existence of endogeneity by its contingency on the use of 'financial reform' instrumental variables. To tackle the endogeneity concern, we shall first assess its presence with the Hausman test before employing an estimation technique that is relevant to the outcome of the test.

2.2.2 Estimation technique

We adopt a Two-Stage Least Squares (2SLS) Instrumental Variable (IV) estimation technique for two reasons: on the one hand, it tackles the puzzle of endogeneity and; on the other hand, it is compatible with the problem statement of the study which aims to assess the instrumentality of financial reforms in the effect of financial sector competition on inequality. Accordingly, IV estimation addresses the concern of endogeneity and hence avoids the inconsistency of estimated coefficients by Ordinary Least Squares (OLS) when the exogenous variables are correlated with the error term in the main equation. The 2SLS estimation procedure will entail the following steps:

First-stage regression:

$$Fin_{it} = \gamma_0 + \gamma_{1i}(Instruments)_{it} + \upsilon_{it} \quad (1)$$

Second-stage regression:

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

In Equation 2, X is a set of control variables (GDP growth, population growth, foreign aid, human development and trade). In the first and second equations, υ_{it} and μ_{it} respectively represent the error terms. Instrumental variables are: money supply, liquid liabilities, banking system efficiency, financial system efficiency, banking system activity and financial system activity. *Inequality* represents the GINI index. We adopt the following steps in the IV analysis: (1) justify the choice of a 2SLS over an OLS estimation technique with the Hausman-test for endogeneity; (2) verify the instruments are exogenous to the endogenous components of the explaining variables (financial sector competition channels) and; (3) ensure the instruments are valid and not correlated with the error-term in the main equation with an Over-identifying Restrictions (OIR) test. Further robustness checks will be ensured with; (1) robust Heteroscedasticity and Autocorrelation Consistent (HAC) standard errors and; (2) the use of two-year, three-year and five-year non-overlapping intervals (NOI) to mitigate short-run disturbances that may loom substantially large.

3. Empirical analysis

3.1 Presentation of results

This section aims to tackle the two main issues discussed in the motivation of the paper, notably: (1) whether financial sector reforms are instrumental in the effect of financial sector competition on inequality and; (2) assessing how financial sector competition plays out in inequality reduction. Specifically, addressing the second issue will depend on the results of the following hypotheses.

Hypothesis 1: Improvement of the formal financial sector both in absolute (GDP-based) and relative (M2-based) terms mitigates inequality. *Proposition 1* and *Proposition 5* will tackle this hypothesis in absolute and relative views respectively.

Hypothesis 2: The semi-formal financial sector decreases inequality both in absolute (GDP-based) and relative (M2-based) terms. *Proposition 2* and *Proposition 6* will examine this hypothesis in absolute and relative terms respectively.

Hypothesis 3: The informal financial sector mitigates inequality both in absolute (GDP-based) and relative (M2-based) terms. *Proposition 3* and *Proposition 7* will assess this hypothesis from absolute and relative perspectives respectively.

Hypothesis 4: The non-formal (informal and semi-formal) financial sector decreases inequality both in absolute (GDP-based) and relative (M2-based) terms. *Proposition 4* and *Proposition 8* will address this hypothesis from absolute and relative standpoints respectively.

Whereas the first issue is addressed by the Sargan OIR test, tackling the second depends on both the results of the Sargan OIR test and the significance of estimated coefficients (propositions). The null hypothesis of the Sargan test is the position that, the financial sector reforms explain inequality only through financial sector competition mechanisms, conditional on the control variables. Hence, a rejection of this null hypothesis is a rejection of the view that the financial sector reform instruments do not explain inequality beyond financial sector competition channels. A Hausman test is performed before every 2SLS-IV approach. The null hypothesis of this test is the position that, estimated coefficients by OLS are efficient and consistent. Therefore, a rejection of this null hypothesis points to the concern of endogeneity due to inconsistent estimates and hence, lends credit to the choice of the IV estimation technique. Accordingly, for all the models (Tables 2-3), there is an overwhelming rejection of the null hypothesis of the Hausman test, hence, lending credit to the appropriateness of the choice of an IV estimation technique. Table 2 entails regressions with absolute (GDP based) financial sector competition measures while Table 3 shows those for relative (M2 based) financial sector competition measures. While Panel A of both tables contains regressions without HAC standard errors, Panel B, irrespective of tables reflects an output that has HAC standard errors.

As concerns the first issue, the failure to reject the null hypothesis of the Sargan test in all the models is an indication that, financial sector reforms are instrumental in the effect of financial sector competition on inequality. With regard to the second issue, the following could be established from the findings of Tables 2-3 summarized in Table 1. (1) For Hypothesis 1, while formal financial development mitigates inequality (Proposition 1), financial sector formalization increases it (Proposition 5). (2) For Hypothesis 2, while semi-formal financial development increases inequality (Proposition 2), the effect of financial semi-informalization is not clear (Proposition 6). (3) For Hypothesis 3, both informal financial development (Proposition 3) and financial sector informalization (Proposition 7) mitigate inequality. (4) According for Hypothesis 4, non-formal financial development decreases inequality (Proposition 4). However, the effect of financial sector nonformalization could not be assessed owing to issues of multicolinearity.

Table 1: Summary of results (effects on income-inequality)

	Hypothesis 1	Hypothesis 2	Hypothesis 3	Hypothesis 4
Prop.1: Formal financial sector development	-			
Prop.5: Financial sector formalization	+			
Prop.2: Semi-formal fin. sector development		+		
Prop.6: Financial sector semi-formalization		?		
Prop.3: Informal fin. sector development			-	
Prop.7: Financial sector informalization			-	
Prop.4: Non-formal fin. sector development				-
Prop.8: Financial sector non-formalisation				na

Prop: Proposition. Fin: Financial. ?: both positive and negative signs. na: not applicable owing to issues of muliticolinearity.

Most of the significant control variables have the expected signs. Economic prosperity and foreign aid mitigate inequality while population growth, human development and trade increase it. The effect of GDP growth is an indication that the fruits of economic prosperity are somehow evenly distributed; while that of foreign-aid indicates that development assistance reaches its target audience through NGO channels. The positive effect of demographic change is consistent with recent African inequality literature (AfDB, 2012) and broadly indicates that, the burden of population growth is supported by the population in lower-income brackets whose household income-growth is sluggishly not in tandem with household demographic shifts. The positive effect of trade is an indication that there are too much imports of 'substitution goods' produced by domestic industries; as majority of the population in the lower-income brackets depend substantially on the affected industries for subsistence income. The positive impact of human development on inequality means that improvements of its constituent elements (GDP per capita, life expectancy and literacy rate) is unequal across income-groups and skewed towards the wealthy.

Table 2: Two-Stage Least Squares estimates for GDP based measures

Panel A: Estimations without HAC standard errors

	Full data		2 Year NOI		3 Year NOI		5 Year NOI	
Constant	54.407***	54.407***	52.480***	52.480***	47.903***	47.903***	43.097*	43.097*
	(21.77)	(21.77)	(3.296)	(3.296)	(2.820)	(2.820)	(1.874)	(1.874)
Proposition 1	-14.065***	-14.065***	-3.037	-3.037	2.064	2.064	5.935	5.935
	(-3.941)	(-3.941)	(-0.210)	(-0.210)	(0.123)	(0.123)	(0.267)	(0.267)
Proposition 2	207.367*	275.29**	455.11***	570.91***	579.13***	694.98***	523.48*	633.13*
	(1.822)	(2.138)	(3.333)	(3.961)	(2.379)	(2.745)	(1.653)	(1.925)
Proposition 3	-67.923***	---	-115.79***	---	-115.84***	---	-109.6***	---
	(-3.453)		(-7.902)		(-5.910)		(-4.556)	
Proposition 4	---	-67.923***	---	-115.79***	---	-115.8***	---	-109.64***
		(-3.453)		(-7.902)		(-5.910)		(-4.556)
Economic Prosperity	---	---	-0.457	-0.457	-0.901	-0.901	-1.060	-1.060
			(-0.581)	(-0.581)	(-0.732)	(-0.732)	(-0.690)	(-0.690)
Population Growth	---	---	-0.447	-0.447	1.604	1.604	3.473	3.473
			(-0.071)	(-0.071)	(0.232)	(0.232)	(0.370)	(0.370)
Foreign Aid	-0.519***	-0.519***	---	---	---	---	---	---
	(-3.132)	(-3.132)						
Human Development	0.153*	0.153*	---	---	---	---	---	---
	(1.719)	(1.719)						
Hausman test	58.318***	58.318***	47.357***	47.357***	27.525***	27.525***	13.155***	13.155***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.004]	[0.004]
Sargan OIR test	0.697	0.697	0.239	0.239	0.227	0.227	2.461	2.461
	[0.403]	[0.403]	[0.624]	[0.624]	[0.633]	[0.633]	[0.116]	[0.116]
R^2	0.205	0.205	0.221	0.221	0.171	0.171	0.125	0.125
Fischer	18.139***	18.139***	15.008***	15.008***	8.187***	8.187***	4.846***	4.846***
Observations	258	258	173	173	107	107	69	69

Panel B: Estimations with HAC standard errors

	Full data		2 Year NOI		3 Year NOI		5 Year NOI	
Constant	54.407***	54.407***	52.480*	52.480*	47.903*	47.903*	43.097	43.097
	(12.43)	(12.43)	(1.699)	(1.699)	(1.770)	(1.770)	(1.457)	(1.457)
Proposition 1	-14.065**	-14.065**	-3.037	-3.037	2.064	2.064	5.935	5.935
	(-2.149)	(-2.149)	(-0.117)	(-0.117)	(0.087)	(0.087)	(0.228)	(0.228)
Proposition 2	207.367	275.29	455.11*	570.91**	579.13*	694.98**	523.48	633.13*
	(1.096)	(1.290)	(1.733)	(2.046)	(1.938)	(2.272)	(1.496)	(1.757)
Proposition 3	-67.923**	---	-115.79***	---	-115.84***	---	-109.64***	---
	(-2.043)		(-5.148)		(-6.107)		(-5.002)	
Proposition 4	---	-67.923**	---	---	---	-115.84***	---	-109.64***
		(-2.043)				(-6.107)		(-5.002)
Economic Prosperity	---	---	-0.457	-0.457	-0.901	-0.901	-1.060	-1.060
			(-0.332)	(-0.332)	(-0.629)	(-0.629)	(-0.741)	(-0.741)
Population Growth	---	---	-0.447	-0.447	1.604	1.604	3.473	3.473
			(-0.036)	(-0.036)	(0.148)	(0.148)	(0.297)	(0.297)
Foreign Aid	-0.519*	-0.519*	---	---	---	---	---	---
	(-1.650)	(-1.650)						
Human Development	0.153	0.153	---	---	---	---	---	---
	(1.058)	(1.058)						
Hausman test	58.318***	58.318***	47.357***	47.357***	27.525***	27.525***	13.155***	13.155***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.004]	[0.004]
Sargan OIR test	0.697	0.697	0.239	0.239	0.227	0.227	2.461	2.461
	[0.403]	[0.403]	[0.624]	[0.624]	[0.633]	[0.633]	[0.116]	[0.116]
Adjusted R^2	0.205	0.205	0.221	0.221	0.171	0.171	0.125	0.125
Fischer	5.333***	5.333***	39.004***	39.004***	21.318***	21.318***	10.174***	10.174***
Observations	258	258	173	173	107	107	69	69

*;**;***: significance levels of 10%, 5% and 1% respectively. Z-statistics in parentheses. [ ]: P-values. Proposition 1: Formal financial development. Proposition 2: Semi-formal financial development. Proposition 3: Informal financial development. Proposition 4: Non-formal (semi-formal and informal) financial development. OIR: Overidentifying Restrictions Test. NOI: Nonoverlapping intervals. HAC: Heteroscedasticity and Autocorrelation Consistent.

Table 3: Two-Stage Least Squares estimates for M2 based measures

Panel A: Estimations without HAC standard errors

	Full data		**2 Year NOI**		**3 Year NOI**		**5 Year NOI**	
Constant	**29.851*** (5.505)**	13.740 (1.357)	-12.453 (-0.865)	**36.935*** (5.002)**	-3.513 (-0.208)	**44.778*** (4.480)**	2.855 (0.174)	**43.363*** (4.189)**
Proposition 5	-16.110 (-1.420)	---	**49.388*** (4.424)**	---	**48.291*** (3.662)**	---	**40.508*** (3.270)**	---
Proposition 6	**-114.68*** (-2.917)**	**-98.574** (-2.237)**	**230.222* (1.785)**	180.833 (1.460)	242.67 (1.341)	194.37 (1.105)	175.91 (0.956)	135.40 (0.751)
Proposition 7	---	16.110 (1.420)	---	**-49.388*** (-4.424)**	---	**-48.291*** (-3.662)**	---	**-40.50*** (-3.270)**
Economic Prosperity	---	---	**-2.118* (-1.667)**	**-2.118* (-1.667)**	**-3.302* (-1.775)**	**-3.302* (-1.775)**	-2.703 (-1.429)	-2.703 (-1.429)
Population Growth	**5.957*** (4.889)**	**5.957*** (4.889)**	**10.912*** (3.384)**	**10.912*** (3.384)**	**9.430** (2.500)**	**9.430** (2.500)**	**8.484** (2.212)**	**8.484** (2.212)**
Human Development	**0.550*** (4.474)**	**0.550*** (4.474)**	---	---	---	---	---	---
Trade	**0.178* (1.779)**	**0.178* (1.779)**	---	---	---	---	---	---
Hausman test	**177.12*** [0.000]**	**177.12*** [0.000]**	**118.39*** [0.000]**	**118.39*** [0.000]**	**71.956*** [0.000]**	**71.956*** [0.000]**	**34.852*** [0.000]**	**34.852*** [0.000]**
Sargan OIR test	**2.182 [0.139]**	**2.182 [0.139]**	**4.177 [0.123]**	**4.177 [0.123]**	**2.484 [0.288]**	**2.484 [0.288]**	**4.413 [0.110]**	**4.413 [0.110]**
Adjusted R²	0.097	0.097	0.007	0.007	0.023	0.023	0.012	0.012
Fischer	**11.221***	**11.221***	**4.990***	**4.990***	**3.457**	**3.457***	**2.742**	**2.742**
Observations	249	249	173	173	107	107	69	69

Panel B: Estimations with HAC standard errors

	Full data		**2 Year NOI**		**3 Year NOI**		**5 Year NOI**	
Constant	**29.851** (2.290)**	13.740 (0.681)	-12.453 (-0.561)	**36.935*** (3.310)**	-3.513 (-0.167)	**44.778*** (3.886)**	2.855 (0.165)	**43.363*** (4.095)**
Proposition 5	-16.110 (-0.690)	---	**49.388*** (3.504)**	---	**48.291*** (4.169)**	---	**40.508*** (3.317)**	---
Proposition 6	-114.68 (-1.076)	-98.574 (-0.867)	230.222 (1.376)	180.83 (1.145)	242.67 (1.253)	194.37 (1.036)	175.91 (0.916)	135.40 (0.731)
Proposition 7	---	16.110 (0.690)	---	**-49.388*** (-3.504)**	---	**-48.29*** (-4.169)**	---	**-40.50*** (-3.317)**
Economic Prosperity	---	---	-2.118 (-1.487)	-2.118 (-1.487)	**-3.302** (-2.182)**	**-3.302** (-2.182)**	-2.703 (-1.564)	-2.703 (-1.564)
Population Growth	**5.957* (1.956)**	**5.957* (1.956)**	**10.912** (1.992)**	**10.912** (1.992)**	**9.430* (1.872)**	**9.430* (1.872)**	**8.484** (1.976)**	**8.484** (1.976)**
Human Development	**0.550** (2.437)**	**0.550** (2.437)**	---	---	---	---	---	---
Trade	---	0.178 (0.839)	---	---	---	---	---	---
Hausman test	**177.127*** [0.000]**	**177.12*** [0.000]**	**118.39*** [0.000]**	**118.39*** [0.000]**	**71.956*** [0.000]**	**71.956*** [0.000]**	**34.852*** [0.000]**	**34.852*** [0.000]**
Sargan OIR test	**2.182 [0.139]**	**2.182 [0.139]**	**4.177 [0.123]**	**4.177 [0.123]**	**2.484 [0.288]**	**2.484 [0.288]**	**4.413 [0.110]**	**4.413 [0.110]**
Adjusted R²	0.097	0.097	0.007	0.007	0.023	0.023	0.012	0.012
Fischer	**4.735***	**4.735***	**4.168***	**4.168***	**7.594***	**7.594***	**3.247**	**3.247**
Observations	249	249	173	173	107	107	69	69

*;**;***: significance levels of 10%, 5% and 1% respectively. Z-statistics in parentheses. [ ]:P-values. Proposition 5: Financial development formalization. Proposition 6: Financial development semi-formalization. Proposition 7: Financial development informalization. OIR: Overidentifying Restrictions Test. NOI: Nonoverlapping intervals. HAC: Heteroscedasticity and Autocorrelation Consistent.

3.2 Discussion of results and policy implications

3.2.1 Discussion of results

The conclusions from the tested hypotheses are as follows: (1) formal and informal financial development have an inequality mitigating tendency; (2) financial sector formalization (informalization) increases (decreases) inequality; (3) semiformal financial development has an income disequalizing effect and; (4) nonformal financial development has a positive income redistributive effect. We shall devote space to discussing the formal and informal financial sectors in detail because, for them we have obtained significant results both in terms of GDP and money supply (M2).

Firstly, the fact that formal and informal financial developments have an inequality mitigating tendency implies that, an improvement in their shares relative to economic prosperity (GDP growth) decreases inequality. This interpretation can be further elucidated on two counts. On the one hand, holding GDP growth and other things constant, formal and informal financial development which are constituents of GDP growth will mitigate poverty by its equalizing effect on income-distribution. On the other hand, if the shares of formal and informal financial sector developments in GDP growth are greater in comparison to other macroeconomic components of GDP growth, the direct effect on income distribution will be an equalizing one. The equalizing effect of the formal financial sector is consistent with recent African inequality literature (Batuo et al., 2010). From a broader point of view, the findings are also in line with empirical (Beck et al., 2004; Beck et al., 2007; Kai & Hamori, 2009) and theoretical (Galor & Zeira, 1993; Banerjee & Newman, 1993) literature which postulate a negative and linear relationship between financial development and income-inequality.

Secondly, the negative (positive) income redistributive effect of financial sector formalization (informalization) means, the effect of the formal financial sector (growing at the expense of other financial sectors) increases inequality whereas the effect of the informal financial sector (growing to the detriment of other financial sectors) decreases inequality. This explanation is logical from common sense because, the increase in bank deposits (liquid liabilities) in the formal banking sector can only result from the fruits of the faction of the population in possession of bank accounts, which is that of the higher- or middle-income brackets. In the same line of thought, when growth in money supply (M2) or an extensive use of currency in an economy transits through the formal banking sector to the detriment of the informal and semi-formal financial sectors, the natural consequence is soaring inequality. This interpretation can further be substantiated with present-day statistics which show that, most formal banking institutions are concentrated in urban areas of African countries. With a substantial proportion of the poor domiciled in rural areas without access to bank accounts, a competitive advantage in the formal banking sector's shares of M2 is not good for the poor.

3.2.2 Policy implications

Based on the weight of available empirical evidence, we recommend the following to governments of sampled countries in particular and developing countries in general. (1) Encourage the establishment of formal financial institutions in rural areas. But why? We have found that formal banking growth in GDP terms is pro-poor (Proposition 1). However, policies of formal banking establishment in rural areas should not be at the expense of informal financial development; as we have also found that financial sector formalization (or growth in M2 terms) is not pro-poor (Proposition 5). (2) As an overall policy recommendation, the poor should be provided incentives for bank account creation. The broad significance of the results demonstrates that financial development is essential in reducing income inequality in African countries. Widening access to informal financial intermediary markets (by means of new KE mechanisms, mobile banking…etc), especially by targeting those at the lower income strata and the rural population would help reduce the persistent income gap between the rural and urban population. A possible way of improving financial access to the poor is to oriented policy towards the reduction of information asymmetries that increase the operating cost of financial institutions.

5. Conclusion

In the first empirical study on how financial reforms have been instrumental in mitigating inequality through financial sector competition, we have contributed at the same time to the macroeconomic literature on measuring financial development and responded to the growing field of economic development by means of informal sector promotion. Hitherto, unexplored financial sector concepts of formalization, semi-formalization and informalization have been introduced. Four main findings have been established: (1) while formal financial development decreases inequality, financial sector formalization increases it; (2) whereas semi-formal financial development increases inequality, the effect of financial semi-formalization is unclear; (3) both informal financial development and financial informalization have an income equalizing effect and; (4) non-formal financial development is pro-poor. Policy implications have been discussed.

Appendices

Appendix 1: Summary statistics and presentation of countries

Panel A: Summary Statistics

		Mean	S.D	Min	Max	Obser.
Inequality	GINI Coefficient	43.104	6.828	29.760	67.400	356
GDP-based financial development indicators	Proposition 1	0.255	0.204	0.036	0.935	363
	Proposition 2	0.003	0.010	-0.007	0.097	419
	Proposition 3	0.050	0.055	-0.292	0.198	419
	Proposition 4	0.053	0.057	-0.290	0.244	419
M2-based measures	Proposition 5	0.749	0.161	0.175	1.456	360
	Proposition 6	0.011	0.036	-0.024	0.224	360
	Proposition 7	0.238	0.161	-0.457	0.824	360
	Proposition 8	0.238	0.161	-0.457	0.824	360
Control variables	Human Development	1.913	8.0128	0.204	47.486	341
	Economic Prosperity	4.273	3.710	-16.740	27.462	420
	Foreign Aid	9.447	8.946	-0.251	54.785	392
	Population growth	2.275	0.741	0.042	4.146	420
	Trade	68.687	29.967	21.574	187.68	401
Financial Depth IV	Money Supply (M2)	0.322	0.219	0.076	1.141	360
	Liquidity Liabilities (Fdgdp)	0.260	0.207	0.037	0.948	363
Financial Efficiency IV	Banking System Efficiency(BcBd)	0.786	0.352	0.206	2.249	379
	Financial System Efficiency (FcFd)	0.848	0.462	0.214	2.587	363
Financial Activity IV	Banking System Activity (Pcrb)	0.203	0.190	0.019	0.869	363
	Financial System Activity(Pcrbof)	0.237	0.279	0.019	1.739	363

Panel B: Presentation of Countries

Botswana, Cameroon, Ivory Coast, Egypt, Ethiopia, Gabon, Ghana, Kenya, Lesotho, Madagascar, Malawi, Mauritania, Mauritius, Morocco, Nigeria, Senegal, Sierra Leone, South Africa, Tanzania, Tunisia, Uganda, Zambia, Niger, Mali, Guinea, Burkina Faso, Burundi, Central African Republic.

S.D: Standard Deviation. Min: Minimum. Max: Maximum. Obser: Observations. IV: Instrumental Variable.

Appendix 2: Correlation analysis

Financial Dependent Variables								Control Variables				
GDP-Based Measures				M2-Based Measures								
Prop1	Prop2	Prop3	Prop4	Prop5	Prop6	Prop7	Prop8	Trade	IHDI	GDPg	NODA	Popg
1.000	0.076	0.099	0.110	0.598	-0.038	-0.590	-0.590	0.290	0.09	0.041	-0.433	-0.61
	1.000	0.104	0.278	-0.065	0.884	-0.134	-0.134	-0.01	-0.04	0.031	0.006	-0.00
		1.000	0.984	-0.606	-0.030	0.613	0.613	-0.06	-0.11	-0.06	0.019	-0.00
			1.000	-0.597	0.166	0.559	0.559	-0.06	-0.12	-0.05	0.019	-0.00
				1.000	-0.111	-0.974	-0.974	0.339	0.18	0.071	-0.332	-0.39
					1.000	-0.111	-0.111	-0.02	-0.03	0.019	0.134	0.10
						1.000	1.000	-0.33	-0.17	-0.07	0.301	0.36
							1.000	-0.33	-0.17	-0.07	0.301	0.36
								1.000	-0.12	-0.02	-0.25	-0.42
									1.000	-0.05	-0.095	0.01
										1.000	0.158	0.23
											1.000	0.50
												1.000

Prop: Proposition. IHDI: Inequality Adjusted Human Development Index. GDPg: GDP growth rate. NODA: Net Official Development Assistance. Popg: Population gr
coefficient.

Appendix 3: Variable definitions

Variables	Signs	Variable definitions	Sources
		Inequality dependent variable	
Inequality	GINI	GINI Coefficient	WDI (World Bank)
		GDP based financial independent variables	
Formal Financial Development	Prop.1	Bank deposits/GDP. Bank deposits here refer to demand, time and saving deposits in deposit money banks (Lines 24 and 25 of International Financial Statistics (IFS); October 2008).	Asongu (2012b)
Semi-formal financial development	Prop.3	(Financial deposits – Bank deposits)/ GDP. Financial deposits are demand, time and saving deposits in deposit money banks and other financial institutions. (Lines 24, 25 and 45 of IFS, October, 2008).	Asongu(2012b)
Informal financial development	Prop.3	(Money Supply – Financial deposits)/GDP	Asongu (2012b)
Informal and semi-formal financial development	Prop.4	(Money Supply – Bank deposits)/GDP	Asongu (2012b)
		M2-based financial independent variables	
Financial intermediary formalization	Prop.5	Bank deposits/ Money Supply (M2). From 'informal and semi-formal' to *formal* financial development (formalization)	Asongu (2012b)
Financial intermediary 'semi-formalization'	Prop.6	(Financial deposits - Bank deposits)/ Money Supply. From 'informal and formal' to *semi-formal* financial development (Semi-formalization)	Asongu (2012b)
Financial intermediary 'informalization'	Prop.7	(Money Supply – Financial deposits)/ Money Supply. From 'formal and semi-formal' to *informal* financial development (Informalisation).	Asongu (2012b)
Financial intermediary 'semi-formalization and informalization'	Prop.8	(Money Supply – Bank Deposits)/Money Supply. Formal to '*informal and semi-formal'* financial development: (Semi-formalization and informalization).	Asongu (2012b)
		Control variables	
Human Development	IHDI	Inequality adjusted Human Development Index	WDI (World Bank)
Economic Prosperity	GDPg	GDP growth rate (annual %)	WDI (World Bank)
Foreign-Aid	NODA	Net Official Development Assistance (% of GDP)	WDI (World Bank)
Population Growth	Popg	Population Growth Rate (annual %)	WDI (World Bank)
Trade Liberalization	Trade	Imports + Exports of Commodities (% of GDP)	WDI (World Bank)
		Instrumental variables	
Financial system Depth	M2	Money Supply (% of GDP)	FDSD (World Bank)
Banking System Depth	Fdgdp	Liquid Liabilities (% of GDP)	FDSD (World Bank)
Banking System Efficiency	BcBd	Bank credit on Bank deposit	FDSD (World Bank)
Financial System Efficiency	FcFd	Financial credit on Financial deposit	FDSD (World Bank)
Banking System Activity	Pcrb	Private domestic credit by deposit banks (% of GDP)	FDSD (World Bank)
Financial System Activity	Pcrbof	Private domestic credit by deposit banks and other financial institutions (% of GDP)	FDSD (World Bank)

WDI: World Bank Development Indicators. GDP: Gross Domestic Product. FDSD: Financial Development and Structure Database.

References

African Development Bank: AfDB (2012). "Income Inequality in Africa*", Brief Notes* 5.

Asongu, S. A. (2012a) "Investment and inequality in Africa: which financial channels are good for the poor?" *African Finance Journal*: Forthcoming.

Asongu, S. A. (2012b) "Financial Sector Competition and Knowledge Economy: Evidence from SSA and MENA Countries" *Journal of the Knowledge Economy*: Forthcoming. http://econpapers.repec.org/paper/pramprapa/43009.htm (accessed: 23/12/2012).

Asongu, S. A. (2012c) "How has mobile phone penetration stimulated financial development in Africa?" *Journal of African Business*: Forthcoming. http://econpapers.repec.org/paper/pramprapa/41198.htm (accessed: 23/12/2012).

Banerjee, A. V., and Newman, A. F. (1993) "Occupational Choice and the Process of Development" *Journal of Political Economy* **101(21)**, 274-298.

Batuo, M. E., Guidi, F., and Mlambo, K. (2010, August). "Financial Development and Income Inequality: Evidence from African countries" African Development Bank.

Beck, T., Demirgüç-Kunt, A., and Levine, R. (2004, June) "Finance, Inequality and Poverty: Cross-country Evidences" *World Bank Policy Research Working Paper* No.3338.

Beck, T., Demirgüç-Kunt, A., and Levine, R. (2007) "Finance, inequality and the poor". Journal of Economic Growth **12(1)**, 27-49.

Galor, O., and Zeira, J. (1993) "Income Distribution and Macroeconomics", *Review of Economics* **60(1)**, 35-52.

IMF (2008, October). "International Financial Statistics Yearbook, 2008", IMF Statistics Department.

Janine, A., and Elbadawi, I. A. (1992) "Parallel Markets, the foreign Exchange Auction, and Exchange Rate Unification in Zambia". *World Bank Policy Working Paper* No. 909, The World Bank.

Kai, H., and Hamori, S. (2009) "Globalization, financial depth and inequality in Sub-Saharan Africa". *Economics Bulletin*, **29(3)**, 2025-2037.

Saxegaard, M. (2006) "Excess liquidity and effectiveness of monetary policy: evidence from sub-Saharan Africa", *IMF Working Paper*, No. 06/115.