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Finance and Inclusive Human Development: Evidence from Africa

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A G D I Working Paper

WP/15/061

Finance and Inclusive Human Development: Evidence from Africa

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Finance and Inclusive Human Development: Evidence from Africa

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Abstract

This study investigates direct and indirect linkages between financial development and inclusive human development in data panels for African countries using a battery of estimation techniques, notably: Two-Stage Least Squares, Fixed Effects, Generalized Method of Moments and Tobit regressions. The dependent variable is the inequality adjusted human development index. All dimensions of the Financial Development and Structure Database (FDSD) of the World Bank are considered. The main finding is that financial dynamics of depth, activity and size improve inclusive human development, whereas the inability of banks to transform mobilized deposits into credit for financial access negatively affects inclusive human development. Policy implications are discussed in the light of fighting surplus liquidity and providing information sharing offices (like public credit registries and private credit bureaus) that would reduce information asymmetry between lenders and borrowers.

JEL Classification: E00;G20;I00;O10

Keywords: Banking; human development; Africa

1. Introduction

There are at least three motivations for investigating the effect of financial development on inclusive development in Africa. They are: (i) growing exclusive development on the continent, (ii) substantially documented surplus liquidity in African financial institutions and (iii) gaps in the literature on finance and inclusive development.

First, a World Bank report in April 2015 on attainment of Millennium Development Goals (MDGs) has shown that extreme poverty has been decreasing in all regions of the world with the exception of Africa where 45 percent of countries in sub Saharan Africa (SSA) were off-track from achieving the MDG extreme poverty target (World Bank, 2015; Asongu & Tchamyou, 2015a). These statistics are in sharp contrast with evidence that the continent: (i) has enjoyed more than two decades of growth resurgence which began in the mid 1990s (Fosu, 2015a, p. 44), (ii) was on time for the MDG extreme poverty target (Pinkivskiy & Sala-i-Martin, 2014) and (iii) is playing an increasing global leadership role (Leautier, 2012). The disturbing poverty trend on the African continent has motivated a growing stream of literature devoted to elucidating the region's extreme poverty and clarifying the 'Africa rising' narrative, notably, studies focused on: (i) understanding whether the growth resurgence is a myth or reality (Fosu, 2015bc), eliciting the need to balance the 'Africa rising' narrative with fundamental ethical concerns like inequality, ecological crises and job sustainability (Obeng-Odoom, 2015) and (iii) shifting paradigms of development from 'strong economics' (neoliberal and structural adjustment policies) to 'soft economics' (human capability development) in order to understand recent poverty trends on the continent (Kuada, 2015). The narrative of Kuada (2015) is consistent with another stream of literature which has responded to recent trends of poverty in Africa by suggesting mechanisms through which foreign aid can be reinvented for more employment, poverty reduction and sustainable development (Page & Söderbom, 2015; Simpasa et al., 2015; Asongu & Tchamyou, 2015b; Page & Shimeles, 2015; Asongu & Nwachukwu, 2016a; Jones et al., 2015; Asongu, 2015a; Jones & Tarp, 2015; Fields, 2015).

Second, in spite of the consensus in the African business literature on the need for more sources of finance for investment (Bartels et al., 2009; Tuomi, 2011; Asongu, 2012a; Darley, 2012), African financial institutions are characterized by surplus liquidity issues which can be translated into allocation inefficiency or the inability of banks to effectively fulfill their

fundamental role of transforming mobilized resources into credit for economic operators (Saxegaard, 2006; Owoundi, 2009; Asongu, 2014ab).

Third, the literature on inclusive human development and finance can be discussed in three main strands (see Asongu & Tchamyou, 2015a). The first encompasses linkages between inequality, financial development and growth (Claessens & Feijen, 2006; Beck et al., 2007). Within this category, there is a narrative arguing that financial development (and particularly allocation efficiency) is directly pro-poor whereas another account maintains that the nexus may be non-linear (Galor & Zeira, 1993; Aghion & Bolton, 1997; Galor & Moay, 2004; Asongu, 2013a). The second strand focuses on usage of, and unequal access to finance which could either be the result of structural (Honohan, 2006; Claessens & Perotti, 2007) and political influence (Rajan & Zingales, 2003; Acemoglu et al., 2005). The third category embodies studies documenting potential externalities regarding how the effect of inequality on financial access might engender, notably: lower growth of firms (Beck et al., 2005; Ayyagari et al., 2006), corruption (Berger & Udell, 1998), decreased overall gains in welfare (Claessens & Feijen, 2007) and declining income convergence and entrepreneurship (Banerjee & Duflo, 2005).

African-specific studies on the relationship between finance and inequality are scarce because of constraints on the availability of data. Three main shortcomings are apparent in the literature: (i) limited use of financial development concepts, (ii) failure to account for surplus liquidity issues in the measurement of financial development and (iii) lack of studies on the relationship between finance and inclusive human development. First, the concepts of financial development employed have been limited to the financial aspects of depth (Kai & Hamori, 2009; Batuo et al., 2010) and activity (Batuo et al., 2010). Furthermore, as recently documented by Asongu (2013a), financial depth in money supply is not equal to liquid liabilities in every development context because a substantial bulk of money supply in developing countries circulates outside the formal banking sector. We address this concern by employing all financial dimensions identified by the Financial Development and Structure Database (FDSD) of the World Bank. Second, in the measurement of financial development, Kai and Hamori (2009) and Batuo et al. (2010) have not accounted for surplus liquidity concerns in African financial institutions. In other words, the financial dynamics of depth and activity employed by the authors do not appreciate the ability of banks to convert mobilised deposits (or financial depth) into credit (or financial activity) for investors. We address this shortcoming by adding to our

financial variables, the missing dimension of financial allocation efficiency. Third, the available literature has focused on inequality and estimated household inequality for the most part (Kai & Hamori, 2009; Batuo et al., 2010; Asongu, 2013a; Asongu & Tchamyou, 2015a). We complement this strand of the literature by employing the inequality adjusted human development index (IHDI) because of three main reasons: They are: (i) the IHDI is recent as it was first published in 2010; (ii) compared to the GINI (or inequality) index, there is less data availability constraints in the IHDI and (iii) the IHDI is preferred because inequality is by definition one of its components. There is a consensus in the theoretical literature that financial development affects inclusive development. Conflicting perspectives however exist, on whether financial development affects inclusive development indirectly (Greenwood & Jovanovic, 1990) or directly (Banerjee & Newman, 1993). This study is concerned with both direct and indirect effects. The direct effects are assessed with the Generalised Method of Moments, the Fixed Effects and Tobit regressions, whereas the indirect impact is investigated with the Two Stage Least Squares instrumental variable approach.

The positioning of the inquiry substantially deviates from recent inclusive development literature that has focused on, among others, nexuses with poverty (Anyanwu, 2013a, 2014a); linkages between poverty, inequality and growth (Fosu, 2010abc, 2011); gender inequality (Balioune-Lutz, 2007; Balioune-Lutz, & McGillivray, 2009; Elu & Loubert, 2013; Anyanwu, 2013b, 2014b); recent advances in finance for sustainable and inclusive development (Asongu & De Moor, 2015); inclusive growth measurements (Anand et al., 2013; Mlachila et al., 2014) and inclusive development from globalization-driven debts (Asongu et al., 2015) and investment (2013a).

The rest of the study is structured as follows. Section 2 discusses data and methodology. The empirical analysis and results are presented in Section 3. Section 4 covers robustness checks, while Section 5 presents concluding implications and further research directions.

2. Data and Methodology

2.1 Data

The study investigates a panel of 38 African countries with data for the period 1996-2008 from: (i) African Development Indicators (ADI) and the FDSI of the World Bank and (ii) the United Nations Development Program (UNDP) databases. Consistent with Asongu et al.

(2015), the IHDI is from UNDP while financial and control variables are from the ADI and FDSO of the World Bank. The IHDI covers three dimensions of human welfare: longevity, education attainment and income. The human development index (HDI) is a composite indicator used by the World Bank to rank countries by levels of human development. It is a comparative measure of life-expectancy, literacy, education and standards of living on a world scale. The IHDI was first reported by the 2010 Human Development Report.

All dimensions of the FDSO are considered in the measurement of financial development. These include the dynamics of depth (from the global economic and financial system standpoints)¹, efficiency (at banking and financial system levels)², activity (from banking and financial system perspectives)³ and size⁴.

The study adopts six main control variables: four to test the strength of instruments and two for the Two-Stage Least Squares (2SLS). Only two control variables are used in the 2SLS process because of the limited number of instruments. In essence, since only five instruments are employed, in order to avoid under-identification the study cannot employ more four endogenous variables. The 2SLS control variables are the 'lending rate' and 'interest rate spread'. The control indicators for testing the validity of instruments are: government expenditure, population growth and legal origins (English common law and French civil law).

The instrumental variables are: Gross Domestic Product (GDP) growth, inflation, trade, regulation quality and the rule of law.

¹ "Borrowing from the FDSO, this paper measures financial depth both from overall-economic and financial system perspectives with indicators of broad money supply ($M2/GDP$) and financial system deposits ($Fdgd$) respectively. While the former denotes the monetary base plus demand, saving and time deposits, the latter indicates liquid liabilities. Since we are dealing exclusively with developing countries, we distinguish liquid liabilities from money supply because a substantial proportion of the monetary base does not go through the banking sector" (Asongu, 2014b, p. 189).

² "By financial intermediation efficiency here, this study neither refers to the profitability-oriented concept nor to the production efficiency of decision-making units in the financial sector (through Data Envelopment Analysis: DEA). What we seek to highlight is the ability of banks to effectively fulfill their fundamental role of transforming mobilized deposits into credit for economic operators (agents). We adopt proxies for banking-system-efficiency and financial-system-efficiency (respectively 'bank credit on bank deposits, $Bcbd$ ' and 'financial system credit on financial system deposits, $Fcfd$ ') (Asongu, 2014b, pp.189-190).

³ "By financial intermediary activity here, the work highlights the ability of banks to grant credit to economic operators. We proxy for both banking intermediary activity and financial intermediary activity with "private domestic credit by deposit banks: $Pcrb$ " and "private credit by domestic banks and other financial institutions: $Pcrbof$ " respectively" (Asongu, 2014b, p. 190).

⁴ Consistent with the FDSO, financial intermediary size is measured as the ratio of "deposit bank assets" to "total assets" (deposit bank assets on central bank assets plus deposit bank assets: $Dbacba$).

We discuss the link between financial development and the control variables on the one hand and instrumental variables on the other. First, government expenditure has been documented to be strongly associated with financial development (Levine & King, 1993; Hassan et al., 2011). This association is based on the intuition that increased government expenditure improves money supply which engenders positive financial development externalities. Second, from intuition we expect population growth to improve financial development. However, it is also interesting to note that if population growth is skewed towards rural and poor communities, it may instead boost the informal financial sector to the detriment of the formal financial sector. Third, recent African law-finance literature has established a strong nexus between legal origins and financial development (Asongu, 2012b). Whereas English Common law countries dominate in financial dynamics of depth and activity, their French civil law counterparts are dominant in financial allocation efficiency.

Fourth, macroeconomic policies that are conducive with stable/low inflation and trade openness are linked to higher levels of financial development. There is a consensus in the literature that trade openness attracts financial development (see Do & Levchenko, 2004; Huang & Temple, 2005). Both empirical (Boyd et al., 2001) and theoretical (Huybens & Smith, 1999) literature accord with the view that lower levels of inflation are associated with bigger, more efficient and better active financial intermediary institutions. Fifth, the positive relationship between economic growth and financial development has also been abundantly documented (Asongu, 2015b). According to Greenwood and Jovanovic (1990) and Saint-Paul (1992), an economy experiencing a higher level of economic growth is very likely to be associated with reduced financial intermediation cost because of the increasing competition and productive investments resulting from increased availability of funding possibilities. The direction of this nexus is in line with Levine (1997, 2003ab). Sixth, good governance in Africa is positive for financial development (Asongu, 2012b). There, the ‘rule of law’ and ‘regulation quality’ are used as proxies for good governance because the institutional web of formal rules and enforcement characteristics affect financial development. The definition of variables, summary statistics, the correlation matrix and legal origins are provided respectively in Appendix 1, Appendix 2, Appendix 3 and Appendix 4.

2.2 Methodology

Consistent with Beck et al. (2013) and Agbor (2015), we employ a 2SLS instrumental variable (IV) estimation technique in order to account for endogeneity. The IV estimator controls for biases that are associated with Ordinary Least Squares (OLS) when explaining variables that are correlated with the error term. We adopt the following steps in the IV procedure: (i) justify the choice of the 2SLS estimation technique instead of OLS with a Hausman test for endogeneity, (ii) show that the endogenous components of financial development variables can be explained by the exogenous components of instruments conditional on other covariates (control variables) and (iii) assess the validity of instruments with an over-identifying restrictions (OIR) test.

The estimation procedure is as follows.

First stage regression:

$$Finance_{it} = \gamma_0 + \gamma_1(Inflation)_{it} + \gamma_2(Trade)_{it} + \gamma_3(GDPg)_{it} + \gamma_4(Law)_{it} + \alpha_i X_{it} + v_{it} \quad (1)$$

Second stage regression:

$$HumanDevelopment_{it} = \lambda_0 + \lambda_1(Finance)_{it} + \beta_i X_{it} + \mu_{it} \quad (2)$$

In both equations, X is the set of control variables. v and u denote the error terms respectively in Eq. (1) and Eq. (2). Instrumental variables are inflation, trade, GDP growth, rule of law and regulation quality. Given that all explaining variables in the 2SLS process are considered as endogenous, the two control variables ('interest rate spread' and 'lending rate') in of the 2SLS estimation are also instrumented.

3. Cross-country regressions

This section presents the results from cross-country regressions in assessing, the: (i) the importance of the instruments in explaining cross-country variances in financial development; (ii) the ability of the instruments to explain cross-country differences in the endogenous explaining variables of control and (iii) the ability of the exogenous components of financial channels to account for cross-country differences in inclusive human development. Table 1 shows results on testing the strength of instruments while Table 2 presents findings corresponding to the 2SLS.

In Table 1, we regress financial dynamics on instruments conditional on other covariates and also test for their joint significance. The significance of all Fisher-test results suggests that distinguishing countries by inflation, trade, GDP growth, regulation quality and rule of law helps explain cross-country differences in financial development. In other words, the instruments are strong. The last-two columns also justify our choices of the ‘lending rate’ and ‘interest rate spread’ as endogenous explaining variables of control. Most of the significant control variables display the expected signs, notably; (i) government expenditure is positively associated with financial development, for the most part and (ii) French civil law (English common law) countries show positive association with financial efficiency (activity).

Table 1: Financial dynamics and instruments

| | | Financial Depth | | Financial Efficiency | | Financial Activity | | Financial Size | Endogenous Explaining Control Variables | |
|-------------------------|-----------|----------------------|-----------------------|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|---|-----------------------|
| | | M2 | Fdgdg | BcBd | FcFd | Pcrb | Pcrbof | Dbacba | Lending | Spread |
| Instruments | Constant | 0.264*** (5.428) | 0.154*** (2.506) | 0.637*** (11.15) | 0.784*** (7.019) | 0.173*** (4.476) | 0.327*** (5.839) | 0.579*** (16.43) | 11.66*** (4.645) | 12.43*** (8.001) |
| | Inflation | -0.001* (-1.855) | -0.001 (-1.486) | -5.730 (-0.878) | -0.004* (-1.785) | -0.001*** (-2.625) | -0.002** (-2.160) | -0.004*** (-5.177) | 0.494*** (7.774) | 0.129*** (3.088) |
| | Trade | 0.000 (1.204) | 0.0007*** (2.730) | -0.001*** (-3.88) | -0.002*** (-4.823) | -0.0003 (-1.561) | -0.001*** (-4.468) | 0.0003 (1.222) | 0.012 (1.092) | 0.011 (1.501) |
| | GDPg | 0.000 (0.209) | 0.002 (1.055) | -0.004 (-1.237) | -0.010* (-1.689) | 0.0003 (0.170) | -0.0002 (-0.092) | 0.0006 (0.227) | -0.071 (-0.594) | -0.122 (-1.566) |
| | Reg. Qua | --- | 0.431*** (6.478) | 0.389*** (4.470) | --- | 0.546*** (11.68) | --- | --- | 6.966** (2.406) | --- |
| | Rule of L | 0.614*** (11.43) | --- | --- | 0.273** (2.105) | --- | 0.526*** (8.189) | 0.335*** (6.281) | --- | -1.434 (-0.847) |
| | Gov. Exp | --- | 0.006*** (2.840) | --- | 0.009** (2.120) | --- | --- | 0.004** (2.377) | -0.35*** (-3.816) | -0.321*** (-4.648) |
| Control Variables | Popg | -0.06*** (-5.597) | -0.077*** (-6.134) | --- | --- | -0.059*** (-6.713) | -0.078*** (-5.577) | --- | 2.651*** (4.995) | 1.020*** (2.930) |
| | French | --- | --- | 0.196*** (6.158) | 0.128** (2.246) | --- | --- | --- | --- | --- |
| | English | --- | --- | --- | --- | --- | 0.050* (1.847) | --- | --- | --- |
| Fisher test | | 59.054*** | 35.106*** | 18.564*** | 7.487*** | 54.35*** | 28.518*** | 22.269*** | 22.41*** | 12.10*** |
| Adjusted R ² | | 0.480 | 0.403 | 0.208 | 0.114 | 0.458 | 0.344 | 0.257 | 0.364 | 0.237 |
| Observations | | 315 | 303 | 334 | 302 | 316 | 315 | 307 | 225 | 215 |

M2: Monetary Base. Fdgdg: Financial system deposits. 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 financial institutions. Dbacba: Deposit bank assets on central bank assets plus deposit bank assets. Popg: Population growth. Gov.Exp: Government Expenditure. GDPg: GDP growth. *, **, ***: significance levels of 10%, 5% and 1% respectively. Student t-statistics are presented in brackets. English: English legal origin. French: French legal origin. Lending: Lending interest rate. Spread: Banking Interest rate spread.

Table 2 addresses two main concerns; namely, whether the (i) exogenous components of financial channels explain human development and (ii) instruments explain human development through some other mechanisms beyond the financial channels. To make these assessments, we use the 2SLS methodology. Results of the Hausman test for endogeneity support our choice of the 2SLS estimation method in all eight regressions. In essence, the consistent rejection of the

null hypothesis of the test implies that OLS estimates are not consistent because the explaining variables are correlated with the disturbance term.

The first issue is addressed by the significance of estimates from financial channels. This implies that the exogenous components of financial development dynamics accounts for cross-country differences in human development. While financial channels of depth, activity and size positively affect inclusive human development, the financial mechanism of efficiency is negative. The negative impact of allocation efficiency is further confirmed by the negative effects of the lending rate and interest rate spread. Hence, from common sense and to some degree banking theory, it can be established that financial intermediary efficiency does not improve inclusive human development because of surplus liquidity, higher interest rate spread and substantial lending rates. Hence, financial allocation is inefficient.

The second issue is addressed by the OIR test. The null hypothesis of the test is the position that the instruments are not correlated with the error term in the equation of interest. Thus a rejection of the test is a rejection of the view that the instruments explain human development only through the financial channels. When endogenous variables of control (lending rate and interest rate spread) are accounted for, the OIR test becomes a general specification test of the validity of the instruments. Thus failure to reject the null hypothesis of the OIR test in all eight regressions implies that the instruments are not correlated with the error term in the equation of interest. To put this into more perspective, it suggests that when other potential exogenous financial determinants of human development are controlled for, the instruments do not explain human development through other mechanisms than financial channels (drivers).

Table 2: Inequality adjusted human development regressions

| | | Dependent variable: Inequality adjusted Human Development Index (IHDI) | | | | | | | |
|------------|-------------------------|--|-----------------------------|-----------------------------|------------------------------|-----------------------------|-----------------------------|------------------------------|-----------------------------|
| | Constant | 0.312** (2.566) | 0.375*** (2.949) | 0.406*** (3.419) | 0.464*** (3.608) | 0.674*** (4.988) | 0.707*** (5.075) | 0.742*** (4.512) | 0.657*** (4.283) |
| Financial | M2 | 0.165** (2.228) | --- | --- | --- | --- | --- | 0.296*** (3.688) | --- |
| Depth | Fdgdg | --- | 0.225*** (3.000) | --- | --- | --- | --- | --- | 0.348*** (4.389) |
| Financial | BcBd | -0.173* (-1.920) | --- | -0.193** (-2.401) | --- | -0.097 (-1.067) | --- | --- | -0.044 (-0.418) |
| Efficiency | FcFd | --- | -0.154* (-1.827) | --- | -0.206*** (-2.635) | --- | -0.125 (-1.213) | -0.132 (-1.069) | --- |
| Financial | Pcbr | --- | --- | 0.317** (2.496) | --- | 0.495*** (4.955) | --- | --- | --- |
| Activity | Pcbrf | --- | --- | --- | 0.350*** (3.193) | --- | 0.478*** (4.683) | --- | --- |
| Financial | Dbacba | 0.406*** (3.834) | 0.307*** (2.790) | 0.315** (2.560) | 0.247** (2.095) | --- | --- | --- | --- |
| Size | | | | | | | | | |
| Control | Lending | -0.003* (-1.956) | -0.003** (-2.362) | -0.004** (-2.507) | -0.004*** (-2.777) | --- | --- | --- | --- |
| Variables | Spread | --- | --- | --- | --- | -0.018** (-2.294) | -0.019** (-2.438) | -0.023*** (-2.606) | -0.021** (-2.459) |
| | Hausman test | 34.966*** | 25.213*** | 21.307*** | 17.377*** | 22.000*** | 21.454*** | 25.433*** | 22.484*** |
| | OIR(Sargan) test | 1.157 | 1.674 | 1.120 | 1.718 | 3.351 | 3.102 | 4.261 | 4.152 |
| | P-values | [0.282] | [0.195] | [0.289] | [0.189] | [0.187] | [0.211] | [0.118] | [0.125] |
| | Adjusted R ² | 0.482 | 0.547 | 0.524 | 0.570 | 0.491 | 0.486 | 0.445 | 0.475 |
| | F-stats | 28.069*** | 35.321*** | 33.830*** | 39.485*** | 28.846*** | 27.308*** | 18.766*** | 23.741*** |
| | Observations | 168 | 168 | 168 | 168 | 162 | 162 | 162 | 162 |

M2: Monetary Base. Fdgdg: Financial system deposits. BcBd: Bank credit on Bank deposits. FcFd: Financial system credit on Financial system deposits. Pcbr: Private domestic credit by deposit banks. Pcbrf: Private domestic credit by financial institutions. Dbacba: Deposit bank assets on central bank assets plus deposit bank assets. Pogg: Population growth. Gov.Exp: Government Expenditure. GDPg: GDP growth. *, **, ***: significance levels of 10%, 5% and 1% respectively. Student t-statistics are presented in brackets. (): z-statistics. Chi-square statistics for Hausman test. LM statistics for Sargan test. []: p-values.

4. Robustness checks

In order to verify the robustness of findings, we use: an alternative sample and periodicity; different estimation techniques and alternative sets of control variables. First we focus exclusively on SSA because, according to the 2015 World Bank report on the MDG extreme poverty target, poverty has been decreasing in all regions of the world with the exception of the SSA sub-region (World Bank, 2015). Second, three estimation techniques are employed to assess the direct effects of financial development on inclusive human development, namely: (i) Fixed Effects (FE) model to account for the unobserved heterogeneity (ii) Generalized Method of Moments (GMM) with forward orthogonal deviations to control for persistence in the dependent variable and (iii) the Tobit model to control for the limited range in the IHDI variable.

4.1 Data and Methodology

4.1.1 Data

We examine a panel of 49 countries in SSA for the period 2000-2012 with data from the same sources as in previous section. The dependent and main independent variables remain unchanged. Four alternative control variables are adopted, namely: mobile phones, GDP per capita growth, remittances and foreign direct investment (FDI). Consistent with recent inclusive development literature (Anand et al., 2012; Mishra et al., 2011; Seneviratne & Sun, 2013; Mlachila et al., 2014; Asongu & Nwachukwu, 2016b), we expect positive nexuses between the control variables and inclusive human development. Accordingly: (i) FDI and per capita economic growth are required for ‘social spending’ that improves human development (Mlachila et al., 2014; Asongu & Nwachukwu, 2016b) whereas (ii) remittances which are employed for consumption purposes for the most part are also closely linked to human development components (Mlachila et al., 2014; Ssozi & Asongu, 2015). The mobile phone has also been recently documented as increasing inclusive human development in Africa (Asongu, 2015c; James, 2016). The definition of variables, summary statistics and the correlation matrix are provided in Appendix 5, Appendix 6 and Appendix 7 respectively.

4.1.2 Methodology

In accordance with recent inclusive human development literature (Asongu & Nwachukwu, 2016b), three principal empirical strategies are adopted in order to control for the unobserved heterogeneity, persistence in the dependent variable and limited range of the dependent variable.

The panel FE model is presented as follows in Eq. (3).

$$IHD_{i,t} = \hat{\partial}_0 + \hat{\partial}_1 F_{i,t} + \sum_{h=1}^4 \omega_h W_{h,i,t-\tau} + \eta_i + \varepsilon_{i,t} \quad (3)$$

Where: $IHD_{i,t}$ is inclusive human development of country i at period t ; $\hat{\partial}$ is a constant; F , is financial development variable; W is the vector of control variables (*Mobile phones; GDP per capita growth, Remittances and Foreign direct investment*); η_i is the country-specific effect and $\varepsilon_{i,t}$ the error term.

There are at least three reasons for adopting the GMM approach. (i) it accounts for endogeneity in the regressors; (ii) it mitigates potential small sample biases of the difference estimator and (iii) accounts for cross-country differences. It is by virtue of the second motive that Bond et al. (2001) have recommended the system GMM estimator (Arellano & Bover, 1995;

Blundell & Bond, 1998) instead of the difference GMM estimator (Arellano & Bond, 1991). In this study, we employ the Roodman (2009ab) extension of Arellano and Bover (1995) that employs forward orthogonal deviations instead of first differences. This extension has been documented to restrict over-identification and limit the proliferation of instruments (Love & Zicchino, 2006; Baltagi, 2008). The specification in *two-step* controls for heteroscedasticity because the *one-step* approach is homoscedasticity-consistent.

The following equations in levels (4) and first difference (5) summarize the standard system GMM estimation procedure.

$$IHD_{i,t} = \sigma_0 + \sigma_1 IHD_{i,t-\tau} + \sigma_2 F_{i,t} + \sum_{h=1}^4 \delta_h W_{h,i,t-\tau} + \eta_i + \xi_t + \varepsilon_{i,t} \quad (4)$$

$$\begin{aligned} IHD_{i,t} - IHD_{i,t-\tau} = & \sigma_0 + \sigma_1 (IHD_{i,t-\tau} - IHD_{i,t-2\tau}) + \sigma_2 (F_{i,t} - F_{i,t-\tau}) + \\ & + \sum_{h=1}^4 \delta_h (W_{h,i,t-\tau} - W_{h,i,t-2\tau}) + (\xi_t - \xi_{t-\tau}) + \varepsilon_{i,t-\tau} \end{aligned} \quad (5)$$

Where: τ represents tau and ξ_t is the time-specific constant.

As recently shown by Asongu and Nwachukwu (2016b), since the dependent variable theoretically falls between 0 and 1, OLS is inappropriate. Many authors have employed double-censored Tobit models in order to account for the limited range of the dependent variable (Kumbhakar & Lovell, 2000; Koetter et al., 2008; Coccoresse & Pellicchia, 2010; Ariss, 2010).

Hence, when no observations of either 0 or 1 is apparent in a dependent variable, as is the case with the IHDI, estimating by a double-censored Tobit model is as similar as estimating by a linear regression model because the two likelihood functions coincide (McDonald, 2009; Coccoresse & Pellicchia, 2010). Hence, the logistic regression associated with the Tobit model is presented in Eq. (6) below:

$$IHD_{it} = \frac{\exp(x_{it}'\beta)}{1 + \exp(x_{it}'\beta)} + \phi_{it} \quad (6)$$

where x_{it} is the same vector of regressors used in the Tobit model, β is the vector of parameters and ϕ_{it} is an independently and identically distributed (iid) with mean zero and σ_ϕ^2 variance.

4.2 Empirical results

4.2.1 Controlling for the unobserved heterogeneity

Table 3 presents the FE findings which are used to control for unobserved heterogeneity in terms of country-specific effects. The following findings can be established. Banking system efficiency and financial size have positive effects on inclusive human development whereas financial system activity has a negative impact. The significant control variables have the expected signs.

Table 3: Inclusive development and finance (Fixed effects)

| | Dependent Variable: Inequality Adjusted Human Development Index (IHDI) | | | | | | |
|----------------------------------|--|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| | Financial Depth | | Financial Efficiency | | Financial Activity | | Financial. Size |
| | M2 | Fdgdg | BcBd | FcFd | Pcrb | Pcrbof | Dbacba |
| Constant | 0.422*** (0.000) | 0.421*** (0.000) | 0.417*** (0.000) | 0.424*** (0.000) | 0.427*** (0.000) | 0.427*** (0.000) | 0.383*** (0.000) |
| Money Supply (M2) | 0.0002 (0.234) | --- | --- | --- | --- | --- | --- |
| Fin. System Depth (Fdgdg) | --- | 0.0004 (0.183) | --- | --- | --- | --- | --- |
| Banking sys. Efficiency (BcBd) | --- | --- | 0.0002** (0.034) | --- | --- | --- | --- |
| Financial sys. Efficiency (FcFd) | --- | --- | --- | 0.00003 (0.727) | --- | --- | --- |
| Banking sys. Activity (Pcrb) | --- | --- | --- | --- | 0.001 (0.246) | --- | --- |
| Financial sys. Activity (Pcrbof) | --- | --- | --- | --- | --- | -0.005*** (0.000) | --- |
| Financial Size (Dbacba) | --- | --- | --- | --- | --- | --- | 0.0006*** (0.000) |
| Mobile Phones | 0.0006*** (0.000) | 0.0006*** (0.000) | 0.0007*** (0.000) | 0.0006*** (0.000) | 0.0006*** (0.000) | 0.0006** * | 0.0005*** (0.000) |
| GDP per capita growth | 0.0009*** (0.003) | 0.0009*** (0.003) | 0.0008*** (0.008) | 0.0009*** (0.003) | 0.0009*** (0.003) | 0.0008** (0.005) | 0.0007** (0.021) |
| Remittances | 0.0007** (0.020) | 0.0007** (0.022) | 0.0008** (0.022) | 0.0007** (0.024) | 0.0007** (0.026) | 0.0007** (0.026) | 0.0005 (0.142) |
| Foreign Direct Investment | 0.0004** (0.019) | 0.0004** (0.023) | 0.0005** (0.014) | 0.0005*** (0.007) | 0.0005*** (0.008) | 0.0005** (0.013) | 0.0002 (0.232) |
| Adjusted R ² (within) | 0.448 | 0.448 | 0.446 | 0.445 | 0.443 | 0.470 | 0.499 |
| Fisher | 38.84*** | 38.95*** | 38.78*** | 38.45*** | 38.82*** | 42.81*** | 47.82*** |
| Countries | 39 | 39 | 39 | 39 | 39 | 39 | 39 |
| Observations | 332 | 332 | 334 | 332 | 332 | 334 | 333 |

*, **, ***: significance levels of 10%, 5% and 1% respectively. GDP: Gross Domestic Product. Fin: Financial. Sys: System.

4.2.2 Controlling for the persistence of the dependent variable:

The GMM approach accounts for time-invariant omitted variables. At least two conditions are necessary for the application of this estimation technique. They are: (i) the number of cross-sections should be higher than the number of years in each time series ($T < N$) and (ii) dependent variable should be persistent. The former condition is met because we have 13 years (T) and 49 countries (N). The latter requirement also holds because the correlation between the IHDI and its first lag (of 0.999) is higher than the rule of thumb threshold of 0.800 required for ascertaining persistence in dependent variables. The four principal information criteria for the validity of models are satisfied in all specifications⁵. The following findings are established. Catch-up in inclusive human development is apparent because the absolute values of the lagged IHDI estimates consistently fall within the range of 0 and 1⁶. Financial activity negatively affects inclusive development. The significant control variables display expected signs.

⁵ “First, the null hypothesis of the second-order Arellano and Bond autocorrelation test ($AR(2)$) in difference for the absence of autocorrelation in the residuals should not be rejected. Second the Sargan and Hansen overidentification restrictions (OIR) tests should not be significant because their null hypotheses are the positions that instruments are valid or not correlated with the error terms. In essence, while the Sargan OIR test is not robust but not weakened by instruments, the Hansen OIR is robust but weakened by instruments. In order to restrict identification or limit the proliferation of instruments, we have ensured that instruments are lower than the number of cross-sections in most specifications. Third, the Difference in the Hansen Test (DHT) for exogeneity of instruments is also employed to assess the validity of results from the Hansen OIR test. Fourth, a Fischer test for the joint validity of estimated coefficients is also provided” (Asongu & De Moor, 2016, pp. 13-14).

⁶ The interested reader can refer to Asongu (2013b, p. 49) and Fung (2009, p. 58) for more insights into the catch-up criterion.

Table 4: Inclusive development and finance (GMM)

| | Dependent Variable: Inequality Adjusted Human Development Index(IHDI) | | | | | | |
|----------------------------------|---|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| | Financial Depth | | Financial Efficiency | | Financial Activity | | Fin. Size |
| | M2 | Fdgdg | BcBd | FcFd | Pcrb | Pcrbof | Dbacba |
| Constant | 0.033*** (0.000) | 0.033*** (0.000) | 0.046*** (0.000) | 0.047*** (0.000) | 0.033*** (0.000) | 0.034*** (0.000) | 0.058*** (0.000) |
| IHDI(-1) | 0.899*** (0.000) | 0.885*** (0.000) | 0.869*** (0.000) | 0.886*** (0.000) | 0.922*** (0.000) | 0.888*** (0.000) | 0.853*** (0.000) |
| Money Supply (M2) | -0.0001 (0.228) | --- | --- | --- | --- | --- | --- |
| Fin. System Depth (Fdgdg) | --- | -0.00003 (0.809) | --- | --- | --- | --- | --- |
| Banking sys. Efficiency (BcBd) | --- | --- | -0.00003 (0.528) | --- | --- | --- | --- |
| Financial sys. Efficiency (FcFd) | --- | --- | --- | -0.00001 (0.782) | --- | --- | --- |
| Banking sys. Activity (Pcrb) | --- | --- | --- | --- | 0.0001 (0.376) | --- | --- |
| Financial sys. Activity (Pcrbof) | --- | --- | --- | --- | --- | -0.004*** (0.000) | --- |
| Financial Size (Dbacba) | --- | --- | --- | --- | --- | --- | -0.00004 (0.374) |
| Mobile Phones | 0.0003*** (0.000) | 0.0004*** (0.000) | 0.0003*** (0.000) | 0.0003*** (0.000) | 0.0003*** (0.000) | 0.0004*** (0.000) | 0.0004*** (0.000) |
| GDP per capita growth | 0.0005*** (0.000) | 0.0004*** (0.000) | 0.0004*** (0.000) | 0.0005*** (0.000) | 0.0006*** (0.000) | 0.0004*** (0.000) | 0.0004*** (0.000) |
| Remittances | -0.00004 (0.632) | -0.00002 (0.778) | 0.0001 (0.155) | -0.0003 (0.687) | -0.00006 (0.392) | 0.000006 (0.946) | 0.0002* (0.084) |
| Foreign Direct Investment | 0.0002*** (0.000) | 0.0002*** (0.000) | 0.0001*** (0.008) | 0.0001*** (0.000) | 0.0001*** (0.000) | 0.0001*** (0.001) | 0.0001*** (0.000) |
| AR(1) | (0.045) | (0.080) | (0.066) | (0.051) | (0.023) | (0.061) | (0.130) |
| AR(2) | (0.295) | (0.308) | (0.489) | (0.289) | (0.395) | (0.162) | (0.678) |
| Sargan OIR | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Hansen OIR | (0.515) | (0.531) | (0.717) | (0.420) | (0.552) | (0.445) | (0.597) |
| DHT for instruments | | | | | | | |
| (a) Instruments in levels | | | | | | | |
| H excluding group | (0.586) | (0.537) | (0.636) | (0.528) | (0.756) | (0.565) | (0.592) |
| Dif(null, H=exogenous) | (0.415) | (0.462) | (0.629) | (0.342) | (0.363) | (0.349) | (0.506) |
| (b) IV (years, eq(diff)) | | | | | | | |
| H excluding group | (0.201) | (0.673) | (0.545) | (0.470) | (0.279) | (0.612) | (0.676) |
| Dif(null, H=exogenous) | (0.825) | (0.341) | (0.707) | (0.362) | (0.761) | (0.289) | (0.417) |
| Fisher | 275528*** | 121056*** | 1.01e+06*** | 65532.29*** | 32587.97*** | 13962.22*** | 94615.72*** |
| Instruments | 37 | 37 | 37 | 37 | 37 | 37 | 37 |
| Countries | 38 | 38 | 38 | 38 | 38 | 38 | 38 |
| Observations | 283 | 283 | 285 | 283 | 283 | 285 | 285 |

*, **, ***: significance levels of 10%, 5% and 1% respectively. GDP: Gross Domestic Product. DHT: Difference in Hansen Test for Exogeneity of Instruments' Subsets. Dif: Difference. OIR: Over-identifying Restrictions Test. The significance of bold values is twofold. 1) The significance of estimated coefficients, Hausman test and the Fisher statistics. 2) The failure to reject the null hypotheses of: a) no autocorrelation in the *AR(1)* and *AR(2)* tests and; b) the validity of the instruments in the Sargan *OIR* test. na: thresholds and/or net effects cannot be computed because of insignificant marginal effects. Fin: Financial. Sys: System. Fin: Financial. Sys: System.

4.2.3 Controlling for the limited range in the dependent variable

The findings from the Tobit model are broadly consistent with the 2SLS regressions, with the exception of financial allocation efficiency,. The other financial dynamics positively affect inclusive human development. Most of the significant control variables have the expected signs.

Table 5: Inclusive development and finance (Tobit)

| | Dependent Variable: Inequality Adjusted Human Development Index(IHDI) | | | | | | |
|----------------------------------|---|----------------------------|------------------------------|-----------------------------|----------------------------|----------------------------|----------------------------|
| | Financial Depth | | Financial Efficiency | | Financial Activity | | Financial. Size |
| | M2 | Fdgdg | BcBd | FcFd | Pcrb | Pcrbof | Dbacba |
| Constant | 0.346*** (0.000) | 0.351*** (0.000) | 0.444*** (0.000) | 0.476*** (0.000) | 0.358*** (0.000) | 0.378*** (0.000) | 0.332*** (0.000) |
| Money Supply (M2) | 0.001*** (0.000) | --- | --- | --- | --- | --- | --- |
| Fin. System Depth (Fdgdg) | --- | 0.002*** (0.000) | --- | --- | --- | --- | --- |
| Banking sys. Efficiency (BcBd) | --- | --- | -0.0009*** (0.000) | --- | --- | --- | --- |
| Financial sys. Efficiency (FcFd) | --- | --- | --- | -0.001*** (0.000) | --- | --- | --- |
| Banking sys. Activity (Pcrb) | --- | --- | --- | --- | 0.004*** (0.000) | --- | --- |
| Financial sys. Activity (Pcrbof) | --- | --- | --- | --- | --- | 0.0006 (0.900) | --- |
| Financial Size (Dbacba) | --- | --- | --- | --- | --- | --- | 0.0006** (0.010) |
| Mobile Phones | 0.001*** (0.000) | 0.001*** (0.000) | 0.001*** (0.000) | 0.001*** (0.000) | 0.001*** (0.000) | 0.001*** (0.000) | 0.001*** (0.000) |
| GDP per capita growth | 0.0006 (0.548) | 0.0002 (0.802) | 0.0004 (0.689) | 0.00007 (0.944) | 0.0007 (0.534) | 0.0008 (0.486) | 0.0009 (0.432) |
| Remittances | -0.00004 (0.924) | -0.0002 (0.602) | -0.0001 (0.746) | -0.0004 (0.346) | 0.0002 (0.544) | 0.0002 (0.558) | 0.00009 (0.844) |
| Foreign Direct Investment | -0.001* (0.090) | -0.001* (0.068) | -0.001** (0.046) | -0.001** (0.017) | -0.0006 (0.246) | -0.0008 (0.178) | -0.0003 (0.587) |
| LR Chi-Square | 232.68*** | 251.56*** | 220.20*** | 256.20*** | 236.70*** | 201.17*** | 210.55*** |
| Log Likelihood | 380.832 | 390.272 | 376.835 | 392.593 | 382.843 | 367.323 | 371.691 |
| Pseudo R ² | -0.439 | -0.475 | -0.412 | -0.484 | -0.447 | -0.377 | -0.395 |
| Observations | 332 | 332 | 334 | 332 | 332 | 334 | 333 |

*, **, ***: significance levels of 10%, 5% and 1% respectively. GDP: Gross Domestic Product. Fin: Financial. Sys: System.

5. Further discussion, concluding implications and future research directions

We have established from the 2SLS and Tobit regressions that the ability of banks to transform mobilized deposits into credit for economic operators is negatively affecting inclusive human development. The implication is that surplus liquidity concerns are constraining financial access. The corresponding issue of excess liquidity is in accordance with African financial

development literature (Saxegaard, 2006; Owoundi, 2009; Asongu, 2013cd). It follows that in the post-2015 development agenda, conducive policies will need to be tailored towards fighting surplus liquidity in order to enhance inclusive human development in Africa.

The following are some suggestions of policy measures for fighting voluntary and involuntary surplus liquidity. First, voluntary excess liquidity can be tackled by facilitating interbank lending and enabling banks with possibilities of tracking their positions in central banks to do so in order to prevent them from holding cash beyond statutory requirements. Second, involuntary holding of surplus liquidity can be avoided (i) developing stock markets in order to enhance investment opportunities for banks, (ii) supporting a banking environment that eases spreads between reserves and bonds and (iii) improving infrastructure and information synchronization in order to prevent banks in remote or local regions from holding cash beyond requirements because of transportation concerns.

From the 2SLS results, we have also observed that the lending rate and interest rate spread are reducing inclusive human development. This represents an important concern of information asymmetry between lenders and borrowers. In essence, because of adverse selection on the part of lenders, interest rates are increased to compensate for the potential moral hazard on the part of borrowers. As a policy implication, information sharing offices (ISOs) like private credit bureaus (PCB) and public credit registries (PCR), need to increase information sharing among banks in order to mitigate moral hazard and adverse selection.

PCR and PCB should not exclusively act as ISOs but should also act as a ‘discipline’ device. Accordingly, even when an ISO has helped reduce informational rents previously enjoyed by financial institutions, banks could still be unwilling to increase allocation efficiency if they are not convinced that information sharing by ISO is associated with higher repayment probabilities on the part of borrowers. Therefore, when acting as a ‘discipline device’ for borrowers, ISOs should provide borrowers with performance incentives in order to mitigate moral hazard. In this light, the role of ISOs should also be to inform borrowers as to the risk of reputational loss and the danger of strong reliance on the informal financial sector as a genuine and reliable alternative to formal banking establishments. This importance of ISOs in increasing financial access is in accordance with the African literature on financial access (Galindo & Miller, 2001; Love & Mylenko, 2003; Singh et al., 2009; Triki & Gajigo, 2014).

This study has investigated direct and indirect linkages between finance and inclusive development in the panels of African countries using a battery of estimation techniques, notably: Two-Stage Least Squares, Fixed Effects, Generalized Method of Moments and Tobit regressions. The dependent variable is the inequality adjusted human development index. All dimensions of the Financial Development and Structure Database (FDSD) have been considered. The main finding is that financial dynamics of depth, activity and size improve inclusive human development, whereas the inability of banks to transform mobilized deposits into credit for financial access negatively affects inclusive human development. Policy implications have been discussed in the light of fighting surplus liquidity and providing information sharing offices that would reduce information asymmetry between lenders and borrowers.

Future studies would improve the extant literature by investigating channels by which information sharing offices can interact with financial allocation efficiency to improve inclusive human development. Moreover, it may also be worthwhile to confirm the validity of established linkages when the human development index is decomposed into its constituent elements. They are income, education and life expectancy.

Appendices

Appendix 1: Definition and sources of variables (Baseline: 38 countries)

| Variables | Signs | Definitions | Sources |
|-----------------------------|--------|---|-------------------|
| Inclusive development | IHDI | Inequality Adjusted Human Development Index | UNDP |
| Economic Financial Depth | M2 | Money Supply (% of GDP) | World Bank (FDSD) |
| Financial System Depth | Fdgdg | Liquid Liabilities (% of GDP) | |
| Banking System Efficiency | BcBd | Bank credit on Bank deposits (%) | |
| Financial System Efficiency | FcFd | Financial credit on Financial deposits(%) | |
| Banking System Activity | Prch | Private domestic credit from deposit banks (% of GDP) | |
| Financial System Activity | Prchof | Private domestic credit from financial institutions (% of GDP) | |
| Financial Size | Dbacba | Deposit bank assets on Central bank assets plus Deposit bank assets (%) | |
| Inflation | Infl. | Mobile phone subscriptions (per 100 people) | |
| Trade Openness | Trade | Imports plus Exports of goods and services (% of GDP) | |
| GDP growth | GDPg | Gross Domestic Product growth rate (%) | |
| GDP per capita growth | GDPpc | Gross Domestic Product per capita growth rate (%) | World Bank (WDI) |
| Rule of Law | RL | “Rule of law (estimate): captures perceptions of the extent to which agents have confidence in and abide by the rules of society and in particular the quality of contract enforcement, property rights, the police, the courts, as well as the likelihood of crime and violence” | |
| Regulation Quality | RQ | “Regulation quality (estimate): measured as the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development”. | |
| Government Expenditure | G.E | Government’s Final Consumption Expenditure (% of GDP) | |
| Population growth | Popg | Population growth rate (annual %) | |
| Lending rate | Lend | Bank rate that usually meets the short- and medium-term financing needs of the private sector (%) | |
| Interest rate spread | Sprd. | The interest rate charged by banks on loans to private sector customers minus the interest rate paid by commercial or similar banks for demand, time, or savings deposits (%) | |
| English Common Law | Eng. | 1 if the country has an English Common law origin and 0, otherwise | |
| French Civil Law | Frch. | 1 if the country has an French Civil law origin and 0, otherwise | |

UNDP: United Nations Development Program. WDI: World Development Indicators. FDSD: Financial Development and Structure Database. GDP: Gross Domestic Product.

Appendix 2: Summary statistics (1996-2008) (Baseline: 38 countries)

| | Mean | SD | Min | Max | Obs |
|------------------------------------|--------|--------|---------|---------|-----|
| Inequality Adj. Human Development | 0.454 | 0.122 | 0.204 | 0.743 | 377 |
| Economic Financial Depth (M2) | 0.322 | 0.232 | 0.001 | 1.279 | 477 |
| Financial System Depth (Fdgd) | 0.255 | 0.218 | 0.001 | 1.054 | 477 |
| Banking System Efficiency (BcBd) | 0.780 | 0.301 | 0.133 | 1.718 | 489 |
| Financial System Efficiency (FcFd) | 0.750 | 0.409 | 0.137 | 2.606 | 477 |
| Banking System Activity (Pcrb) | 0.174 | 0.170 | 0.001 | 0.810 | 477 |
| Financial System Activity (Pcrbof) | 0.197 | 0.240 | 0.001 | 1.624 | 477 |
| Financial Size (Dbacba) | 0.725 | 0.228 | 0.017 | 1.264 | 484 |
| Inflation (Infl.) | 18.844 | 193.57 | -100.00 | 4145.10 | 465 |
| Trade Openness (Trade) | 77.646 | 39.886 | 17.859 | 255.01 | 472 |
| GDP growth (GDPg) | 4.597 | 4.456 | -28.100 | 33.629 | 494 |
| GDP per capita growth (GDPpc) | 2.202 | 4.246 | -29.630 | 29.062 | 494 |
| Rule of law (RL) | 0.330 | 0.211 | 0.014 | 0.810 | 379 |
| Regulation Quality (RQ) | 0.332 | 0.171 | 0.044 | 0.792 | 380 |
| Government Expenditure (G.E) | 14.147 | 5.418 | 2.650 | 35.138 | 454 |
| Population growth (Popg) | 2.336 | 1.023 | -1.075 | 10564 | 481 |
| Lending rate (Lend) | 21.792 | 16.969 | 0.000 | 217.88 | 342 |
| Interest rate spread (Sprd.) | 12.054 | 8.985 | 2.375 | 70.750 | 327 |
| English Common Law (Eng.) | 0.421 | 0.494 | 0.000 | 1.000 | 494 |
| French Civil Law (Frch.) | 0.473 | 0.499 | 0.000 | 1.000 | 494 |

SD: Standard deviation. Min: Minimum. Max: Maximum. Obs: Observations. Adj: Adjusted.

Appendix 3: Correlation analysis for model specification (Baseline: 38 countries)

| Financial Intermediary Determinants | | | | | | | Human Development | | Second-stage Control Vbls | | First-Stage Control Variables | | | | | | | | | |
|-------------------------------------|-------|----------------|-------|---------------|--------|--------|-------------------|-------|---------------------------|-------|-------------------------------|--------|--------|-------|-------|--------------|-------|-------|-------|--------|
| Fin. Depth | | Fin.Efficiency | | Fin. Activity | | F.Size | | | | | Macro economic | | | Law | | Legal origin | | | | |
| M2 | Fdgdg | BcBd | FcFd | Pcrb | Pcrbof | Dbacba | IHDI | GDPpc | Lend | Sprd | Infl. | Trade | GDPg | G.E | Popg | R.Q | R.L | Eng. | Frch. | |
| 1.000 | 0.974 | -0.07 | -0.00 | 0.748 | 0.598 | 0.394 | 0.716 | 0.057 | -0.28 | -0.34 | -0.06 | 0.304 | -0.052 | 0.33 | -0.46 | 0.40 | 0.63 | 0.21 | -0.23 | M2 |
| | 1.000 | -0.04 | 0.069 | 0.805 | 0.685 | 0.460 | 0.745 | 0.101 | -0.27 | -0.36 | -0.05 | 0.327 | -0.015 | 0.37 | -0.49 | 0.48 | 0.68 | 0.29 | -0.28 | Fdgdg |
| | | 1.000 | 0.870 | 0.403 | 0.421 | 0.259 | -0.20 | -0.08 | -0.25 | -0.20 | -0.11 | -0.230 | -0.091 | -0.07 | 0.01 | 0.19 | -0.00 | -0.26 | 0.41 | BcBd |
| | | | 1.000 | 0.530 | 0.679 | 0.282 | -0.21 | -0.07 | -0.20 | -0.21 | -0.08 | -0.235 | -0.090 | 0.04 | -0.04 | 0.30 | 0.10 | -0.11 | 0.25 | FcFd |
| | | | | 1.000 | 0.930 | 0.515 | 0.644 | 0.077 | -0.26 | -0.34 | -0.06 | 0.106 | -0.023 | 0.24 | -0.41 | 0.61 | 0.62 | 0.15 | -0.11 | Pcrb |
| | | | | | 1.000 | 0.454 | 0.635 | 0.055 | -0.21 | -0.30 | -0.05 | 0.050 | -0.031 | 0.26 | -0.35 | 0.57 | 0.53 | 0.19 | -0.14 | Pcrbof |
| | | | | | | 1.000 | 0.461 | 0.133 | -0.29 | -0.33 | -0.09 | 0.210 | 0.063 | 0.27 | -0.29 | 0.48 | 0.45 | 0.00 | 0.01 | Dbacba |
| | | | | | | | 1.000 | 0.136 | -0.26 | -0.44 | -0.08 | 0.427 | -0.032 | 0.17 | -0.57 | 0.48 | 0.51 | 0.31 | -0.23 | IHDI |
| | | | | | | | | 1.000 | 0.04 | 0.00 | 0.07 | 0.082 | 0.971 | 0.06 | -0.01 | 0.08 | 0.08 | 0.05 | -0.14 | GDPpc |
| | | | | | | | | | 1.00 | 0.86 | 0.68 | 0.111 | 0.100 | -0.29 | 0.30 | -0.16 | -0.21 | -0.04 | -0.16 | Lend |
| | | | | | | | | | | 1.00 | 0.42 | 0.087 | 0.069 | -0.40 | 0.25 | -0.28 | -0.30 | -0.19 | -0.00 | Sprd |
| | | | | | | | | | | | 1.00 | 0.103 | 0.078 | -0.14 | 0.03 | -0.09 | -0.09 | -0.03 | -0.07 | Infl. |
| | | | | | | | | | | | | 1.000 | -0.01 | 0.37 | -0.40 | 0.04 | 0.23 | 0.22 | -0.29 | Trade |
| | | | | | | | | | | | | | 1.000 | -0.02 | 0.22 | 0.02 | 0.00 | 0.01 | -0.09 | GDPg |
| | | | | | | | | | | | | | | 1.00 | -0.33 | 0.19 | -0.27 | 0.30 | -0.27 | GE |
| | | | | | | | | | | | | | | | 1.00 | -0.27 | -0.34 | -0.20 | 0.22 | Popg |
| | | | | | | | | | | | | | | | | 1.00 | 0.79 | 0.23 | -0.14 | R.Q |
| | | | | | | | | | | | | | | | | | 1.00 | 0.30 | -0.23 | RL |
| | | | | | | | | | | | | | | | | | | 1.00 | -0.80 | Eng |
| | | | | | | | | | | | | | | | | | | | 1.00 | Frch |

M2: Monetary Base. Fdgdg: Financial system deposits. 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 financial institutions. Dbacba: Deposit bank assets on central bank assets plus deposit bank assets. R.Q: Regulation Quality. RL:Rule of Law. Infl: Inflation. Popg: Population growth. GE: Government Expenditure. GDPg: GDP growth. GDPpc: GDP per capita growth. Eng: English legal origin. Frch: French legal origin.IHDI: Inequality adjusted Human Development Index. Popg: Population growth. Vbls: Variables.

Appendix 4: Countries selected for the study (Baseline: 38 countries)

| Legal origin | Countries | Num. |
|---------------------------|--|------|
| English | Botswana, Egypt, Gambia, Ghana, Kenya, Lesotho, Malawi, Mauritius, Nigeria, Seychelles, Sierra Leone, South Africa, Sudan, Swaziland, Tanzania, Zambia. | 16 |
| French | Algeria, Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo Republic, Côte d'Ivoire, Gabon, Madagascar, Mali, Morocco, Niger, Rwanda, Senegal, Togo, Tunisia. | 18 |
| Portuguese | Angola, Cape Verde, Guinea-Bissau, Mozambique. | 4 |
| French sub-Saharan Africa | Benin, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo Republic, Côte d'Ivoire, Gabon, Madagascar, Mali, Niger, Rwanda, Senegal, Togo. | 15 |
| North Africa | Algeria, Egypt, Morocco, Tunisia. | 4 |

Num: Number of countries.

Appendix 5: Definition and sources of variables (Robustness checks: 49 SSA Countries)

| Variables | Signs | Definitions | Sources |
|-----------------------------|--------|---|-------------------|
| Inclusive development | IHDI | Inequality Adjusted Human Development Index | UNDP |
| Economic Financial Depth | M2 | Money Supply (% of GDP) | |
| Financial System Depth | Fdgdg | Liquid Liabilities (% of GDP) | |
| Banking System Efficiency | BcBd | Bank credit on Bank deposits (%) | |
| Financial System Efficiency | FcFd | Financial credit on Financial deposits(%) | World Bank (FDSD) |
| Banking System Activity | Prcb | Private domestic credit from deposit banks (% of GDP) | |
| Financial System Activity | Prcbof | Private domestic credit from financial institutions (% of GDP) | |
| Financial Size | Dbacba | Deposit bank assets on Central bank assets plus Deposit bank assets (%) | |
| Mobile Phone | Mobile | Mobile phone subscriptions (per 100 people) | |
| GDP per capita | GDPpcg | GDP per Capita growth rate | World Bank (WDI) |
| Remittance | Remit | Remittance inflows (% of GDP) | |
| Foreign investment | FDI | Foreign Direct Investment net inflows (% of GDP) | |

UNDP: United Nations Development Program. WDI: World Development Indicators. FDSD: Financial Development and Structure Database. GDP: Gross Domestic Product.

Appendix 6: Summary statistics (2000-2011) (Robustness check: 49 SSA Countries)

| | Mean | SD | Min | Max | Obs |
|---------------------------------------|--------|--------|---------|---------|-----|
| Inequality Adj. Human Development | 0.441 | 0.115 | 0.129 | 0.765 | 437 |
| Economic Financial Depth (M2) | 29.601 | 19.195 | 4.129 | 112.830 | 505 |
| Financial System Depth (Fdgdg) | 23.967 | 18.860 | 1.690 | 97.823 | 505 |
| Banking System Efficiency (BcBd) | 68.165 | 28.233 | 14.106 | 171.853 | 546 |
| Financial System Efficiency (FcFd) | 73.748 | 37.493 | 13.753 | 260.665 | 505 |
| Banking System Activity (Pcrb) | 16.656 | 15.462 | 0.551 | 86.720 | 505 |
| Financial System Activity (Pcrbof) | 18.497 | 22.503 | 0.010 | 149.775 | 507 |
| Financial Size (Dbacba) | 73.166 | 22.690 | 2.982 | 99.999 | 542 |
| Mobile Phone Penetration | 23.379 | 28.004 | 0.000 | 147.202 | 572 |
| GDP per Capita growth | 2.270 | 5.764 | -33.983 | 58.363 | 558 |
| Remittances | 3.977 | 8.031 | 0.000 | 64.100 | 434 |
| Net Foreign Direct Investment Inflows | 5.150 | 8.278 | -5.131 | 91.007 | 557 |

SD: Standard deviation. Min: Minimum. Max: Maximum. Obs: Observations. Adj: Adjusted.

Appendix 7: Correlation Matrix (Uniform sample size: 331)(49 SSA Countries)

| Financial Development Dynamics | | | | | | | De p. | | Vble | | | |
|--------------------------------|-------|----------------------|-------|--------------------|--------|----------------|------------|------------|--------|--------|--------|--------|
| Financial Depth | | Financial Efficiency | | Financial Activity | | Financial Size | Mobil e | GDPp cg | Remit | FDI | IHDI | |
| M2 | Fdgdg | BcBd | FcFd | Pcrb | Pcrbof | Dbacba | | | | | | |
| 1.000 | 0.970 | -0.013 | 0.031 | 0.807 | 0.648 | 0.409 | 0.482 | 0.049 | 0.035 | 0.028 | 0.586 | M2 |
| | 1.000 | 0.015 | 0.122 | 0.869 | 0.756 | 0.454 | 0.536 | 0.078 | 0.033 | 0.019 | 0.651 | Fdgdg |
| | | 1.000 | 0.862 | 0.414 | 0.401 | 0.348 | 0.074 | -0.083 | -0.237 | -0.211 | 0.004 | Bcbd |
| | | | 1.000 | 0.519 | 0.660 | 0.316 | 0.178 | -0.069 | -0.214 | -0.194 | 0.075 | FcFd |
| | | | | 1.000 | 0.926 | 0.490 | 0.525 | 0.033 | -0.083 | -0.075 | 0.612 | Pcrb |
| | | | | | 1.000 | 0.414 | 0.512 | 0.029 | -0.089 | -0.077 | 0.537 | Pcrbof |
| | | | | | | 1.000 | 0.389 | -0.027 | 0.079 | -0.232 | 0.408 | Dbacba |
| | | | | | | | 1.000 | 0.039 | -0.052 | 0.091 | 0.625 | Mobile |
| | | | | | | | | 1.000 | 0.032 | 0.173 | 0.050 | GDPpcg |
| | | | | | | | | | 1.000 | 0.119 | -0.030 | Remit |
| | | | | | | | | | | 1.000 | -0.023 | FDI |
| | | | | | | | | | | | 1.000 | IHDI |

M2: Money Supply. Fdgdg: Financial deposits (liquid liabilities). BcBd: Bank credit on bank deposits. FcFd: Financial credit on Financial deposits. Pcrb: Private domestic credit from deposit banks. Pcrbof: Private domestic credit from deposit banks and other financial institutions. Dbacba: Deposit bank assets on central bank assets plus deposit bank assets. GDPpcg : GDP per capita growth rate. Remit: Remittances. FDI: Foreign Direct Investment. Mobile: Mobile Phone Penetration. IHDI: Inequality Adjusted Human Development Index. Dep. Vble: Dependent Variable.

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