Bank efficiency and openness in Africa: do income levels matter?

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Abstract

The business of this study is to investigate what role openness play in bank efficiency with respect to income levels. From a panel of 29 countries spelling from 1987 to 2008, we provide evidence that; trade and financial openness, breed less bank efficiency in low income countries; justifying the absence of a banking comparative advantage in said countries and therefore a likely palaver of over-liquidity. Results for middle income countries are not significant. For policy implication, it holds that; openness will increase the economic cost of banks in low income sampled countries. Bearing this in mind, trade openness will be more detrimental than financial openness.

Keywords: Bank efficiency, Openness, Panel, Africa.

1.INTRODUCTION

Globalization and free trade have been decried by many proponents as detrimental to domestic firms, while increasing welfare. In the past two decades, structural adjustment policies imposed on indebted African countries by the World Bank and International Monetary Fund have been perceived with mixed feelings. Many view openness as a means of improving efficiency via allocation of savings into profitable and productive projects. It is argued that, openness exposes countries to the most advanced new ideas and methods of production, there-by increasing international competition and enhancing efficiency. Today, many African nations have adopted policies that encourage trade liberalization and progressive meandering towards market-based economies. Restricting ourselves to the financial side of the hypothesis, the curiosity of knowing how financial efficiency might be affected by openness becomes vital. Owing to just a few well functioning stock exchange markets on the African continent, we are further poised to restrict our study to the bank sector: financial intermediary development.

2. LITERATURE REVIEW

The debate over Financial Development(FD) and openness has much been object of recent studies. However, many of such studies fail to pin-point what aspects of financial development are tied to openness. In this work, we shall limit ourselves exclusively to bank efficiency in financial intermediary development.

Most research on bank efficiency in developing countries has been based on Data Envelopment Analysis(DEA); which is a non parametric method in operations research used for estimating production efficiency of decision making units: production frontiers. Though this method has the advantage of not assuming a particular functional form(non parametric

approach), it presents the short coming of not being able to provide a link between output and input(endogenous and exogenous variables). Sathye(2002) for instance, uses the DEA method to measure differing efficiency of Indian banks across sectors. Results based on data from 1997-1998, show; the mean efficiency score of Indian banks is quite comparative with that of the world. Also, the efficiency of the private sector commercial banks, as a group, is lower than that of foreign and public banks. While this study could be of pertinence in presenting a case against privatization of commercial banks, its policy implication remains purely qualitative. This thesis, of state-owned firms being more efficient is confirmed by Staub et al.(2010). Still using DEA, they probe into technical and allocative efficiency of Brazilian banks between 2000-2007. Their findings reveal; compared to banks in Europe and the USA, Brazilian banks have low levels of efficiency(economic cost). Also, state-owned banks are significantly more cost efficient than those with foreign, private-domestic and private with foreign participation.

Literature on openness has been widely covered. With some authors distinguishing between financial and trade openness, and others not doing so. As to what concerns the link between openness and financial development, Rajan and Zingales(2003) put forth a hypothesis that; only through interaction of trade openness and financial openness can, financial development be possible. They make use of a panel of twenty-four countries and their results demonstrate; closed economies will more likely benefit from financial development(particularly stock market development) if there were a free cross border capital flow. The premise of interaction between openness indicators is later verified by Baltagi et al. (2009).Their findings reject the hypothesis that both types of openness are necessary for financial development to take place. In a study of twenty-nine Asian countries, Hanh(2010) confirms the results put forth by Baltagi et al. The work shows existence of a bi-directional causality between types of openness and financial development. Using Pooled Mean Group

on 28 countries, with data from 1960 to 2005, Kim et al.(2010), establish a long-run link between trade openness and finance. Suffice to mention here that, indicators of financial development mostly used by these authors are liquidity liabilities on GDP and private domestic credit on GDP. In our work, we shall approach this concept, exclusively from the perspective of 'bank credit on bank deposit'; which is an macro economic indicator of financial intermediary efficiency(Demirgüç-Kunt et al.,1999).

Beside the use of Data Envelopment Analysis(DEA) for efficiency measurement(as elucidated above), some authors look at bank sector(industry) efficiency from an Overall Economic Efficiency perspective(product of Technical Efficiency and Scale Efficiency). Such are the likes of Al-Obaidan(2008), whom; using a composite indicator for the banking industry in the Gulf region, shows with deterministic and stochastic analyses that, openness enhances technical efficiency.

Our present research agenda will differ from those of previous authors by: (1) distinguishing between trade openness and financial openness(contrary to Al-Obaidan; 2008)[1], (2)limiting ourselves to the African region; (3) using an aggregated indicator for bank sector efficiency; unlike Baltagi et al(2009) and Hanh(2010) ; (4) differing from Data Envelopment Analysis, contrary to Sathye(2002) and Staub et al.(2010); (5) integrating two welfare variables in a bid to control for 'growth-led-finance nexus'.

3. DATA and METHODOLOGY

3.1 Data

Our data spans from 1987 to 2008 because, we endeavored to capture the bank efficiency implications of the structural adjustment policy that cropped from the mid 1980's, as much as possible. Also, we are limited to 29 countries because of data unavailability.

[1] This author however fails to establish foreign direct investment as an indicator of financial openness. Just qualifying this proxy as in indicator of openness without specifying what sort of openness may be misleading.

Regarding our data sources, there's no telling that, these are widely acclaimed and used by authors; as detail on the table 1 below.

Table 1: Data collection summary

Variables	Proxies	Signs	Sources	Usages in Literature
Bank Efficiency	Bank credit/ Bank deposit	BcBd	FDSD	Demirguc-Kunt et al.(1999)
Trade Openness	(Import + Export)/GDP	IXgdp	ADI	Hanh(2010)
Financial Openness	-Foreign Direct Investment/GDP	FDIgdp	ADI	Lane and Milesi-Ferreti (2006), Baltagi et al. (2009), Hanh(2010)
	-Gross Private Capital Flows/GDP	PCFgdp	ADI	
Control Variables	GDP growth	GDPg	ADI	Hanh(2010)
	GDP growth per capita	GDPgpc	ADI	

FDSB: Financial Development and Structure Database. ADI: African Development Indicators.

3.2 Methodology

3.2.1 Unit root tests

As it is our goal to use a parametric panel method for data analysis, we begin by testing the stationary properties of our series. When a series is not integrated at level: not I(0), we endeavor to verify if it is at first difference: I(1). Integration shows stationarity and indicates, a model that assumes a particular functional distribution could be used. There are generally, two types of panel unit root tests. While the first generational assume, independence across sections, the second is founded on the premise of cross sectional dependence. We opt for the first on the basis that, sampled countries have independent economic policies. Beyond this truism, the bank efficiency indicator of each country should be independent because of the absence of a common monetary union. With regard to this generational choice, there are two types of unit root tests still: one that is homogenous and assumes a common unit root(therefore within variation) and another that is heterogeneous and is premised on individual unit roots(therefore between variation); they are respectively Levin, Lin and Chu (LLC-2002) and Im, Pesaran and Shin (IPS-2003). We shall perform both tests

but base our decisions on the later in event of conflict of interest; for any benefit of doubt. Our choice in case of conflict of interest is founded on the ground that, the alternative hypothesis of the LLC test is too powerful. Another important consideration to take into profound account in unit root tests is the autoregressive character of their processes. Consequently, optimal lag selection for goodness of fit is crucial for efficiency of tests. As pointed out by Khim and Liew(2004); when observations are below 60, the AIC(Akaike Information Criterion) and FPE (Final Prediction Error) are best at estimating optimal lags. On the other hand, when observations exceed 60 and are more or less 120, the Hannan-Quin Criterion (HQC) is best. Therefore, our LLC and IPS models will be specified by HQC and AIC respectively. Results are summarized on tables 2 and 3 below.

Table 2 : LLC Unit root test

		IXgdp	FDIgdp	PCFgdp	BcBd	GDPpcg	GDPg
Level	c	-2.788***	-5.517***	-4.267***	-2.764***	-11.79***	-12.48***
	ct	-5.173***	-7.043***	-6.441***	-3.012***	-11.95***	-12.41***
First difference	c	---	---	---	---	---	---
	ct	---	---	---	---	---	---

*,**,*** denote significance levels at 10%, 5% and 1% respectively. Maximum lag is 2 and optimal lags are chosen via HQC. 'c' and 'ct': 'constant' and 'constant and trend' respectively.

Table 3: IPS Unit root test

		IXgdp	FDIgdp	PCFgdp	BcBd	GDPpcg	GDPg
Level	c	-1.736***	-5.609***	-4.717***	-1.360*	-11.96***	-12.23***
	ct	-4.001***	-5.283***	-5.343***	-0.498	-11.05***	-11.21***
First difference	c	---	---	---	---	---	---
	ct	---	---	---	---	---	---

*,**,*** denote significance levels at 10%, 5% and 1% respectively. Maximum lag is 2 and optimal lags are chosen via AIC. 'c' and 'ct': 'constant' and 'constant and trend' respectively.

3.2.2 Model Specification tests

Panel model specification will be based on two main tests: one in a bid to verify if variance of residuals is constant or not(homoscedasticity or hetescedasticity) and the other to investigate whether specific cross sectional effects play a role in the determination of

estimators(fixed effect when they do and random effect when they don't). These tests are the Breusch Pagan and Hausman respectively. While the null hypothesis of the former test, argues for homoscedasticity, that of the later, makes the case for panel with random effect. To put this into perspective, as summarized on table 4; GLS with RE(Generalized Least Squares with Random Effect), indicate; rejection of null hypothesis for Breusch Pagan test and non rejection of its equivalent in Hausman test. Both tests follow the chi-square distribution.

Table 4: Panel Model Specification tests

Model Specification	Dependent Variable(BcBd)				
	Model 1	Model 2	Model 3	Model 4	Model 5
B.P. Test	1694.29***	1630.8***	1725.28***	1781.17***	1646.64***
Hausman T.	9.89	8.95	6.84	6.26	9.65
Model	GLS with R.E	GLS with R.E	GLS with R.E	GLS with R.E	GLS with R.E

Breusch Pagan and Hausman tests all follow a chi-square distribution. *,**,*** denote significance levels at 10%, 5% and 1% respectively. GLS: Generalized Least Squares. R.E: Random Effect.

3.2.3 Model Formulation

Let's consider the following binary multivariate dummy model:

$$BcBd_{it} = \gamma_0 + \gamma_{1l} L_{it} XI_{it} + \gamma_{1m} M_{it} XI_{it} + \gamma_{2l} L_{it} FDI_{it} + \gamma_{2m} M_{it} FDI_{it} + \gamma_{3l} L_{it} PCF_{it} + \gamma_{3m} M_{it} PCF_{it} + \gamma_{4l} L_{it} GDPpcg_{it} + \gamma_{4m} M_{it} GDPpcg_{it} + \gamma_{5l} L_{it} GDPg_{it} + \gamma_{5m} M_{it} GDPg_{it} + \varepsilon_{it}$$

Where:

- countries $i = 1,2,...,29$; time $t = 1,2,...,20$

-for Low Income countries; $L_{it} = 1/M_{it} = 0$

-for Middle Income countries; $M_{it} = 1/L_{it} = 0$

-XI, FDI and PCF are all on GDP.

For ease in interpretation of estimators upon regression, parameters of the model in estimated form are represented as: constant, *liXIgdp, miXIgdp, liFDIgdp, miFDIgdp, liPCFgdp, miPCFgdp, liGDPpcg, miGDPpcg, liGDPg, miGDPg*.

4. EMPIRICAL ANALYSIS

4.1 Empirical Results

Table 5 : Empirical Results

Independent Variables	Dependent Variable(BcBd)				
	Model 1	Model 2	Model 3	Model 4	Model 5
constant	0.85 (14.57)***	0.74(14.35)***	0.84(12.92)***	0.84(12.69)***	0.84(12.80)***
liXIgdp	-0.34(-2.67)***	---	-0.38(-2.97)***	-0.39(-3.07)***	-0.38(-2.96)***
miXIgdp	-0.14(-1.22)	---	-0.10(-0.84)	-0.09(-0.75)	-0.08(-0.75)
liFDIgdp	-0.04(-2.11)**	-0.05(-2.24)**	-0.01(-2.18)**	---	-0.04(-2.11)**
miFDIgdp	0.001(0.15)	0.003(0.34)	-0.005(-2.36)**	---	0.002(0.24)
liPCFgdp	0.03(1.50)	0.03(1.50)	---	-0.01(-1.64)*	0.034(1.56)
miPCFgdp	-0.005(-0.59)	-0.009(-0.94)	---	-0.005(-2.48)**	-0.007(-0.80)
liGDPpcg	---	-0.01(-2.12)**	-0.01(-2.31)**	-0.01(-2.31)**	-0.01(-2.34)**
miGDPpcg	---	-0.02(-1.32)	-0.01(-0.74)	-0.01(-0.83)	-0.01(-0.85)
liGDPg	---	0.01(1.79)*	0.01(1.94)*	0.01(1.91)*	0.01(1.95)*
miGDPg	---	0.01(0.82)	0.004(0.23)	0.006(0.32)	0.00(0.34)

*,**,*** denote significance levels at 10%, 5% and 1% respectively.

Estimated results as summarized on table 5, indicate : (1) trade openness and financial openness decrease bank efficiency in low income countries but not significant in middle income countries; (2) the trade openness elasticity to bank efficiency is greater than financial openness elasticity to bank efficiency; (3) foreign direct investment is more significant as an indicator of financial openness than private capital flows; (4) Growth per capita and GDP growth are only significant for low income countries; (5) GDP per capita growth and GDP growth affect bank efficiency negatively and positively respectively.

4.2 Discussion and Policy Implications

Results appear to support the thesis that, with globalization, openness and free trade, financial development in low income countries via bank efficiency seem blur. Opening up of low income countries should bring about a comparative advantage in product and services linked to unskilled labour; most predominantly in the primary sector. However, the bank industry is a tertiary sector and low income countries are not competitive enough in it. So results are but logical. They partially see with Asongu(2010b) who does not find any linkage

between financial development and openness in African countries; albeit binary dummies were not part and parcel of estimation model. An explanation as to why, per capita growth negate bank efficiency, while GDP growth increases it, could be understood from the fact that; population growth rates are higher than GDP growth rates; such that, variation in GDP growth only decreases per capita growth. Less capita growth implies, less deposit per capita; less deposit per capita decreases the denominator of the bank efficiency ratio; therefore increasing it. This explanation is only suggestive and maybe object of further research.

For policy implications, sampled low income countries(see Appendix A) should be mindful of their competitive disadvantage in the banking sector when adopting openness policies. They should also take note, trade openness is more detrimental than financial openness in the reduction of financial intermediary efficiency.

5) CONCLUSION

In this work, we aimed at investigating the relationship between openness and bank efficiency in a selected African counties. Our negative linked results meet expectations for low income countries in the continent because, their banking sectors are at the disadvantage; competitive speaking. It follows that, completely opening-up the financial intermediary sector would be to the detriment of bank sector efficiency. Whether this would be same for stock market efficiency, should be subject to further research. Also another important dimension of a future study could have to do with investigating whether this inefficiency originates from state-owned, foreign, private-domestic or private-foreign banks

Appendix A: List of African Countries

Income Levels	Countries
Low Income	Burundi, Côte d'Ivoire, Ghana, Kenya, Madagascar, Mali, Togo, Mozambique, Malawi, Nigeria, Rwanda, Senegal, Sierra Leon, Tanzania, Uganda, Zambia.
Middle Income	Angola, Botswana, Cameroon, Congo Republic, Egypt, Gabon, Lesotho, Morocco, Mauritius, Sudan, Swaziland, Tunisia, South Africa.

Source(author)

Appendix B: Summary Statistics(1988-2007 ; countries 29)

Variables	**Source**	**M.Unit**	**Mean**	**S.D**	**Min.**	**Max.**	**Kurt.**	**Skew.**	**Observ.**
IXgdp	ADI	% GDP	0.39	0.21	0.00	1.37	4.15	1.81	580
FDIgdp	ADI	% GDP	2.61	5.03	-8.62	42.49	23.44	4.14	552
PCFgdp	ADI	% GDP	2.63	5.08	-9.10	42.49	22.23	3.96	556
BcBd	FDSD	---	0.74	0.32	0.13	1.84	0.46	0.75	567
GDPpcg	ADI	%	1.45	5.18	-46.89	37.83	19.27	-1.26	579
GDPg	ADI	%	3.84	5.38	-50.24	35.22	21.88	-1.84	579

M.Unit: Measurement Unit, S.D: Standard Deviation, Min:Minimun , Max:Maximum, Kurt:Kurtosis, Skew: Skewness, Observ: Observations, ADI : African Development Indicators, FDSD :Financial Development and Structure Database.

Appendix C: Correlation Analysis

	IXgdp	FDIgdp	PCFgdp	BcBd	GDPpcg	GDPg
IXgdp	1					
FDIgdp	0.469	1				
PCFgdp	0.462	0.977	1			
BcBd	-0.124	-0.229	-0.204	1		
GDPpcg	0.075	0.046	0.035	-0.193	1	
GDPg	0.032	0.033	0.025	-0.184	0.972	1

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