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Content

1. Profitability in the Banking Sector and Difference in Exchange Rate Regimes: The Cases of Selected Sub-Saharan African Countries: **Kanfitine Lare-Lantone**: 3-29
2. Do Commodity Prices Follow a Random Walk? An Application of Joint Variance Ratio Tests: **Kingsley Nwala**: 30-39
3. Savings and Investment Nexus in the Perspective of Foreign Capital: The Feldstein-Horioka Paradox: **P. K. Mishra**: 40-49
4. An Econometric Analysis of Growth Rate: Indian Electronics Industry from 1981 to 2004: **Aditi Ghosh**: 50-61
5. The Rise in Equity Exchange Traded Funds (ETFs): The case of Momentum: **Young O. Dimkpah et al.**: 62-70

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PROFITABILITY IN THE BANKING SECTOR AND DIFFERENCE IN EXCHANGE RATE REGIMES: THE CASES OF SELECTED SUB-SAHARAN AFRICAN COUNTRIES

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Abstract: This paper investigated whether profitability in banking sectors is sensitive to differences in exchange rate regimes in selected Sub-Saharan African countries: Cameroon, Cote d'Ivoire, Gabon, Ghana, Kenya, Mauritius, Nigeria, Senegal, and South Africa. It compares the behaviors of specific production, structure, and efficiency variables along with macroeconomic variables as determinants of banks' ROAs, ROEs, and interest spreads in both fixed and flexible exchange rate regimes. The model estimated using aggregated national banking data in panel regressions provided better results with the interest spread as the dependent variable. Globally, banks' foreign liabilities, assets, and liabilities are weakly sensitive to differences in exchange rate regimes. Specifically, the bank management quality variable is found to be significant for Ghana and South Africa while the exchange rate is significant for Cameroon, Gabon, and Mauritius. This leads to mixed results as the exchange rate is not significant for Cote d'Ivoire, Senegal which are fixed exchange rate countries. Bank assets are revealed significant determinants of their profitability for Ghana. Bank liabilities are found significant determinants for Cameroon Gabon, Mauritius, Nigeria, and South Africa.

INTRODUCTION

Economic literature has identified several determinants of bank profitability, of which country specific factors [Lolos & Papapetrou (1998)] such as monetary policy [Bagliano & al (2000)], fiscal policy [Poghosyan & al (2009)], regulatory framework [Spong (1994)], and political and legal settings [Beck and Levine (2004); Chinn and Ito (2005); etc.] While accounting for the influence of national macroeconomic environments in the analysis is popular, the impact a country's exchange rate arrangement exerts on bank profitability is yet to be investigated. This paper compares the profitability in the banking sectors in nine Sub-Saharan African countries with different exchange rate regimes. Cameroon, Cote d'Ivoire, Gabon, and Senegal have fixed exchange rate regimes while Ghana, Kenya, Mauritius, Nigeria, and South Africa have flexible exchange rates. The theoretical model links the profitability in a banking sector to its production, structure, and efficiency variables and macroeconomic variables. The variable exchange rate is used to control for the impact exchange rate regimes exerted on banks profitability. The model is estimated using aggregated national banking data and panel regressions.

Globally, the results of the regressions with interest spread as the dependent variable provided better results than those with the Return on Assets (ROA) and the Return on Equity (ROE). Exchange rate is revealed to be a statistically significant determinant of interest rate spread in Cameroon, Gabon, and Mauritius suggesting a mixed result as to the importance of exchange rate regimes in explaining profitability in banking sectors. The fact that the exchange rate is statistically significant in only two of the fixed exchange rate countries suggests that profitability may be more sensitive to other factors such as trade and debt flows than to exchange rate regime. Management quality is revealed as a statistically significant determinant of the profitability in Ghana and South Africa but not in any of the fixed exchange rate countries. The other explanatory variables: domestic assets, domestic liabilities, and foreign liabilities are generally weak determinants of the profitability in the nine banking sectors.

The rest of the paper is organized in four sections. Section II reviews the literature. Section III sets the methodological background and develops the theoretical model. Section IV presents the empirical analysis and Section V the conclusion.

LITERATURE REVIEW

Previous studies have identified factors such as management [Bryan (1971); Revell (1972); etc.] industry specific characteristics [Bryan (1971); Short (1977); etc.], market structure [Honohan & Kinsella (1982); Kwast & Rose (1982), etc.], regulations [Short (1979); Hancock (1985); etc.], ownership type [Bourke (1988); Molyneux & Thornton (1992); etc.], regional environment [Kwast & Rose (1982)], technological change and innovation [Hannan & McDowell (1984); Aoki (1994); etc.], and economies of scale [Mullineaux (1978); Murray & White (1983); etc.] as determinants of commercial banks profitability. The accounting for the influence of macroeconomic environments in the analysis of banks profitability also started earlier [Kwast & Rose (1982), Bourke (1988); Liang (1989); Molyneux & Thornton (1992); etc.] But, it was sustained with studies of the influences the changes in national economic environments, due to the unification of European economies, could have exerted on the behaviors and profitability of banks [Bagliano & al (2000); Dietsch & Lozano-Vivas (2000); De Bandt & Davis (2000); etc.] For example, Hondroyannis & al (1998) investigated the impact changes in the macroeconomic environment may have on the competition level in the Greek banking industry. They found that the new measures adopted from 1993 to facilitate the adhesion of Greece to the European Monetary System (EMS) had positively affected the competition level of the banking sector and improved firms' performances. Bagliano & al (2000) investigated the potential impact of the implementation of the European Monetary Union (EMU) on collusion among banks. Using a model of oligopolistic competition they analyzed the possible effects the European Central Bank (ECB) policy criteria may exert on the cost of credit in national markets. They suggested that the increasing integration of national economic environments will modify the market structure of credit markets in member countries but also the shift from national central banks to the ECB may have specific effects on banks' behavior. Dietsch & Lozano-Vivas (2000) compared French and Spanish banking industries in order to set how differences in national economic environments affect bank performances. They selected macroeconomic variables as well as variables explaining the peculiar features of each country's banking industry such as regulatory conditions, banking structure and accessibility of banking services to identify the common frontier. Their findings suggest that countries with a higher per capita income have a banking system that operates in a mature environment resulting in more competitive interest rates and profit margins. Also, banks operating in markets with a lower density of demand incur higher expenses because this demand factor may impose a ceiling on the reachable efficiency level of their branches. Athanasoglou & al. (2006) study the profitability behavior of the Southeastern European banking industry over the period 1998–02 and concluded that the enhancement of bank profitability in those countries requires new standards in risk management and operating efficiency, which, according to the evidence presented in their paper, crucially affect profits. A key result is that the effect of market concentration is positive, while the picture regarding macroeconomic variables is mixed.

The impact of the macroeconomic environment is also routinely tested in the analysis of banks profitability in Africa. Using accounting decompositions, as well as panel regressions, Al-Haschimi (2007) studied the determinants of bank net interest rate margins in 10 Sub-Saharan African countries and found that credit risk and operating inefficiencies, a signal of market power, explain most of the variation in net interest margins across the region. In addition, macroeconomic and regulatory conditions have a pronounced impact on margins and profitability. In another study of the determinants of commercial banks profitability in Sub Saharan Africa, Flamini & al (2009) found that bank specific and macroeconomic risk factors are the most important ex-

planations for banks' high returns though not conclusive as to whether market power influences bank returns.

Earlier authors used various proxies to capture the influence of the macroeconomic environment on banks profitability but with time the research interest is being geared towards assessing the impact a specific macroeconomic variable may exert on it. David Hauner (2006) investigated the impact the use of bank credit to finance public debt as a substitute for external financing can have on the profitability and efficiency of banks and in the long run on the quality of financial development. Using a panel data, he tested this relationship for banks in 73 middle income countries and found that the financing of public debt with bank credit harm bank profitability and efficiency. Poghosyan & al (2009) attempted to measure the impact oil shock have on MENA countries bank profitability directly and indirectly via macroeconomic and country specific variables. Applying GMM panel data technique to 145 banks, they found that oil shocks have an indirect impact on banks profitability. More recently, de Blas & Russ (2010) measured the impact of Foreign Direct Investments (FDI) on bank interest gain. Using heterogeneous, imperfectly competitive lenders, they found that that FDI can cause markups to increase at the same time efficiency gains and local competition keep the interest rates that banks charge borrowers from rising.

Though the literature had not systematically analyzed the impact exchange rate or an exchange rate regime may exert on bank profitability, findings by Hondroyiannis & al (1998) suggest that the gradual removal of exchange control has benefited the competition in the Greek banking industry. Aizenman & Hausmann (2000) explored the links between exchange rate regimes and financial market imperfections and found that when the welfare gain due to lower interest rate associated with lower flexibility of the exchange rate is reduced, a fixed exchange rate regime is desirable. Inversely, when the real interest rate gain due to exchange rate stability is reduced because of a greater integration to the global capital market, an optimal flexible exchange rate is desirable. Analyzing the ongoing reforms of the international financial system at the aftermath of the 1998 East Asian crisis, Citrin and Fisher (2000) discussed the importance of exchange rate regimes as a source of volatility in the financial system. They show that both short term volatility and medium-term swings in exchange rates among the three central currencies had caused capital inflows in emerging countries to be too large and interest rate spread to be too narrow to depress their financial markets. This, according to them, raises concerns over the right choice of exchange rate regime, a matter of controversy for well over a century.

It is clear from the review that assessment of the impact exchange rate regimes may exert on profitability in the banking sector can only contribute effectively to the literature.

METHODOLOGY

The Model

It is assumed a developing economy which banking sector holds domestic and foreign liabilities, supplies only domestic assets, and conducts all of its interest related operations in domestic currency. In the reality, the foreign demand for bank assets is very marginal while the foreign demand for bank liabilities is significant. Thus, profitability in the banking sector depends on foreign liabilities which, in turn is determined by the level of foreign savings, foreign deposits rate and the exchange rate of the domestic currency into the foreign currency. On that basis, the ability of the banking sector to intermediate and ultimately maximize its profit depends on the movements in the exchange rate, *ceteris paribus*. That impact will be null in case the exchange rate between the two currencies is fixed.

Further, it is assumed that the banking sector is competitive in both assets and liabilities markets and its profit function which is similar to that of the typical banking firm can be written as:

$$\Pi = rA - iL \quad (1)$$

Π is the profit, A is the total assets, L is the total liabilities, r is the domestic rate of interest on assets (credit rate), and i is the domestic rate of interest on liabilities (deposits rate). Due to regulations, banks hold part of their liabilities as required reserves and their total assets is determined as:

$$A = (1 - \beta)L \quad (2)$$

β is the required reserve ratio. Total liabilities are the sum of domestic and foreign liabilities and can be written as:

$$L = L_d + L_f \quad (3)$$

L_d is the foreign demand for domestic bank liabilities and L_f is the domestic demand for domestic bank liabilities. The rate of interest on domestic banks assets is determined by the total demand for their assets, the domestic and foreign demands for domestic banks liabilities and the national production (Y).

$$r_d = r_d(\bar{A}, \bar{L}_d, \bar{L}_f, \bar{Y}) \quad (4)$$

The rate of interest on banks liabilities depends on the total demand for banks assets, the domestic and foreign demands for domestic banks liabilities, and the exchange rate of the domestic currency in the foreign currency (e).

$$i_d = i_d(\bar{A}, \bar{L}_d, \bar{L}_f, \bar{e}) \quad (5)$$

The domestic demand for domestic banks liabilities is determined by the domestic rate of interest on liabilities and the domestic savings (S_d).

$$L_d = L_d(\bar{i}_d, \bar{s}_d) \quad (6)$$

The foreign demand for domestic banks liabilities is determined by the domestic rate of interest on liabilities and the exchange rate.

$$L_f = L_f(\bar{i}_d, \bar{e}) \quad (7)$$

Banks maximize their profit by maximizing Equation (1) constrained by Equations (2) through (7) using the Lagrangean function as:

$$L = [r_d A - i_d L] + \lambda_1 [A - (1 - \beta)L] + \lambda_2 [(L_d - L_d(i_d, s_d)) + \lambda_3 [L_f - L_f(i_d, e)] + \lambda_4 [r_d - r_d(A, L_d, L_f, Y_d)] + \lambda_5 [i_d - i_d(A, L_d, L_f, e)] \quad (8)$$

Resolving the Lagrangean function leads to the domestic banks interest spread and profit rate as:

$$\frac{r_d}{i_d} = \frac{[(1 - \beta)(1 + E_{e/L_f})]^2 [e - A - L_d - L_f]}{(1 - \beta)(1 + E_{r_d/A})^2 [Y - A - L_d - L_f]} \quad (9)$$

and

$$\Pi = \frac{[(1 - \beta)E_{i_d/L}E_{L/A} + a]^2 [e - A - L_d - L_f]L - [(1 - \beta)(1 + E_{r_d/A})]^2 [Y - A - L_d - L_f]A}{[(1 - \beta)(1 + E_{r_d/A})][(1 - \beta)E_{i_d/L}E_{L/A} + a]} \quad (10)$$

$E_{i/L}$ is the inverse elasticity of bank liabilities with respect to the rate of interest on liabilities, $E_{r/A}$ is the inverse elasticity of bank assets with respect to the rate of interest on assets, $E_{L/A}$ is the elasticity of bank liabilities with respect to their assets, and (a) is the transformation ratio. Equa-

tions (9) and (10) indicate that domestic banks' interest spread and profits are determined by the size of their assets, their intermediation ratio, the elasticity of their liabilities with respect to the rate of interest on liabilities, the elasticity of their assets with respect to the rate of interest on assets, the elasticity of their assets with respect to their liabilities, the domestic demand for their liabilities, the foreign demand for their liabilities, the exchange rate, and the level of the national production. Thus:

$$\frac{r_d}{i_d} = \frac{r_d}{i_d} [A, a, e, L_d, L_f, E_{A/r_d}, E_{L/i_d}, E_{L/A}, Y] \quad (11)$$

and

$$\Pi = \Pi [A, a, e, L_d, L_f, E_{A/r_d}, E_{L/i_d}, E_{L/A}, Y] \quad (12)$$

The impact of the exchange rate will be positive in the case of a depreciation of the domestic currency leading to an increase in the foreign demand for domestic banks assets. The impact will be reversed in the case of an appreciation of the exchange rate. Assuming a linear relationship between the interest rate spread and the profit rate and their respective determinants, the actual relationships are:

$$\frac{r_d}{i_d} = \alpha_0 + \alpha_1 A + \alpha_2 a + \alpha_3 e + \alpha_4 L_d + \alpha_5 L_f + \alpha_6 E_{A/r_d} + \alpha_7 E_{L/i_d} + \alpha_8 E_{L/A} + \alpha_9 Y \quad (13)$$

and

$$\Pi = \beta_0 + \beta_1 A + \beta_2 a + \beta_3 e + \beta_4 L_d + \beta_5 L_f + \beta_6 E_{A/r_d} + \beta_7 E_{L/i_d} + \beta_8 E_{L/A} + \beta_9 Y \quad (14)$$

In order to capture the impact each banking sector's specific features exert on banks profitability, we extended the model by adding three additional variables to control for concentration, efficiency and management quality (Table 1). The expected signs of their coefficients are set respectively on the basis of the following underlying assumptions. (i) Firms in a concentrated market gain extra profit as they set prices above the equilibrium level. Thus a positive relationship is assumed between concentration level and profitability. (ii) Cost efficient firms tend to be more profitable. (iii) Firms that exhibit good management quality reduce their cost and consequently increase their profits.

The extended model was estimated using data obtained from various sources. Financial data are extracted from the World Bank's (i) Financial Structure database and (ii) African Development and Financial Indicators. Country data on lending rate, deposit rate, foreign liabilities, and exchange rate are those published in the IMF International Financial Statistics (Table 2.) Country data on debt currency composition and destinations of trade are obtained from the IMF Direction of Trade. The data on (i) debt currency composition and (ii) destination of trade were used to determine the foreign currency in which each country had exchanged the most with the rest of the world during the period 1995-2008. The underlying assumption is that banks' profitability will be most sensitive to fluctuations in that specific foreign currency than others. Based on that, their profitability can also be explained by fluctuations in the exchange rate of the domestic currency into that specific foreign currency.

In order to determine the foreign currency to which each banking industry was most sensitive, we computed the weighted average of the shares of the country debt and trade relative to their currencies of denomination. Table 3 presents the estimated values and specifies exchange rate arrangements. As suggested by the values, it is logical to assume that the profitability in the banking sectors of Cameroon, Cote d'Ivoire, Gabon, and Senegal have been most sensitive to

fluctuations in the Euro currency as their common currency; the CFA franc is pegged to the Euro.

As a consequence and also because of enduring post colonial ties, they have traded essentially with countries in the Euro zone and particularly with France. Referring to our theoretical framework, the impact of the exchange rate on banks profitability in such cases should be null. For, we considered testing the significance of both dollar and Euro currencies as determinants of the profitability in the banking sector in all the targeted countries.

Finally, depending on their specific nature, the exogenous variables can be set in four categories: (i) production variables (EARAT, ELRATE, ELIAS, INTMED), (ii) structure variables (ASSETS, LIAB, FORLIAB), (iii) performance variables (STRUC EFFIC, MGT), and macroeconomic variables (EXCHGE (\$), EXCHGE (€), NATPRO.) EXCHGE (\$) and EXCHGE (€) are respectively the dollar based and Euro based exchange rate variables.

EMPIRICAL RESULTS

In order to capture each country's specific features and avoid losing degrees of freedom, given the short nature of the data, we used panel regressions. Initially, the tests for stationarity in the series using the (i) Levin, Lin & Chu (LLC) and (ii) Im, Pesaran & Shin (IPS) tests including individual effects suggest a rejection of the null hypothesis of a common unit root in the series EARAT, ELRATE, ELIAS, EXCHGE (\$), EXCHGE (€), STRUC, and ROE. Inversely, they suggest an acceptance of the null hypothesis for the series FORLIAB, EFFIC, LIAB, MGT, NATPRO, and ROA (Annex 1). Specifically, the LLC tests suggest a rejection of the null hypothesis for the series INTMED, ASSETS, and SPREAD. We then performed cointegration tests of the series using the Johansen test substituting successively the dependent variables ROA, ROE, and SPREAD in the set of variables. Both Trace and Maximum Eigen Value tests suggest the existence of at least 5 cointegrating equations leading to a rejection of the null hypothesis of no cointegration among the series (Annex 2.)

Table 1. Definition of variables

Symbol	Definition	Expected sign
Π	Profit	
r_d/i_d	Spread	
A	Total assets	+
L_d	Domestic liabilities	-
A	Intermediation ratio	+
L_f	Foreign demand for domestic banks liabilities	-
$E_{l/d}$	Elasticity of the demand for domestic banks liabilities with respect to the rate of interest on liabilities	-
E_{A/r_d}	Elasticity of the domestic demand for banks assets with respect to the rate of interest on assets	+
$E_{A/L}$	Elasticity of the demand for banks assets with respect to the demand for banks liabilities	+
E	Exchange rate	+/-
Y	National production	+
Extended	Concentration ratio	+
Extended	Financial efficiency	+
Extended	Management quality	+

Table 2. Measures of the variables

Name	Measure	Source
ROA	Net income/Total assets	1
ROE	Net income/Total equity	1
SPREAD	Interest rate spread	1
ASSETS	Deposit money bank assets/GDP	1
LIAB	Bank deposits/GDP	1
INTMED	Bank credit/Bank deposits	1
FORLIAB	Bank foreign liabilities (current LCU)	3
ELRATE	Computed elasticity of domestic banks liabilities with respect to the rate of interest on liabilities	2; 4
EARATE	Computed elasticity of domestic banks assets with respect to the rate of interest on assets	2; 4
ELIASS	Computed elasticity of banks assets with respect to banks liabilities	1; 4
EXCHGE (\$)	Change in real exchange rate (LCU per US\$, period average)	3; 4
EXCHGE (€)	Change in Real exchange rate (LCU per FF/EURO, period average)	2; 4
NATPRO	Per capita GDP	2
STRUC	Assets of three largest banks/Total assets of all banks.	1
EFFIC	Bank overhead/Total assets	1
MGT	Liquid liabilities/GDP	1

(1) World Bank Financial Structure database; (2) World Bank African Development Indicators; (3) IMF International Financial Statistics; (4) Author's calculations.

Table 3. Countries foreign trade and debt currencies composition

Country	Averaged weight			Currency Sensitivity			ERA ³	
	Euro	USD ¹	Rest ²	Euro	USD	Rest	Fixed	Flexible
Cameroon	75.2	15.1	9.7	Most	-	-	Yes	No
Cote d'Ivoire	55.5	33.0	11.5	Most	-	-	Yes	No
Gabon	48.4	41.2	10.4	Most	-	-	Yes	No
Ghana	34.6	40.8	24.6	-	Most	-	No	Yes
Kenya	31.2	31.5	37.3	Equally	Equally	-	No	Yes
Mauritius	47.7	21.3	31	Most	-	-	No	Yes
Nigeria	32.6	51.7	15.7	-	Most	-	No	Yes
Senegal	52.8	25.7	21.5	Most	-	-	Yes	No
South Africa	40.8	34.1	25.1	Most	-	-	No	Yes

(1) USD: US Dollar; (2) Rest: Others, Pound Sterling, Swiss Franc, Yen; (3) ERA: Exchange Rate Arrangement / Source: IMF Direction of Trade and author's calculation.

We ran the regressions of the independent variables by category with each dependent variable (Tables 4a-4b) and selected the statistically significant variables from each group. Then we ran new regressions of the selected variables with the initially specified dependent variable. The Hausman specification tests applied to the new estimation outputs suggest a rejection of the null

hypothesis of no correlation among the regressors and the random effect for the regression with the ROA, i.e., the suitability of the random effect specification panel model. Inversely, it suggests an acceptance of the null hypothesis for the regression with the ROE and the SPREAD, i.e., the suitability of the fixed panel model specification (Annex 3.) The results of the estimations based on these specifications are compiled in Tables 5.

Globally, regressions with the dependent variable SPREAD generated better results than both the ROA and the ROE, suggesting a better fit of the data to the theoretical model. The superiority of interest spread as dependent variable may be an indication that, in most of the targeted countries, bank activities are essentially interest-related. Non-interest related activities are marginal or nonexistent. The coefficient of the variables ASSETS, LIAB, and MGT are statistically significant with the dependent variable SPREAD. Also, the coefficients of the variables ELRATE, EFFIC, and MGT are statistically significant with the dependent variable ROA. Though the coefficient of the variable EXCHGE (\$) is statistically non-significant, it is more significant with ROE and SPREAD and comparatively more significant than that of EXCHGE (€). The comparatively very weak statistical significance of the variable EXCHGE (€) shows that banks profitability is more sensitive to changes in the value of the dollar regardless of a country's trade and debt currency compositions or exchange rate regime.

To capture country specific effects, we reran the regressions with the ROE and SPREAD holding successively the coefficients of (i) the dollar-based exchange rate variable and then (ii) each of the revealed statistically significant variables as a cross section (Annex 4.)

The variable EXCHGE (\$) is more statistically significant with the dependent variable SPREAD than the ROE. Its coefficient is statistically significant and bears the positive sign with SPREAD for Cameroon, Gabon, and Mauritius. Surprisingly, the coefficient of EXCHGE (\$) is statistically significant for Cameroon and Gabon and not Cote d'Ivoire and Senegal, all fixed exchange rate regime countries. Such a result may be in part due to capital controls in the WAEMU while supports for the benefits of capital liberalization abound in the literature. For example, Hondroyannis, et al. (1998) found that the gradual removal of exchange control has benefited the competition in the Greek banking industry. Thus, our results relative to the sensitivity of profitability in the banking sector to exchange rate regimes are mixed.

It is only for Cote d'Ivoire that the coefficient of FORLIAB is statistically significant and bears the expected sign when estimated with the ROE. This finding reflects the fact that Cote d'Ivoire is the financial center of the eight-member countries economic and monetary union (WAEMU). In addition to hosting the regional stocks market, the country had benefited from significant FDI inflows evidenced by the 4359% increase in the size of the foreign liabilities held by its banking sector from 1995 to 2006. The impact of foreign liabilities is weak in the rest of the countries and no evidence is offered as to whether it is sensitive to differences in exchange rate regimes.

The variable MGT performed better with the dependent variable SPREAD than ROE. Its coefficient is statistically significant and carries the expected sign for Ghana and South Africa, both flexible exchange rate regime countries. Bank management in these two countries had generated important exchange rate gains and fuelled the national economies with significant liquid liabilities. The weak significance of the coefficient of MGT for the fixed exchange rate countries is no strong evidence relative to banks interest spread sensitivity to differences in exchange rate regimes.

Though, the coefficient of ASSETS bears the expected sign for Gabon, Ghana, Kenya, and South Africa, it is only statistically significant for Ghana. This result suggests that interest spreads in the country's banking sector are highly sensitive to changes in banks assets sizes evi-

denced by a period (1995-2008) average price elasticity of assets of 0.71 compared to 0.28 for the other eight countries combined. The impact of banks assets on their profitability is weak in the rest of the countries and no evidence is offered as to whether it is sensitive to differences in exchange rate regimes.

The coefficient of LIAB carries the expected sign for all the countries except Ghana but is only statistically significant for Cameroon Gabon, Mauritius, Nigeria, and South Africa. This is an indication that interest spreads in these countries banking sectors are rather more sensitive to changes in the sizes of banks liabilities. Peculiarly, neither banks assets nor their liabilities are found to be significant determinants of interest spread in the banking sectors of Cote d'Ivoire and Senegal. This may be due to the facts that over the period, nominal deposit rates have been officially set within the CFA zone countries but adjusted six times in the CEMAC and never in the WAEMU. The impact of banks liabilities on banks profitability is weak in the rest of the countries and no evidence is offered relative to its sensitivity to exchange rate regimes. Thus, given an exchange rate regime, it is the choice of monetary policy instruments and their effectiveness that impact the profitability of banks. Our conclusion provides a support to the view that strong policies and institutions are needed for economic stability no matter the exchange rate system [Citrin & Fisher (2000).]

CONCLUSION

This paper investigated the impact differences in exchange rate regime exerted on profitability in nine sub-Saharan countries banking sectors. It linked banking sector's production, structure, and efficiency variables along with macroeconomic variables to their ROA, ROE, and interest spread. The variable is used to control for difference in exchange rate regimes. Generally, the results differed with the ROA, the ROE, and interest spread as dependent variable. Consistently, interest spread as a measure of profitability provided the best results suggesting that banks profitability in these countries is mainly interest related. On one hand, Banks assets, liabilities, and management quality are statistically significant determinants of their spread. On the other hand, the elasticity of the demand for banks assets with respect to their rate of interest, efficiency, and management quality are statistically significant determinants of their ROA while none of the variable is revealed statistically significant with the ROE.

Cross-country comparisons of the coefficients of the exogenous variables indicate that foreign liabilities are only statistically significant in explaining banks profitability in the case of Cote d'Ivoire. Similarly, bank assets are only statistically significant in explaining banks profitability in Ghana while their liabilities are statistically significant in explaining bank profitability in Cameroon, Nigeria, Mauritius, Gabon, and South Africa. Neither banks assets nor their liabilities are statistically significant determinants of their profitability in Cote d'Ivoire and Senegal. The exchange of domestic currencies in the dollar is statistically significant for Cameroon, Gabon, and Mauritius leading to a mixed result relatively to the importance of the exchange rate regime in explaining bank profitability. Finally, neither exchange rate nor the exchange rate regime influences banks profitability significantly.

Table 4a. Estimation results of independent variables tested by specified groups

	ROA	ROE	SPR	ROA	ROE	SPR	ROA	ROE	SPR
Constant	0.02 (1.7)	0.16 (1.9)	11.31 (5.9)	0.02 (2.8)	0.2 (5.6)	13.72 (12.2)	0.03 (2.2)	0.27 (2.8)	13.89 (6.2)
EARATE	0.00 (-0.4)	0.01 (0.6)	0.04 (0.1)						
ELRATE	0.00 (-1.5)	0.00 (0.3)	0.02 (0.5)						
ELIAS	0.00 (0.5)	0.00 (-0.0)	0.00 (-0.1)						
INTMED	0.00 (-0.1)	0.00 (-0.0)	-0.14 (-0.1)						
ASSETS				-0.02 (-0.4)	0.00 (0.0)	13.34 (2.0)			
LIAB				0.00 (0.0)	-0.2 (-0.5)	-24.43 (-2.9)			
FORLIAB				0.00 (1.8)	0.00 (1.4)	0.00 (-0.1)			
STRUC							0.02 (1.6)	0.01 (0.1)	-2.65 (-1.3)
EFFIC							-0.36 (-3.7)	-0.92 (-1.1)	21.43 (1.3)
MGT							-0.03 (-1.6)	-0.2 (-2.1)	-5.74 (-1.9)
Cross-section random									
S.D.	0.01	0.06	2.36	0.01	0.05	2.16	0.01	0.04	1.98
Rho	0.22	0.12	0.44	0.41	0.1	0.43	0.41	0.05	0.37
Idiosyncratic random									
S.D.	0.02	0.16	2.65	0.02	0.16	2.51	0.02	0.15	2.58
Rho	0.78	0.88	0.56	0.59	0.9	0.57	0.59	0.95	0.63
Weighted Statistics									
R-squared	0.02	0	0	0.03	0.03	0.1	0.12	0.03	0.06
Adjusted R-squared	-0.01	-0.03	-0.03	0	0.01	0.08	0.09	0.01	0.04
F-statistic	0.65	0.1	0.07	1.13	1.34	4.38	5.26	1.41	2.51
Prob(F-statistic)	0.63	0.98	0.99	0.34	0.27	0.01	0	0.24	0.06
Durbin-Watson stat	0.93	1.75	0.83	1.06	1.8	0.92	1.15	1.76	0.82
Unweighted Statistics									
R-squared	0	0	0.01	0.01	0.04	0.2	-0.09	0.03	0.17
Durbin-Watson stat	0.68	1.61	0.49	0.74	1.67	0.61	0.66	1.65	0.55

Numbers in parentheses are t-statistics values.

Table 4b. Estimation results of independent variables tested by specified groups

	ROA	ROE	SPR	ROA	ROE	SPR
Constant	0.02 (4.2)	0.16 (6.6)	10.58 (10.5)	0.02 (3.5)	0.16 (5.3)	10.51 (10.0)
EXCHGE (\$)	0.00 (0.9)	0.00 (2.2)	0.02 (2.4)			
EXCHGE (€)				0.00 (0.4)	0.00 (-0.1)	0.00 (1.0)
NATPRO	0.00 (0.4)	0.00 (0.0)	0.00 (1.1)	0.00 (0.4)	0.00 (0.1)	0.00 (1.0)
Cross-section random						
S.D	0.01	0.04	2.38	0.01	0.06	2.5
Rho	0.17	0.07	0.47	0.23	0.13	0.48
Idiosyncratic random						
S.D	0.02	0.15	2.54	0.02	0.16	2.59
Rho	0.83	0.93	0.53	0.77	0.87	0.52
Weighted Statistics						
R-squared	0.01	0.04	0.06	0	0	0.02
Adjusted R-squared	-0.01	0.02	0.04	-0.01	-0.02	0
F-statistic	0.48	2.33	3.6	0.18	0.01	1.15
Prob(F-statistic)	0.62	0.1	0.03	0.84	0.99	0.32
Durbin-Watson stat	1.04	1.77	0.86	1.05	1.75	0.86
Unweighted Statistics						
R-squared	0.04	0.04	0.10	-0.01	0.00	0.07
Durbin-Watson stat	0.80	1.64	0.51	0.77	1.58	0.52

Numbers in parentheses are t-statistics values.

Table 5. Estimation results of core determining variables

	ROA ¹	ROE ²	SPREAD ²
Constant	0.04 (2.4)	0.25 (2.5)	12.66 (7.7)
ELRATE	(-0.00) (-2.1)		
ASSETS			(15.58) (2.0)
LIAB			-53.24 (-4.0)
FORLIAB	0.00 (1.6)	0.00 (1.6)	
STRUC	0.02 (1.5)		
EFFIC	-0.38 (-3.9)		
MGT	-0.04 (-2.0)	-0.32 (-1.0)	25.48 (3.3)
EXCHGE (\$)		0.00 (1.8)	0.01 (1.8)
Cross-section random			
S.D.	0.02		
Rho	0.55		
Idiosyncratic random			
S.D.	0.02		
Rho	0.45		
Weighted Statistics			
R-squared	0.18	0.18	0.56
Adjusted R-squared	0.14	0.10	0.51
F-statistic	5.09	2.27	11.70
Prob(F-statistic)	0.00	0.02	0.00
Durbin-Watson stat	1.19	1.96	1.12
R-squared	-0.10		
Unweighted Statistics			
Log likelihood		62.51	-276.83
Akaike info criterion		-0.82	4.67
Schwarz criterion		-0.55	4.97
Hannan-Quinn criter		-0.71	4.79

Numbers in parentheses are t-statistics values. (1) Estimated using a random effect model specification.

(2) Estimated using a fixed effect model specification

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Annexure I

Table X. Debt currency composition (average percentage 1995-2007)

	Others ¹	Euro	Yen ²	MC ³	PS ⁴	SF ⁵	USD ⁶	Total
Cameroon	3.3	67.9	0.6	5.0	1.7	0.9	20.5	100
Cote d'Ivoire	2.1	41.8	1.3	9.0	0.6	0.2	45.0	100
Gabon	4.7	56.5	0.8	6.9	5.9	0.6	24.7	100
Ghana	4.1	5.4	10.4	5.6	2.4	0.2	71.9	100
Kenya	3.9	12.8	20.7	7.5	2.4	1.6	51.0	100
Mauritius	7.0	38.1	4.5	7.8	1.7	0.3	42.8	102
Nigeria	4.1	22.8	10.1	9.4	1.0	0.8	51.9	100
Senegal	12.0	16.4	3.3	10.3	11.0	0.2	48.4	102
South Africa	0.9	9.0	2.9	0.0	0.1	0.0	87.2	100

(1) All other currencies. (2) Japanese yen. (3) Multiple currencies. (4) Pound Sterling. (5) Swiss Franc.

(6) US Dollars. Source World Bank PPG debt currency composition