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Financial Development and the Social Cost of Financial Intermediation in Africa

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ABSTRACT

This article investigates the effect of financial development on the social costs of financial intermediation across a large number of banks in Africa. The study distinguishes between countries that are financially developed and those that are not financially developed to examine the impact of financial development on the social costs of financial intermediation. A sample of 260 banks from 29 countries in Africa is used over an 8-year period from 2006 to 2013. We employ both Random Effect and GMM techniques to resolve the issues of unobserved heterogeneity and endogeneity. We observe that overall, financial development reduces the social costs of intermediation. We also determine that the social costs of intermediation are lower for countries that have more developed financial systems compared to those with less developed financial systems. Our study is useful because it suggests that if countries want to reduce their social costs of intermediation, they should develop their financial systems.

KEYWORDS

Social cost of intermediation; financial development; financial institutions; net interest margin

1. Introduction

Financial intermediation largely involves banks transferring resources amongst economic agents in an economy. In performing this vital role, banks charge a higher lending rate than they pay on deposits, which constitutes a positive spread or net interest margin. The net interest margin is usually computed as the difference between interest income and interest expenses scaled by a bank's assets (total assets or earning assets). According to Naceur (2003), a narrow spread indicates a reduction in the interest charged on loans granted to seekers of funds or, alternatively, an increase in the interest paid on depositors' savings. To this end, the wider the net interest margin is, the more profitable the bank is, and vice versa. Although wide interest margins may represent higher profitability and serve the interests of shareholders, a wide interest margin may also signify inefficiency and indicate that the social costs of financial intermediation to society are notably high.

The reference to net interest margins as the social costs of financial intermediation stems from the simple concept that the functional role of financial institutions as intermediaries requires a reward for the provision of these services, which is paid either directly or indirectly by society. Demirgüç-Kunt and Huizinga (1999) further argued that financial intermediation affects the net returns to saving and the gross returns to investment and that the difference between these two rates mirrors bank interest spreads in addition to the transaction costs and taxes borne directly by savers and investors. Thus, the net interest margin is deemed as a cost to social participants for having banks perform the intermediation role for people who may have surplus funds seeking to defer consumption or those in need of funds for immediate consumption. Therefore, the wider the net interest margin is, the larger the social costs of financial intermediation are. High spreads may lead to social agitations because society believes that banks are capturing unnecessarily high rents and functioning as cartels. Furthermore, high spreads discourage both savings and investments, thereby leading to lower growth outcomes. Under such circumstances, society bears notably high costs for having banks perform the intermediation role. There have been debates in such countries as Ghana on capping the rates that banks can charge on the loans that they give to their clients because of high interest spreads.

However, Demirgüç-Kunt and Huizinga (1999) cautioned that an increase in the net interest margin does not always suggest that the banking system is inefficient. For example, these researchers explain that an increase in loan defaults will lead to a reduction in the net interest margin because of a reduction in the interest income. However, this effect does not indicate that the banking system has become more efficient. Although it is an imperfect proxy, we believe that high interest margins do indeed capture the inefficiencies in the banking industry and capture the costs that society will have to bear for financial intermediation. Consequently, in this article, we use the net interest margins to proxy for the social costs of financial intermediation.

Studies on most financial institutions in developed and developing countries have sought to unveil various aspects of financial institutions' architecture, especially with respect to sustenance and profitability. An area of pertinent importance has been the concerns of performance as viewed from bank profitability and/or net interest margins in the United States and Asia (Mendes & Abreu, 2003; Naceur, 2003; Park & Weber, 2006). Research conducted on developed and developing countries (though mostly not on Africa) have indicated that operating costs of banks, capital adequacy, the size of the bank, the risk associated with interest rates, inflation rates and economic growth are the main determinants of the net interest rate margins of financial institutions (see Demirgüç-Kunt & Huizinga, 1999; Garza-García, 2010; Hamadi & Awdeh, 2012; Khediri & Ben-Khedhiri, 2011; Naceur, 2003). Tarus, Chekol, and Mutwol (2012) also studied the determinants of net interest margins of commercial banks in Kenya, and their findings do not deviate from the already mentioned studies.

An important factor that has the potential of influencing the social costs of financial intermediation but has been largely ignored in previous literature is financial development.¹ In the view of Demirgüç-Kunt and Huizinga (2000), a well-developed

¹Essentially, an economy is said to be developed when financial instruments, markets and intermediaries work together to reduce costs of information, facilitate trading, and diversify and manage risk (Adenutsi, 2011; Ak, Altintaş, & Akpolat, 2013; Asongu, 2013; Assefa & Mollick, 2017; Beck, Levine, & Loayza, 2000; Chirwa & Mlachila, 2004; Hamadi & Awdeh, 2012; Rajan & Zingales, 1998; Tchamyoyou & Asongu, 2017).

financial system leads to greater competition and eventually leads to increased efficiency. Consequently, when banks become more efficient, they are able to reduce their lending rates and lower the net interest margin and the social costs of intermediation. Unlike Demirgüç-Kunt and Huizinga (2000), who examined the impacts of the financial sector's composition (which primarily includes the development of banks and the development of markets on banks' profitability), we investigate the effects of financial development on the net interest margin (social costs of intermediation) in Africa. In essence, we examine if net interest margins systematically differ across African countries based on the level of financial development. Our study contributes to the extant literature in a number of respects. From a policy perspective, this article is relevant because African banks operate on one of the highest spreads in the world (see Garr & Kyereboah-Coleman, 2013;² Were & Wambua, 2014). With most economies in the African region being bank-based (see Martinez & Mody, 2004), the costs at which businesses can borrow from banks has direct implications on whether they are able to borrow in the first place or (if they manage to borrow) the returns that they obtain from their investments is eroded because of high costs. It is therefore important to examine whether pursuing the development of the financial sector can lead to lower spreads, which will lead to increased savings and investments in the economy. In addition, the wide variation in financial development across the region provides room for countries to learn from each other in terms of designing financial systems that are germane to the African context.

Finally, aside from examining African countries in general, we also compare countries that are more financially developed to those that are less financially developed. This approach enables us to better understand the relationship between financial development and net interest margins. We expect more financially developed countries to exhibit lower margins compared to less financially developed countries. That is, financial development should lead to a more efficient and competitive banking system (Tchamyou & Asongu, 2017) and therefore lead to a reduction in the social costs of intermediation.

The rest of the article is organized as follows. Section 2 reviews the literature regarding the pertinent determinants of net interest margins in the banking sector. Section 3 presents the empirical methods we employ to investigate the effects of financial development on the net interest margins of banks in Africa. Finally, we discuss our results in Section 4 and present the study's conclusions in Section 5.

2. Literature review

In this section, we review both the empirical and theoretical literature on the determinants of the social costs of financial intermediation (net interest margins).

2.1 Theoretical review

The theoretical concept of the net interest margins of financial institutions can arguably be said to have been established by Ho and Saunders (1981). Ho and Saunders (1981)

²There exists a contemporaneous variable in the differenced dynamic term that may be correlated with the contemporaneous term in the differenced error term.

proposed the dealership model which asserted that financial institutions acted as dealers in the financial market, which brought together the lenders of funds (depositors) and the borrowers of funds (loan seekers). This function that banks perform (called financial intermediation) does not just involve banks simply matching borrowers and savers, but also involves bridging the gap that exists between borrowers and savers. Generally, savers prefer to give out small sums as deposits for a short time, and they are risk-averse. On the other hand, borrowers prefer large sums of money, need those sums for a longer period of time and prefer to undertake risky ventures to obtain high returns. Banks serve as intermediaries transferring resources amongst economic agents in a way and manner that will be attractive to both lenders and borrowers. As such, banks mobilize large numbers of small deposits on which they pay interest and bundle them together to make a smaller number of large loans that borrowers require (savings mobilization). Borrowers subsequently pay interest on the loans that they have acquired.

Banks also embark on risk transformation and maturity transformation that make it easier for lenders to recall their funds more quickly and with greater certainty of their value than would otherwise be the case. Banks perform this role by accepting deposits that are liable for payment at a given date and transforming them into loans of a quite different maturity. Intuitively, holding one asset may produce unexpected outcomes. Banks reduce risk through diversification and professional management. In undertaking these functions, banks face major uncertainties and thus associated costs. Accordingly, banks need to structure interest incomes and interest payments on loans and deposits respectively so as not to incur losses, since their prime motive is profit-making. Banks are subsequently inclined to demand positive interest spreads as the price of providing intermediary services due to the uncertainties generated by the time variations associated with deposit supplies, loan demands and the risk involved. This finding means that the net interest margin can be used as a measure of profitability for the bank. However, a large net interest margin can also signify bank inefficiency and high costs of social intermediation. Wide net interest margin implies that banks are operating on high costs or merely exploiting people. Irrespective of how we look at this, a wide net interest margin suggests that the costs to society through banks' intermediary activities are high.

Furthermore, according to Ho and Saunders (1981), the degree of risk aversion, the market structure and the average size of bank transactions are some of the factors that affect banks' spreads. Generally, banks that are more risk-averse are likely to have a wider interest rate spread because they are likely to charge a high rate on loans to compensate for the potential risk that they face. Furthermore, banks with monopoly power are also likely to have a wider spread as they can afford to collude to increase the interest rates on loans. A similar reasoning applies to smaller banks as smaller banks will find it difficult to take advantage of economies of scale to reduce their costs. Judging from this, it stands to reason that in a well-developed financial system where banks are likely to be large, competitive and less risky, banks will charge lower interest rates on loans. This effect will narrow the interest rate spread and reduce the social costs of intermediation.

Other studies have tried to extend the dealership theory by introducing other determinants of the net interest margins of banks. These studies included factors

such as credit risks, interest rate risks, short term market rates and their uncertainties. Among these studies are McShane and Sharpe (1985), Angbazo (1997), Saunders and Schumacher (2000), Maudos and Fernández de Guevara (2004) and Carbó Valverde, López Del Paso, & Rodríguez Fernández (2007). These studies postulated that the administrative costs and other non-interest income of financial institutions were major determinants of a bank's net interest margin. According to these studies, the greater level of uncertainty of the expected return on loans granted (which can be assessed as the increased volatility of returns) leads financial institutions to increase the margins to cover the risk of default. This makes credit risk a determinant of net interest margins (Maudos & Fernández de Guevara, 2004). Short-term market rates (also termed as the money market rates) are deemed as determinants of net interest margins because the more volatile that they are, the higher the market risk is. Banks therefore will find it appropriate and necessary to operate with higher margins. This elucidation could be akin to interest rates as a determinant of interest rate margins.

2.2 Empirical review

Empirical studies have been conducted in the quest to further explain the determinants of net interest margins. Among such studies are Angbazo (1997), Brock and Suarez (2000), Maudos and Fernández de Guevara (2004), Martinez and Mody (2004) and Tarus et al. (2012). The determinants of bank interest margins have evidently been extensively studied in the literature. These factors can be classified as bank specific factors, industry factors and macroeconomic factors.

2.3 Bank specific factors

Findings from previous studies postulate that a critical constituent in the determination of the net interest margin is the efficiency of banks' operations. For instance, Berger (1995) found that there is a positive and significant relationship between the costs of operations (measured as overhead cost) and the net interest margins. Beck and Hesse (2009) and Kasman, Tunc, Vardar, and Okan (2010) found a positive relationship between the efficiency ratio and net interest margin. These studies indicated that the efficiency of banks operations can affect both deposits and loan pricing. Angbazo (1997) found that there is a positive relationship between the risk profile of a bank and the interest margins. Banks with higher interest rate risk exposure select portfolios in order to achieve higher net interest margins. Kasman et al. (2010) found that credit risks had a positive and significant relationship with net interest margins. Berger, Hanweck, and Humphrey (1987) indicated that significant levels of economies of scale for banks were achieved when the asset size of the banks were very large. The size of the financial institution mostly has negative and significant effects on the net interest margins. Larger banks tend to lower margins. Supporting this assertion, Kasman et al. (2010) found that asset size had a negative relationship with interest margins.

2.4 Industry factors

Saunders and Schumacher (2000) indicated that the lower the concentration in the financial intermediary segment, the higher the market power, which then increases interest margins. The lack of a high degree of market competition among banks in developing countries subsequently contributes to higher net interest margins. Other studies on industry factors suggest that certain banks have market power in raising uninsured finance, which may or may not be as a result of size (Brissimis & Delis, 2010). Hussain (2014), while studying the determinants of net interest margins for Pakistani banks, used industrial growth as explanatory variable and found a positive and significant relationship.

2.5 Macroeconomic factors

In studying the determinants of net interest margins of banks operating in Central and Eastern European countries from 1999 to 2010, Dumicic and Rizdak (2013) concluded that stable macroeconomic environments consisting of low inflation, low short-term interest rates and high capital inflows led to a reduction of interest margins prior to the global financial crises of 2008. In addition, they found that higher growth rates propelled an increase in the demand for credit, which subsequently led to higher interest rates charged by banks, thus further widening the net interest margins. Saunders and Schumacher (2000) indicated that interest rate volatilities that were highly traced to unstable macroeconomic environments increased interest margins. Dumicic and Rizdak (2013) indicated that higher growth rates propel an increase in the demand for credit, which subsequently leads to higher interest rates charged by banks, thus further widening the net interest margins.

Demirgüç-Kunt and Huizinga (1999) found that macroeconomic conditions are mostly insignificant in the determination of interest margins and profits with the exception of inflation, which suggests that financial institutions thrive in inflationary environments. Demirgüç-Kunt and Huizinga (1999) indicated that greater bank development resulted in increased competition, which then spurred greater efficiency levels among banks and thus lowered interest margins and profits. Mensah and Abor (2014) found a positive relationship between inflation and net interest margins in Ghana. Claeys and Vander Venet (2008) posited that developing countries have higher net interest margins due to the low efficiency of their financial institutions.

2.6 Summary of literature

Banking sector efficiency is directly impacted by the level of development of the financial sector, thereby having implications for the observed spreads (Bektas, 2014). Several factors have been shown to be related to net interest margins. However, the effect of financial development on net interest margins in Africa is an empirical question worth investigating, given that to the best of our knowledge no study has explored this question.

3. Data and methodology

3.1 Data

The data for this study covering balance sheet and income statement information is sourced from the Bankscope database. This database is reliable since it standardizes information on banks from different countries to allow us to do effective work across countries. We also took information on inflation and institutional indicators from the World Development Indicators and the World Governance Indicators respectively. Our data are annual and span the period from 2006 to 2013. The total number of banks in our data is 560. However, because not all the banks have the information that we require for this study, we end up with approximately 260 banks from 29 countries in Africa.

3.2 Methodology

3.2.1 Model specification and variable measurement

To achieve the objective of the study, we use two models. The models were grounded in the theoretical model of Ho and Saunders (1981). The first model shows the general model meant to determine the impact of financial development on the social costs of intermediation. In the second model, we distinguish between countries with high financial development and low financial development to determine which group has lower social costs of intermediation. The models for this study are thus given by:

$$NIM_{it} = \beta_0 + \beta_1 NIM_{it-1} + \beta_2 NONIRATIO_{it} + \beta_3 LOGASIZE_{it} + \beta_4 CSHOCK_{it} + \beta_5 ROE_{it} + \beta_6 LIQTY_{it} + \beta_7 HHI_{it} + \beta_8 INFL_t + \beta_9 INSTI_t + \beta_{10} GDPPCG_t + \beta_{11} PRECREDIT_t + \varepsilon_{it} \quad (1)$$

$$NIM_{it} = \beta_0 + \beta_1 NIM_{it-1} + \beta_2 NONIRATIO_{it} + \beta_3 LOGASIZE_{it} + \beta_4 CSHOCK_{it} + \beta_5 ROE_{it} + \beta_6 LIQTY_{it} + \beta_7 HHI_{it} + \beta_8 INFL_t + \beta_9 INSTI_t + \beta_{10} 10GDPPCG_t + \beta_{11} HIGHPRECREDIT_t + \varepsilon_{it} \quad (2)$$

where NIM represents the net interest margin, noniratio represents the non-interest income ratio, logasize is the log of total assets, cshock is credit shock and represents the volume of loans to total assets, ROE represents the return on equity, liqty is liquidity and represents a bank's investment in securities as a proportion of its assets, HHI represents the Herfindahl Hirschmann Index, INFL represents inflation, INSTI represents institutions, GDPPCG represents GDP Per Capita Growth, and PRECREDIT represents the credit to the private sector scaled by GDP (a proxy for financial development). Equation 2 is different from Equation 1 in the sense that we include a dummy to capture countries with developed financial systems. Countries with developed financial systems take a value of 1. The remaining countries take a value of 0.

3.3 Justification for including variables

We expect that banks that are diversified will not rely as much on loans or the pure intermediation process and can therefore afford to reduce their margins. This suggests a

negative relationship between non-interest income (diversification) and net interest margins. We also expect larger banks to reduce their margins because they can operate on economies of scale (see Berger et al., 1987). This suggests a negative relationship between size and net interest margins (see Kasman et al., 2010). We expect that banks with more loans in their asset mix will display a higher net interest margin. This indicates a positive relationship between credit shocks and the net interest margin (Hawtrey & Liang, 2008; Hanweck & Ryu, 2005). A negative relationship is also possible since banks with more loans in their portfolio are exposed to higher credit risk. We expect banks with a higher ROE to exhibit higher net interest margins, thus suggesting a positive relationship.

We expect liquidity to exhibit a negative relationship with net interest margin. This is because as banks shift more assets into liquid investments, they have to reduce the loans that they give, which tends to generate more returns for a bank. A positive relationship is also plausible if liquidity gives both depositors and borrowers the confidence to transact with a bank. The Herfindahl Hirschman Index (HHI) is a measure of concentration or competition. A higher HHI suggests more concentration or a less competitive market. Thus, we expect a positive relationship between the HHI and the net interest margin. This finding suggests that concentration or less competition leads to higher margins because banks can exercise market power.

We expect a positive relationship between inflation and net interest margins (see Dumitic & Rizdak, 2013). This is because we expect the interest on loans to be more sensitive to changes in inflation rates compared to the interest on deposits. We expect institutional quality to exhibit a negative relationship with net interest margin. This suggests that interest margins should be lower in countries with good and strong institutions. Good institutions reduce the risk of doing business, thereby making it possible for banks to reduce their spread. We expect economic growth to be positively related to net interest margins. A positive relationship suggests that the demand for loans increases during economic booms. A negative relationship is also plausible because risk premiums and loan defaults are lower during economic booms. Finally, we postulate a negative relationship between financial development and the net interest margin. This relationship is likely to be observed because financial development leads to more efficient ways of providing financial services to customers (Asongu, 2013).

We summarize the definitions of the variables used in the model and their relationship with the net interest margin in [Table 1](#).

3.4 *Econometric technique*

Two potential problems may arise from the models indicated above. The first is the fact that differences in banks leading to differences in their social costs of intermediation may not be adequately captured. For instance, differences in the managerial ability of banks that may lead to differences in the social costs of intermediation may not be observed. Another problem this study faces is endogeneity. First, endogeneity results from the dynamic term we introduce. Second, it also results from the bi-causal relationship that may exist between some of the explanatory variables and the dependent variable. In a dynamic setting, the lagged dependent variable is likely to be correlated

Table 1. Variable Selection and Justification.

Variable	Measurement	Indicator	Source	Expected Sign
Dependent Variable				
NIM	(Interest income – Interest expense)/Total assets	Social costs of intermediation	Computed by authors based on data from Bank Scope	
Independent Variables				
NON-INTEREST INCOME RATIO	Non-Interest Income/Total Income	Diversification	Computed by authors based on data from Bank Scope	[-]
LOG SIZE	Natural log of total assets	Bank size	Computed by authors based on data from Bank Scope	[-]
CREDIT SHOCK	Gross Loans/Total Assets	Credit risk	Computed by authors based on data from Bank Scope	[±]
ROE	Net income/total equity	Profitability	Computed by authors based on data from Bank Scope	[+]
LIQUIDITY	Total securities/total assets	Liquidity	Computed by authors based on data from Bank Scope	[+/-]
HHI	$\frac{1}{(total\ loan)^2} \sum_{i=1}^N l_i^2$	Concentration	Computed by authors based on data from Bank Scope	[+]
INFLATION INSTITUTIONS	Consumer price index	Macroeconomic stability	World Development Indicators database	[+]
GDPPCG	Overall Kaufmann indicator of institutional quality	Quality of institutions	World Development Indicators database	[-]
PRECREDIT	Yearly growth in gross domestic product per capita	Macroeconomic stability	World Development Indicators database	[+/-]
HIGH PRECREDIT	Private credit/GDP	Financial development	World Development Indicators database	[-]
	Dummy variable equal to 1 for countries with developed financial systems	Financial development	Generated by authors	[-]

with the fixed effect component of the error term, thus leading to inconsistent estimates of the lagged dependent variable.

A solution to the problem of unobserved heterogeneity involves taking the first differences of the original model using the fixed or the random effect model. Although the fixed or random effect model will eliminate the unobserved heterogeneity problem, there will still be correlation between the differenced lagged dependent variable and the error term.³ Thus, the Generalized Method of Moments (GMM) is the best estimator under these circumstances since it accounts for both unobserved heterogeneity and the possible endogeneity of the regressors. It can account for unobserved heterogeneity by estimating the equation in first differences and account for endogeneity by instrumenting the endogenous regressors with two or more lags, which will ensure that the correlation between the dynamic term and the error term is completely eroded.

We use the Forward Orthogonal version of the GMM to minimize the gaps that may exist in the data. The forward orthogonal method takes the deviations of each observation from the mean rather than from the previous observation, thus increasing the sample size. We also use the system GMM because, compared to first differences, the system GMM improves efficiency and reduces finite sample bias (see Arellano & Bover, 1995; Blundell & Bond, 1998). We also make small sample size adjustments and use robust standard errors to conduct our analysis. Our instrument choice is made up of all regressors lagged twice. In evaluating whether the instruments used are valid, the Hansen J test of overidentifying restrictions is used. The Hansen test is distributed as a chi-square under the null that the instruments are valid. Moreover, we check whether the model is correctly specified by examining the presence of n th-order serial correlation using the $m(n)$ test. The $m(n)$ test is distributed as a standard normal under the null of no n -th order serial correlation. We also present the estimates of the Random Effect Model to show the differences that may arise in the estimates for the two techniques.⁴

4. Results

We present the summary statistics of the variables used in the regressions, the correlation coefficients and the estimation results. Table 2 shows the summary statistics of the variables employed in this study. From the summary statistics, outliers that have the possibility to influence the consistency and efficiency of coefficients were not observed in the dataset. Table 2 also presents the normality and Variance Inflation Factor (VIF) of the variables employed. While the Shapiro Wilk's normality test was used to test for the normality of the data, the VIF was used to test for the acceptability of each variable in the model. With the maximum acceptable VIF being 10, all the variables were below the threshold of 10, thus indicating that all the variables can be included in the regressions. Additionally, the Shapiro-Wilk test with a null hypothesis of no normal distribution was rejected for all the variables, thus indicating that the variables were all normally distributed around their means. From Table 2, the net interest margin used to

³Before we used the Random Effect Model, we checked with the Hausman test whether the Random Effect or Fixed Effect was appropriate. The results are presented in the Appendix.

Table 2. Summary Statistics of the Variables Used.

Variable	Obs	Mean	Std. Dev	Min	Max	VIF	SWILK
Net Interest Margin	2522	0.061	0.045	−0.168	0.392	-	0.000***
Non-Interest Income Ratio	1799	0.296	0.188	−2.5	2	1.09	0.000***
Size	2585	6.134	1.785	0	11.790	1.36	0.000***
HHI	4248	0.180	0.147	0	1	1.18	0.000***
Credit Shock	2521	0.642	0.240	0	1.739	1.73	0.000***
Return on Equity	2573	0.120	0.455	9.017	9.657	1.02	0.000***
Liquidity	2448	0.192	0.167	0	1	1.72	0.000***
Inflation	3066	2.002	21.073	−0.011	244.110	1.13	0.000***
Institutional Quality	3186	−2.913	3.355	−9.761	4.827	1.18	0.000***
GDP per capita growth	3674	0.029	0.032	−0.175	0.124	1.13	0.000***
Private Credit	4120	0.220	0.218	0	0.763	1.43	0.000***

Notes: Significance Level *** (1%), ** (5%), and * (10%).

measure the social costs of intermediation is approximately 6.1%, thus indicating that the costs of intermediation to society are moderately high compared to that of South Asia, for instance, which has averaged approximately 5.2% in recent years. The non-interest income ratio on average is approximately 30%, thereby indicating that banks do not earn much of their income outside their core intermediation function. HHI, which is a measure of concentration, is on average 18%, thus indicating a low concentration among banks in Africa. “Credit shock” is used to measure banks’ credit risk. On average, the volume of loans forms 64.18% of total assets. Additionally, the summary statistics table shows that banks average a return of 12.04% on their equity employed. Credit to the private sector, which is used to measure financial development, is on average 22% of gross domestic product (GDP), thus indicating that financial development is low in Africa. With a standard deviation of approximately 22%, we can clearly deduce that financial development is notably high in certain countries and low in others.

In [Table 3](#), we present the net interest margins across our sample countries. Sierra Leone, Uganda and Ghana have the highest net interest margins with means of 12.2%, 10% and 9.4%, respectively. Swaziland, Namibia and South Africa have moderate net interest margins with means of 6.5%, 6.4% and 6.3%, respectively. Finally, Egypt, Tunisia and Mauritius exhibit the lowest net interest margins of 2.8%, 2.6% and 2.4%, respectively.

In [Table 4](#), we present the net interest margins for the different subsamples. Thus, we compare the average net interest margin for countries with high financial development with that of countries with low financial development. Our expectation is that the sample of countries with high financial development will exhibit a lower mean compared to the sample of countries with low financial development.

[Table 4](#) shows that countries with high financial development exhibit a lower net interest margin (5.1%) compared to countries with low financial development (7.2%). This confirms our a priori expectations. The difference between the 2 samples of almost 200 basis points is notably significant.

The Pearson’s correlation matrix, which is used as a mechanism for checking and controlling multicollinearity, is shown in [Table 5](#). Following Kennedy (2008), the study sets the multicollinearity threshold to 0.7. Hence, the results presented in [Table 5](#) show no evidence of multicollinearity. Furthermore, we see that financial development is

Table 3. Net Interest Margins across Our Sample.

Code	Country	Mean Net Interest Margin	Number of Banks
1	Algeria	0.047	17
2	Benin	0.041	10
3	Botswana	0.075	13
4	Burkina	0.048	9
5	Cameroon	0.057	12
6	Cote D'Ivoire	0.044	19
7	Egypt	0.028	33
8	Ethiopia	0.044	24
9	Ghana	0.094	23
10	Kenya	0.072	53
11	Malawi	0.078	14
12	Mali	0.052	10
13	Mauritania	0.048	8
14	Mauritius	0.024	18
15	Morocco	0.036	20
16	Mozambique	0.089	13
17	Namibia	0.064	8
18	Nigeria	0.067	31
19	Rwanda	0.087	8
20	Senegal	0.046	12
21	Sierra Leone	0.122	13
22	South Africa	0.063	34
23	Sudan	0.066	15
24	Swaziland	0.065	6
25	Tunisia	0.026	21
26	Uganda	0.1	17
27	Tanzania	0.072	34
28	Zambia	0.083	24
29	Zimbabwe	0.075	23

Table 4. Net Interest Margin Based on Subsamples.

	High Financial Development	Low Financial Development
Mean Net Interest Margin	0.051	0.072

negatively correlated with the net interest margin. This provides support for what we observed in Table 4. Thus, even before we perform the formal econometric analysis, the data suggests a negative relationship between financial development and observed net interest margins.

4.1. Discussion of empirical results

In this section, we present the results from the empirical experiments. We find evidence that in Africa, financial development has a negative effect on net interest margins. This can be seen in columns 1 and 3 of Table 6. This finding suggests that financial development leads to a reduction in net interest margins. The results therefore imply that financial development reduces the social costs of financial intermediation. Thus, countries with developed financial systems have a lower net interest margin compared to those with under-developed financial systems. We check whether countries that are more financially developed have a lower net interest margin compared to countries that are less financially developed. Thus, we estimate Equation 2 above. Dummies for

Table 5. Pearson's Correlation Matrix.

	Net Interest Margin	Non-Interest Income	Size	HHI	Credit Shock	Return on Equity	Liquidity	Inflation	Institution	GDPPCG	Credit to the Private Sector
Net Interest Margin	1										
Non-Interest Income	-0.0844	1									
Ratio											
Size	-0.2837	-0.1429	1								
HHI	0.0384	0.1841	-0.1146	1							
Credit Shock	0.2234	-0.1101	0.0091	0.0691	1						
Return on Equity	0.063	-0.031	0.132	0.0383	-0.0452	1					
Liquidity	-0.0767	-0.0433	0.0591	-0.0614	-0.6499	0.0501	1				
Inflation	0.1089	-0.0388	-0.0933	-0.2023	-0.0474	0.0201	0.0854	1			
Institution	-0.0165	-0.1926	0.0519	-0.1021	0.1124	0.0082	-0.0198	-0.1851	1		
GDP per Capita Growth	0.0349	0.0683	-0.054	0.1196	-0.0559	0.0245	0.03	-0.2043	0.1055	1	
Private Credit	-0.2314	-0.1394	0.4122	0.0239	0.1856	0.0388	-0.0144	-0.0894	0.298	-0.0181	1

Table 6. Effect of Financial Development on the Social Costs of Financial Intermediation.

Variables	Model 1 Random Effect Estimates for Entire Sample		Model 2- Random Effect Estimates For Sub-Samples		Model 3 GMM Estimates For Entire Sample		Model 4 GMM Estimates for Sub-Samples	
	Coef.		Coef.					
Net Interest Margin	0.563		0.563					
Lagged Net Interest Margin	[0.074]***		[0.075]***		0.534		0.551	
	–0.024		–0.024		[0.101]***		[0.095]***	
Non-Interest Income Ratio	[0.005]***		[0.005]***		–0.032		–0.024	
	–0.003		–0.004		[0.015]*		[0.013]*	
Log of Size	[0.001]***		[0.001]***		–0.003		–0.003	
	0.021		0.024		[0.001]***		[0.001]***	
HHI	[0.016]		[0.016]		0.040		0.042	
Credit Shock	0.026		0.026		[0.021]*		[0.018]**	
	[0.007]***		[0.007]***		0.023		0.023	
Return on Equity	0.005		0.005		[0.007]***		[0.006]***	
	[0.003]		[0.003]		0.004		0.004	
Liquidity	0.019		0.012		[0.004]		[0.004]	
	[0.008]**		[0.008]**		0.022		0.024	
Inflation1	0.052		0.052		[0.010]**		[0.009]***	
	[0.013]***		[0.013]***		0.066		0.069	
Institutional Quality	–0.000		–0.001		[0.017]***		[0.016]***	
	[0.000]		[0.000]**		–0.001		–0.001	
GDP Per Capita Growth	0.031		0.028		[0.000]*		[0.000]***	
	[0.023]		[0.023]		0.086		0.073	
Financial Development	–0.014				[0.026]***		[0.025]***	
	[0.005]***				–0.0216			
High Financial Development					[0.007]***			
Constant	.0278		–0.006				–0.010	
	[0.008]***		[0.002]***				[0.002]***	
Number of obs	1090		0.028		0.023		0.019	
Number of groups	313		[0.008]***		[0.012]		[0.010]*	
AR(2)			1090		1090		1090	
Hansen Test			313		313		313	
sigma_u	0.011				0.248		0.151	
sigma_e	0.012							
rho	0.425				0.196		0.195	

Notes: Significance Level *** (1%), ** (5%) and * (10%). Standard errors are reported in parentheses. The AR test operates under the null that the model is correctly specified and the Hansen test operates under the null that the instruments are valid.

countries with high financial development become our base category. The dummies are constructed as follows. Countries with high financial development representing those lying above the median take a value of 1 and 0 otherwise for the low financial development category. This approach allows us to examine whether differences exist between countries with high versus low financial development. Our results are reported in columns 2 and 4 of [Table 6](#). Indeed, we observe that compared to countries with low financial development, countries with high financial development have lower net interest margins. This finding is observed because the financial intermediation function is performed more efficiently in countries with developed financial systems. Because the financial intermediation function is performed more efficiently, banks will have a lower cost structure, thus making it possible for them to reduce their margins. Our results are supported by the findings of Demirgüç-Kunt and Huizinga (2000).

We now discuss the control variables included in the regressions. From [Table 6](#), irrespective of whether we are looking at columns 1 and 2 that represent the estimates for Equation 1 or columns 3 and 4 that represent the estimates for Equation 2, we find similar results for each of the variables. Non-interest income is negatively and significantly related to the net interest margin. The coefficient is significant at the 1% level. The results show that when banks diversify their sources of income, they are able to reduce the net interest margin. A diversified bank makes income from other sources and can therefore reduce the spread that it charges. The results imply that diversification leads to a reduction in the social costs of financial intermediation. The results are in line with our *a priori* expectations.

The results also show that larger banks are characterized by lower spreads compared to smaller banks. The results are significant at the 1% level. The results imply that larger banks are able to reduce their spread because they operate on economies of scale. This may be attributable to the fact that larger banks can achieve scale economies. Consequently, they can pass on their cost savings to their clients by charging lower rates on their loans. Our results are in line with the propositions of Ho and Saunders (1981). The results are also supported by the findings of Berger et al. (1987) and Kasman et al. (2010). Thus, the evidence suggests that bank size reduces the social costs of financial intermediation.

Industry factors also affect the net interest margin. The HHI is positive and significant at the 5% level of significance. This suggests that industry concentration leads to higher interest margins. The results are in line with our *a priori* expectations. A concentrated banking system implies less competition in the banking industry. Less competition in the banking system implies that banks have monopoly power and can therefore charge higher rents, thus increasing their net interest margins. As the concentration in the banking system increases, the net interest margin rises accordingly. Put differently, an increase in competition in the banking industry leads to a reduction in net interest margins. This finding means that competition leads to a reduction in the social costs of financial intermediation. The findings are in line with the propositions of Ho and Saunders (1981) and Saunders and Schumacher (2000).

Furthermore, we observe that credit shocks are positively and significantly related to the net interest margin. The coefficient for credit shock is positive and significant at the 1% level in all the regressions. Credit shock is measured as the volume of loans as a percentage of a bank's earning assets. Thus, the results suggest that as the volume of

loans increases compared to a bank's earnings assets, the net interest margin rises. The findings suggest that as banks give more loans, their exposure to credit risk increases. Thus, banks increase the net interest margin to compensate. The findings also suggest that as the proportion of loans increases in a bank's asset mix, the net interest margin increases. This increase is expected because the returns on loans are usually higher than the returns on other earning assets. Thus, if the proportion of loans increases, then a bank's net interest margin should also increase. Thus, the social costs of financial intermediation increase as loans increase in a bank's earnings asset mix. This reflects the increased risk of the banks' earning assets portfolio. Our results are in line with previous studies that found that an increase in credit risks leads to an increase in bank interest spreads (see, for example, Maudos & Fernández de Guevara, 2004; Kasman et al., 2010).

We find that liquidity is positive and significantly related to the net interest margin. Liquidity is highly significant at the 1% level. This suggests that banks that have a higher proportion of liquid securities in their asset mix compared to banks that have a lower mix tend to have higher net interest margins. This finding suggests that having considerable liquidity improves the confidence of both depositors and borrowers to transact with a bank, leading to an increase in the spread. Thus, high liquidity leads to an increase in the social costs of financial intermediation.

We also find that inflation is positively and significantly related to the net interest margin. Thus, an increase in inflation leads to an increase in the social costs of financial intermediation. If inflation affects a bank's interest income and interest expenses to a similar extent, then a bank's net interest margin should not change much due to changes in inflation rates. However, if banks are slow to adjust deposit rates in response to inflation but quickly adjust rates on loans to reflect changes in inflation, then an increase in inflation is likely to positively impact the bank's margin. The results seem to suggest that indeed this is the case. We do note that the results are significant at the 1% level. Our results are supported by Demirgüç-Kunt and Huizinga (1999), Dumitric and Rizdak (2013) and Mensah and Abor (2014).

Finally, the results show that growth in GDP per capita is positively related to the net interest margin. The coefficient of GDP per capita growth is significant at the 1% level. The results mean that growth in the economy leads to an increase in net interest margin. The results suggest that the demand for loans increases during economic booms, thus leading to an increase in the rate of loans that is not sufficiently offset by reductions in default risk premiums due to economic growth. Thus, economic growth leads to an increase in the social costs of financial intermediation. Our results differ from Demirgüç-Kunt and Huizinga (1999), who did not observe a significant relationship between GDP per capita growth and net interest margins.

5. Conclusions

In this study, the impact of financial development on the social costs of intermediation in Africa is examined. We use the net interest margin to proxy for the social costs of having banks perform the financial intermediation function. We use random effect and the system GMM estimation methods to examine the empirical relationships. The data we use covers 260 banks from 29 countries in Africa from 2006 to 2013. Our primary

results suggest that pursuing the financial development agenda can yield significant benefits in terms of leading to a reduction in net interest margins. Financial development itself entails such effects as improved corporate governance and risk management, better allocation of resources in the economy, lower transactional costs, and improved efficiency of the financial sector. Consequently, a reduction in net interest margins improves societal welfare since it is accompanied by an increase in the savings rate and a reduction in the rate of loans. This should lead to an increase in savings and investments in the economy, thus raising the levels of economic growth and development (see Jayaatne & Strahan, 1996). Given the wide variation in the level of financial development across our sample countries, our results provide inspiration to policy-makers to learn from each other regarding what works and how to overcome the challenges that constrain the development of financial systems across the continent.

The results show a negative relationship between the net interest margin and both non-interest income and bank size, respectively. Therefore, our results suggest that bank diversification and bank size reduce the net interest margin. We find a positive relationship between the HHI and net interest margins. This suggests that pursuing policies that promote competition in the banking industry or reduce the market power of banks can lead to a reduction in interest rate spreads. The volume of loans and bank liquidity are found to exhibit positive relationships with the net interest margin. We observe that inflation is positively related to net interest margins. Thus, policies that reduce the level and volatility of inflation should be useful in reducing net interest margins. We further find that institutional quality is negatively related to the net interest margin. Consequently, promoting the rule of law, controlling corruption, improving voice and accountability, promoting political stability, and improving government effectiveness and regulatory quality are essential to reducing the costs of bank intermediation. Finally, our results show a positive relationship between GDP per capita growth and net interest margins.

Although our results show that financial development reduces the costs of bank intermediation, considerably more work remains to be performed to better understand this relationship. Future research can explore how the quality of financial infrastructure (such as payment and settlement systems), the quality of financial regulations and the costs of financial services affect the net interest spread or the social costs of financial intermediation. This will certainly deepen our understanding of how specific improvements in the financial system are related to net interest margins.

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Appendix

	Column 1 (b)	Column 2 (B)	Column 3 (b-B)	Column4 sqrt(diag(V_b S.E.	Column3 V_B))
Dependent Variable: Net Interest Margin	Fixed Effects	Random Effects	Difference		
Non Interest Ratio	−0.0122379	−0.0110873	−0.0011507	0.0002338	
Log of Size	−0.0057784	−0.0056673	−0.0001111	.	
HHI	0.0614304	0.0394701	0.0219603	0.0057629	
Credit Shock	0.064621	0.0662691	−0.0016481	0.0004533	
Return on Equity	0.0068995	0.0067221	0.0001774	.	
Liquidity	0.0496543	0.0538122	−0.0041579	0.0012174	
Inflation	0.1368189	0.1233427	0.0134762	0.009582	
GDP per Capita Growth	0.2027628	0.1721348	0.030628	0.012288	
Financial Development	−0.0307323	−0.0325068	0.0017745	0.0002807	

Test: Ho: difference in coefficients not systematic

$$\chi^2(9) = (b-B)'[(V_b - V_B)^{-1}](b-B) = 16.01$$

$$\text{Prob} > \chi^2 = 0.0668$$

(V_b - V_B is not positive definite)

Test: Ho: difference in coefficients not systematic

	Column 1 (b)	Column 2 (B)	Column 3 (b-B)	Column 4 sqrt(diag(V_b - V_B)) S.E.
Dependent Variable: Net Interest Margin	Fixed Effects	Random Effects	Difference	
Non Interest Ratio	−0.0129965	−0.011869	−0.0011275	0.0002475
Log of Size	−0.0061774	−0.0061217	−0.0000556	0.0000111
HHI	0.0626052	0.0417541	0.0208511	0.0056858
Credit Shock	0.0658039	0.0673243	−0.0015204	0.0004527
Return on Equity	0.0073781	0.0072551	0.000123	.
Liquidity	0.0526363	0.0566767	−0.0040404	0.0012307
Inflation	0.1412768	0.1286074	0.0126694	0.00948
GDP per Capita Growth	0.1659038	0.1342404	0.0316634	0.0123421
High Financial Development	−0.0162061	−0.0168506	0.0006445	0.0001564

Test: Ho: difference in coefficients not systematic

$$\chi^2(9) = (b-B)'[(V_b - V_B)^{-1}](b-B) = 14.02$$

$$\text{Prob} > \chi^2 = 0.1217$$

(V_b - V_B is not positive definite)