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Factors Determining the Use of Financial Derivatives by Selected Banks Listed on the Ghana Stock Exchange

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Abstract

This paper examines the factors that influence the use of financial derivatives by selected banks listed on the Ghana Stock Exchange (GSE). Using data selected from seven banks for the period 2007 – 2014, two key hypotheses were tested: firm size hypothesis (FSH) and financial distress hypothesis (FDH). The study finds that the factors that influence the use of financial derivatives in Ghana banks are bank size, financial distress indicators such as return on equity, current ratio and interest cover ratio. We, however, found that debt to equity has no significant effect on the use of financial derivatives. We argue that the insignificant relationship could be attributed to the fact that debt to equity is not a good measure of a bank's debt level.

Keywords: Bank Size, Determinants, derivatives, Financial Distress

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1. INTRODUCTION AND BACKGROUND

The dynamic environment of the banking industry poses a tremendous threat for the industry players. Many companies in the banking industry have collapsed due to these threats which are all forms of risks (Ahmad & Haris, 2012). Consequently, risk managers of firms have resolved to curtail the devastating effects of such an occurrence and thus put inappropriate risk management measures before the risk occurs. One of such risk management tools was the use of financial derivatives.

Financial derivatives is seen as an effective risk management tool for off-balance sheet risk since they provide an easy means to hedge the residual risk from commercial operations (Shiu & Moles, 2010). This phenomenon attracted the attention of researchers alike to look into the risk management practices of both the financial and non-financial companies. One trend that seems to be prevalent by these risk managers or risk management practice is the use of financial derivatives.

Previous works such as (Bashir, 2013; Crawford, Lee, Whinston, & Yurukoglu, 2015; Lee, 2010; Piontak, 2012) have all studied a different aspect of derivatives. For instance, a study by Piontak, (2012) investigated why companies use derivatives and what kinds of derivatives companies use. Another study by Bashir (2013) investigated the impact of derivatives usage on firm value using 107 non-financial firms listed on the Karachi Stock Exchange. With a sample of 264 property funds in 2008 Lee (2010) studied the use of derivatives by Property Funds and found that the main reason for using financial derivatives was to reduce the cash flow volatility. Focusing on Malaysia non-financial companies, Ahmad & Haris (2012) investigated the factors that could influence the use of derivatives. The above discussions show that derivatives is significant as it has attracted the attention of a lot of scholars.

We contribute to literature by throwing more insight on the factors that influences the use of derivatives in the context of Sub-Saharan Africa using Ghana as the research focus, since most of these researches have been conducted in developed and emerging economies in Europe and the Americas such as; U.K, U.S. and Australia as well as developing economies in Asia like; Taiwan, Philippines, Pakistan, Malaysia and the likes. Studying the factors that determine the use of derivatives in Ghana is likely to bring out different findings since economic situations in developing economies in Sub-Saharan Africa are different from that of developed economies in Europe and Asia. The selected reviewed works reveal that existing works have focused on non-financial firms. This study aims to examine the factors that determine the use of financial derivatives in Ghana (a developing country), using the banking sector as the case study. The findings of this paper will reveal the common factors that determine the use of financial derivatives in both the developed and developing economies as well as that of financial and non-financial institutions.

2. LITERATURE REVIEW

Previous works on derivatives have focused on either developed economies, emerging economies or well-structured markets and/or non-financial institutions. Focusing on non-financial firms listed on the Karachi Stock Exchange of Pakistan for the period of 2004 to 2007, Afza & Alam (2011) found a positive relationship between a firm's extent of derivative usage and lower financial distress costs, higher debt, underinvestment problem and fewer managerial holdings. Again, (Bashir, 2013) found no significant impact of derivatives usage on firm value using a sample of 107 non-financial firms listed on Karachi Stock Exchange (KSE) form 2006-2010. Similarly, Mizerka & Stróżyńska (2013) found that the market size of a company, the

probability of financial distress and agency problems are key factors that influence the use of financial derivatives by non-financial Polish companies. Focusing on both users and non-users of financial derivatives in Australia, Lee (2010) found that the main reason for using financial derivatives was to reduce the cash flow volatility, the second most important factor, according to his study was to reduce earnings volatility. A study by Ahmad & Haris (2012) revealed that only current ratios and market-to-book value are the main factors influencing these companies to use derivatives in the Malaysian market. A study on Philippines' firms by Velasco (2014) concluded that the firms that are likely to use derivatives were large firms who had knowledge about financial derivatives and Philippines' firms prefer to use financial buffer instead of derivatives. They argued that these firms have the notation that derivatives are sophisticated risk management tools. On managing foreign exchange risk with derivatives in UK non-financial firms, Zhou & Wang (2013) found that, UK non-financial firms use derivatives to hedge against the risk of unfavorable exchange rate movements. The above-selected works show that although derivatives usage have been extensively researched on in developed and developing economies in Europe and Asia, fewer works have been done on developing economies in sub Saharan Africa. Although a study by Piontak, (2012) found that derivatives usage in Ghana is low at 29.6% whiles Nigeria had an anecdotal evidence of 14.12% of usage of derivatives for the period 2008-2009, it is possible the shorter period might have affected the results

2.1 Theoretical background and hypothesis

In modeling the hypotheses for this study, we first identify the factors that could have a substantial impact on the use of financial derivatives. All these factors were grouped under company size and financial distress which supported the

hypothesis of most of the research work reviewed for this study. Ahmad & Haris (2012) tested three hypotheses: financial distress cost hypothesis, underinvestment costs hypothesis, and Agency Costs/ managerial Risk aversion on factors that determine the use of derivatives in Malaysian non-financial companies. Their findings supported the underinvestment costs hypothesis rather than the financial distress hypothesis. On the other hand, the findings of Hardwick & Adams (1999), Shaari, Hasan, Palanimally, Moona, & Mohamed (2013), Mizerka & Stróżyńska (2013) provide support for the firm size hypothesis and indicated that the use of financial derivatives was significantly influenced by the size of a company or firm. Therefore, for the purposes of this study, firm size and financial distress hypothesis are adopted. The adoption of Firm Size Hypothesis (FSH) and the Financial Distress Hypothesis (FDH) for this study is of great significance. Firstly, FSH has received extensive usage and has strong support from empirical studies as efficient in examining the determinants of derivative use among firms. Conversely, though FDH has also been identified as efficient in examining the determinants of derivative usage, there are differing views on its impact on derivative use. Thus this study will test both the FSH and FDH on the listed banks in Ghana to examine their impact on the usage of financial derivatives.

2.2 Firm size hypothesis

Most researchers agree that the use of derivatives is highly influenced by the size of the company. For instance, Ahmad & Haris (2012) argue that large companies are likely to use derivatives to hedge risk exposure rather than small companies because these larger companies have the necessary resources and knowledge to apply the techniques of hedging or financial derivative use. This assertion is supported by Nguyen & Faff (2002). According to Minton, Stulz, & Williamson (2009), huge

companies may use derivatives because they have enough resources to undertake derivative activities, other huge companies may not use derivatives because they believe they have enough resources to cushion them even in times of financial crisis. On the contrary, Ang, Chua, & MCconnell (1982) disclosed that small companies are more likely to be in financial distress and therefore will opt to hedge to protect them from going bankrupt. Similarly, Lien (2008) asserts that smaller companies may be influenced to use financial derivatives to help them acquire some assets or funds which may not have been readily available to them. Moreover, that research admits that if a company is small in terms of size, they may not use financial derivatives because they may not have the necessary resources to undertake derivate activities. For the purposes of this study, the bank's total asset is used as a proxy for bank size (Nguyen & Faff, 2010). Following, Hann, Ogneva, & Ozbas (2013), the bigger the company, the higher the likelihood of using derivatives and the smaller the company size, the lower the likelihood of using financial derivatives. This study thus posits that:

H1: Bank size has a positive relationship with the use of financial derivatives by the listed banks.

2.3 Financial distress hypothesis

A great number of companies that show the warning signals of financial distress are highly susceptible to be bankrupt (Al-khatib, (2012). Financial distress is related to a company's leverage decision.

Financially distressed companies often suffer from lack of liquidity and therefore need timely bridge financing in the process of resolving financial distress. These companies need enough and sufficient cash to pay employees, suppliers and other stakeholders. Many types of research have been conducted on financial distress and how to predict it. Most of

these researches make use of financial ratios to aid them in making their assessment of a company's situation. One of such researches was done by Edward I. Altman in which he introduced the Altman Z-score. These z-scores help to identify the state in which an organization is in. His model (Altman Z-score) makes use of financial ratios. This model had some restrictions and wasn't applicable to every organization because its users were mainly public manufacturing companies (Altman, 1989). Financial ratios, on the other hand, provide a greater understanding of a company's financial position. These ratios quantify many aspects of the company's core business and are a very important part of financial statement analysis. This study thus uses financial ratios as explanatory variables to ascertain the financial distress level among the listed banks and to examine its influence on the use of derivatives by the listed banks.

Debt to equity ratio is used to measure business' ability to repay its financial debt obligations through the use of equity. This ratio is one of the most important financial metrics because it indicates potential financial risk. Firms with a higher debt to equity ratio tend to fail because of their inability to meet their obligations. This is because as the ratio increases the company is being financed by creditors rather than from their own financial sources which may always be a dangerous trend. The question is how large of debt to equity ratio is acceptable for banks and other financial institutions this is so because the major products that banks sell is debt in the form of deposits and others. This ratio is calculated as total debt divided by total equity. This implies that a company with a higher debt to equity ratio is at risk of financial distress hence the more likely the use of derivatives. The study thus hypothesizes that:

H2: Debt to Equity ratio positively influence the use of financial derivatives

Current ratio depicts the ability of a company to pay off its short term financial obligations known as short term liabilities with its liquid current assets. Banks that have lower current ratio indicates that the company is unable to pay off liability and hence the need to use derivatives to prevent financial uncertainties which might result in financial distress (Kim & Sung, 2005). The study thus asserts that:
H3: Current ratios negatively influence the use of derivatives among the listed banks in Ghana.

Interest cover ratio is used to ascertain how easily a company can pay interest in outstanding debt. It is a measure of the margin of safety of a company for paying interest for a particular period of time and this serves a cushion for the company to survive the future financial hardships in case it arises. It is prudent for banks to have an optimal ratio because anything below the acceptable ratio means banks will have to further borrow to pay off interest whiles these monies could have been used in investing in capital assets. The lower a firm's interest coverage ratio, the more it is susceptible to financial burdens. The minimum threshold for interest coverage is 1.5 and this implies that anything below this implies that their ability to pay off interest expense is questionable. Lenders may see companies with low-interest coverage as high risk and may not lend them monies again. The warning threshold is 2.5 and since interest coverage depicts the generation of revenues to cater for interest expenses, lower interest coverage may mean a company is running into bankruptcy (Aretz & Bartram, 2010). The study, therefore, posits that:
H4: Interest Cover Ratio negatively influences the use of financial derivatives among the listed banks in Ghana.

Return on Equity is a profitability ratio that can be used to check how well a company is using its resources to generate

earnings. As a firms profit falls, the company nears breakeven point and subsequently to the negative profit zone (Chan, Powell, & Treepongkaruna, 2014), (Nelson, Moffitt, & Affleck-Graves, 2005). This implies that lower ROE's will trigger banks to use more derivatives. The converse is equally true. Hence the hypothesis that:

H5: Return on Equity negatively influence the use of financial derivatives among the listed banks in Ghana.

3. METHODOLOGY

3.1 Data

The data for this study was obtained from the annual financial reports of commercial banks listed on the Ghana Stock Exchange (GSE) (www.gse.com.gh). All the financial reports have been fully audited and approved by the GSE. An initial review and analysis of the financial statements of the listed banks indicated that whereas some banks used financial derivatives throughout the study period (2007 – 2014) others used the derivatives only in certain years. Overall, seven(7) banks out of twenty-seven(27) commercial banks operating in Ghana were selected for the study. The selection was based on the following criteria: (1) the banks are listed on the Ghana stock exchange ;(2) there is available, accurate and verifiable data on the banks within the study period; and (3) the banks have prior knowledge of trading in financial assets and or financial derivatives (i.e. by listing on GSE).

3.2 Variables

In the case of this study, the dependent variable is financial derivative usage. This dependent variable is dichotomous(Y=1 if the banks used derivatives and Y=0 if otherwise). The independent variables are the determinants of derivative usage as obtained from the literature. Namely bank size (total assets),

current ratio, and debt to equity ratio return on equity and interest cover ratio. Table 1 provides a summary of the variables, their corresponding proxies and definitions; and prior expectations.

Table 1: Variables and their definitions

Dependent Variable	Theory/Hypothesis	Independent Variable		Prior Expectation
		Proxy	Definition	
Derivative Use(DU)	Firm Size Hypothesis (FSH)	Total Assets (TA)	Log(Total Assets)	+
	Financial Distress Hypothesis (FDH)	Current Ratio (CR)	Current assets / Current Liabilities	-
		Debt to Equity (DE)	Total Debt/ Total Equity	+
		Interest Cover Ratio(ICR)	EBIT/Interest Expense	+
		Return on Equity(ROE)	Net Income/Equity	-

3.3 Model specification

A logistic regression model (logit model) was used to examine the direction of the selected factors influences on the use of financial derivatives and the relatedness or significance of that influence. Logistic regression was chosen as the probability model due to the dichotomous nature of the dependent variable. The outcome of the dependent variable is to be restricted between the values of 0 and 1. Logistic regression can better help keep this range rather than the ordinary least square regression model . Even though the outcome is binary, logistic regression gives us the results that will maximize the chance of derivative use (Williams, 2014). Similar methodology has been used in similar studies (Ahmad & Haris, 2012; Al-khatib, 2012; Mizerka & Stróżyńska, 2013; Williams, 2014).

The general model for the logistic equation is,

$$\text{Logit}(p) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots. B_k X_k \text{ (Statsoft, 2013)}$$

Simplifying,

$$\text{Logit}(p) = \beta_0 + \beta_1 TA + \beta_2 CR + \beta_3 DE + \beta_4 ICR + \beta_5 ROE \qquad (1)$$

Where:

β_0 measures the output level holding all the independent variables constant;

β_1, β_2, β_3, β_4 and $\beta 5$ are standardized coefficients that measure the strength of the respective distinctive effect of the independent variables in each model on the dependent variable

Logit (p) predicts the logit transformation of the probability of derivative usage.

Logit (p) = p/ (1-p)

p = the probability of banks using derivatives

1-p = the probability of not using derivatives

4. ANALYSIS, RESULTS AND DISCUSSION

4.1 Summary of statistics

Table 2 shows the general descriptive statistics and correlation on the data used for the study.

Table 2: Summary Statistics on Variables

Independent Variable	Mean	Standard Deviation	Pearson Correlations					
			TA	CR	DE	ICR	ROE	DU
Total Assets(TA)	6.959	1.35420	1					
Current Ratio(CR)	1.077	0.16693	.404**	1				
Debt/Equity Ratio(DE)	7.183	2.30526	-.323*	-.106	1			
Interest Cover Ratio(ICR)	1.533	1.14541	.121	-.394**	-.324*	1		
Return On Equity(ROE)	0.266	0.11682	-.487**	-.334*	.021	.509**	1	
Derivative Usage(DU)			.082	-.176	-.141	.119	.178	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

From Table 2, the average current ratio is 1.0774 which is 42.26 percent below the acceptable ratio limit. The implication is that the sample in this study is susceptible to financial distress even though the ratio is slightly higher than 1.

Moreover, with respect to Interest Cover Ratio (ICR), Table 2 reports a mean ratio of 1.5334. Though the mean ratio of the listed banks' ICRs is above the acceptable minimum threshold (i.e.1.5), any figure below 2.5 is a warning signal. Hence the banks in the sample still face the threat of financial distress. In addition, it is observed that the debt to equity ratio (DE) has a mean of 7.1826. This value is very high compared to

the generally accepted minimum value of 1.5. Though high DE may not in itself be a negative indicator, it may imply some form of risk for the banks. Some companies have a higher debt to equity ratio because of growth objectives and opportunities. However, if DE is high then return on equity must equally be high. Since banks normally deal in debt products, it is not surprising to see higher DE. Furthermore, the average Return on Equity (ROE) of the banks in this sample is 0.2664(26.64 percent) whiles the industry common average is 8.15 percent. This implies that banks are generating more revenue from the use of equity. The high ROE reported by the banks supports the earlier assertion that if the banks have higher DE, then it should be compensated with higher ROE.

4.2 Logistics regression results

Table 3 shows the logistics regression output. This table indicates the regression coefficient (B), the Wald statistic and the Odds Ratio (Exp (B)) for each variable category. The ß values (in log-odds units) predict the dependent variable from the independent variables. The Wald chi-square statistics test the unique statistical significance of the coefficients. The odds ratio indicates the relative amount by which the odds of the outcome (derivative usage) increase or decrease when the value of the independent variable is increased or decreased by 1 unit.

Table 3: Summary of Logistics Regression Output

Variable	B	S.E.	Wald	Sig.	Exp(B)
TA	0.833	0.383	4.746	.029**	2.301
CR	-5.448	2.547	4.575	.032**	0.004
DE	-0.175	0.147	1.422	0.233	0.839
ICR	-0.858	0.472	3.308	.069*	0.424
ROE	10.51	4.889	4.621	.032**	36671.79
Constant	0.283	3.278	0.007	0.931	1.328

* and ** denote 10% and 5% significant level respectively

4.3 Factors with a positive impact on derivatives use

From Table 3, TA (a proxy for bank Size) positively and significantly influence the use of derivatives (DU) by the listed banks (B=0.833; p-value = 0.029) at 5 percent significant level. This finding supports H1. The 2.301 odds ratio for TA indicates that the odds or likelihood of the listed banks using financial derivatives increases by 2.301 times for every 1 unit increase in the banks' total assets. Thus, a one unit increase in the banks' Total Assets (TA) increases the likelihood of using derivatives by 113 percent [i.e. (2.301-1)*100=130.1%]. This outcome is consistent with the findings of (Allayannis & Weston, 2001; Mizerka & Stróżyńska, 2013; Shaari et al., 2013; Sinkey & Carter, 2000; Sprcic, 2008). The views on bank size and its impact of derivative usage are of two perspectives. The first perspective is that banks with bigger total assets (classified as large banks) have the required resources to carry out financial derivative transactions. On the other hand, banks with fewer assets (classified as small banks) have a greater incentive to use derivatives. Their major incentive being the cost of financial distress, therefore, the small banks hedge to avoid the risk.

Similarly, the results (Table 3) show that ROE has a significantly positive relationship with the use of financial derivatives by banks listed on the Ghana stock exchange (B=10.51; p-value = 0.032). The relationship is statistically significant at 5 percent. The 36671.79 odds ratio for ROE indicates that the odds or likelihood of the listed banks using financial derivatives increases by 36671.79 times for every 1 unit increase in the banks' ROE. Thus, a one unit increase in the banks' ROE increases the likelihood of using derivatives by 3667079 percent [i.e. (36671.79-1)*100=3667079%]. This outcome is contrary to prior expectation (H2). Since financial derivatives is used as a risk management tool, the initial expectation was that if the banks had high ROE, then the threat of financial distress was minimal and hence less risk and

less likely to warrant the need for financial derivatives. One reason for this outcome could be the impact of banks' profits on the use of financial derivatives. As the income of the banks increases relative to the use of equity, the derivative amount to be hedged also increases. A similar finding is reported by (Shaari et al., 2013) in a study on the determinants of derivative use in Malaysian firms.

4.4 Factors with a negative impact on derivatives use

On current ratio (CR), the regression results indicate a significant and negative relationship with the use of derivatives by the banks in the study sample (B=-5.448; p-value = 0.032). The relationship supports prior expectation (H3) and is significant at 5 percent. The 0.004 odds ratio for CR implies that the odds or likelihood of the listed banks using financial derivatives increases by 0.004 times for every 1 unit decrease in the banks' CR. Thus, a one unit decrease in the banks' CR increases the likelihood of using derivatives by 99.6 percent [i.e. (0.004-1)*100=-99.6%]. This result implies that the banks in the study have less incentive to use financial derivatives as their current ratio increases. This outcome is similar to the findings of (Nguyen and Faff 2002). In a study on the determinants of derivative usage by Australian companies, (Nguyen and Faff 2002) concluded that companies with higher current ratios have lesser incentives to use derivatives since such firms are able to meet their short term financial obligations. (Mizerka & Stróżyńska, 2013) on the other hand, found no statistically significant relationship between derivative usage and current ratio in a study on polish companies.

Table 5 reports a negative and significant relationship between ICR and derivative use (B=-0.858; p-value = 0.069). This outcome partly supports the initial prediction of the study (H4) at 10 percent significance level. The 0.424 odds ratio for ICR implies that the odds or likelihood of the listed banks using

financial derivatives increases by 0.424 times for every 1 unit decrease in the banks' ICR. Thus, a one unit increase in the banks' ICR decreases the likelihood of using derivatives by 57.6 percent [i.e. (0.424-1)*100=-57.6%]. A lower ICR indicates the threat of insolvency which may lead to financial distress. This finding is consistent with the findings of (Aretz & Bartram, 2010).

4.5 Factors with insignificant Impact on derivative Use

The model shows that there is no statistically significant relationship between the use of derivatives by banks in the sample and debt to equity ratio (DE) (B=-0.175; p-value = 0.233). Though the relationship is negative and partly supports prior expectation (H5), the insignificance is inconsistent with some prior studies. For instance, (Froot, Scharfstein, & Stein, 1993; Mizerka & Stróżyńska, 2013; Nguyen & Faff, 2002), found that debt to equity was significantly related to the use of derivatives. That said, (Shaari et al., 2013) explains that the insignificant relationship could be attributed to the fact that banks DE ratio does not accurately show the debt level because some banks might not like to raise external funds.

5. CONCLUSIONS

The study finds a positive and significant relationship between the use of derivatives and total assets (TA). The positive and significant relationship between bank size and derivative usage could have converging implications. Whereas the "big" banks may have enough resources to undertake derivative activities, the "small" banks may use derivatives as risk management strategy due to high uncertainties. However, it is, bank size (or TA) is a key determinant for the use of derivatives by the listed banks in Ghana.

Similarly, the study finds that Return on Equity (ROE) positively and significantly affect the use of derivatives. ROE is the ratio of profit generated per the use of equity. The positive effect of ROE as a financial distress indicator suggests that, the banks use derivatives when they are generating enough revenue or profits from the use of equity. Equally, if the listed banks generate lower profits from the use of equity capital, then the use of derivatives may be less or extinct. Of all the factors, ROE has the greatest impact on derivative use with a coefficient of 10.510.

Furthermore, the study reports a negative and significant relationship between derivative use and the banks' Current Ratio (CR). Higher bank CR indicates that the banks are able to meet their short-term financial obligations. Likewise, if the CR is below the acceptable minimum ratio, it means the banks will not be able to meet its financial obligations as it falls due. The latter is an indication of the threat of financial distress. In the case of the sampled banks listed on the stock exchange of Ghana, the negative relationship and the low odds ratio (0.004) imply a higher threat of financial distress and thus a higher likelihood of derivatives use.

Again, Interest Cover Ratio (ICR) reported a negative relationship on the use of financial derivatives. Lower ICR means that a company may be insolvent which leads to financial distress. A financially distressed firm will use financial derivatives. From the descriptive statistics, listed banks have a mean of 1.5334 which indicates the probability of financial distress. The negative impact of ICR on derivative use is an indication that banks listed on the GSE have lower ICR and more likely to be financially distressed, hence, the use of financial derivatives.

The results of this study show no significant effect of debt to equity ratio (DE) on the use derivatives by the sampled banks. Though the relationship is positive, it was insignificant.

Hence this study cannot conclude that DE is a key determinant of derivatives usage among listed banks in Ghana. Despite the fact that the findings of this study provide support for the hypotheses, the factors determining the use of financial derivatives cannot be generalized for the entire banking sector of Ghana. In future research, the researchers recommend a survey into all the banks in Ghana so that appropriate conclusions can be made with regards to derivative use by banks in Ghana. Again, whereas this study used firm size and financial distress indicators, there are other factors such as the availability of suitable derivatives market, profitability, and managerial incentives among others. It is recommended that future studies expand the list of determinants to understand their impact.

Conflicts of Interest: The authors declare no conflicts of interest

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