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DEFAULT IN LENDING POTENTIAL OF SMALL AND MEDIUM ENTERPRISES: THE CASE OF GHANA

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ABSTRACT
Ability of a firm to repay loans is crucial to its access to credit. Banks in Ghana rate high default rate as a major obstacle of small and medium-sized enterprises (SMEs) in loan acquisition. The ability of a bank to predict default potential will help mitigate default rates. In most African countries, methods of accessing default potential are still rudimentary, thus making it even more difficult for businesses, especially SMEs to secure loans. The objective of this research is to empirically test an internal model for assessing default potential by SMEs in Ghana. To achieve this, we utilize probit and logit models based on survey information from 70 SMEs and proprietary data from a large Ghanaian bank to estimate loan default probability. We find that the default risk for SMEs in Ghana is minimal for SMEs with a high net profit, a large amount borrowed, and personal property used as collateral in securing the loan. While the statistical analyses buttress the evidence documented in the literature, we find that the substantive impact for net profit and amount borrowed stands at less than one percent and at approximately three percent if the SMEs report 634 and 1,215 thousand Ghanaian cedi, respectively.

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I. INTRODUCTION

Default potential can undermine access to loans. A bank's ability to predict default potential could lessen issuance of bad loans. In emerging and frontier markets such as most of the developing world including Africa, default potential is even higher and results in higher interest rates. However, industries and segments that are stimulants of economic growth still need access to funds. In most economies, these stimulants are small and medium-sized enterprises (hereafter abbreviated as SMEs). SMEs are job creators and act as engines of growth in African economies (Abor and Quartey, 2010), hence their ability to secure loans could have a multiplier effect in the economy. Yet, bank loans account for less than a quarter of SMEs total debt financing (Abor and Biekpe, 2007). One of the main reasons for this is the potentially high risk of default, which is exacerbated by asymmetric information between banks and borrowers and the attitudes adopted by business owners (Boahene et al., 2012; Kauffman, 2005).

High default rate ranks third among the eight top three perceived obstacles that mitigate against the financial inclusion of SMEs by banks in Ghana (PWC, 2013). Consequently, methods of determining default potential are vital to the successful operation of banks. While there are several scholars that have researched SMEs financing in Ghana, (see Aryeetey et al., 1994; Biekpe, 2004; Abor and Quartey, 2010), these are either qualitative in nature or focused on growth and exports. This paper examines factors affecting the default probability of SME customers of a prominent bank in Ghana using probit and logit models. Specifically, we ask the following question: "What characteristics contribute to an SME defaulting?"

The next section of the article literature review of SME studies on bank financing and defaults. This is followed by the introduction of the probit and logit model specifications as well as data used in the data and methodology section. The last two sections of the paper are empirical results and conclusion, respectively.

II. REVIEW OF LITERATURE

To estimate the default probability of SMEs in Ghana, we first review SME studies on bank financing and defaults. Abor and Biekpe (2007) used a panel regression model to explore the determinants of SME's access to bank financing in Ghana. They find that age, size, and tangibility have a positive and significant impact on bank financing as measured by their bank debt-total debt ratios. Surprisingly, profitability was found to be negative. In a latter study, Abor et al. (2014) used a probit model to assess the relationship between bank finance and export potential of SMEs. They found the relationship to be positive.

Altman and Sabato (2007) used a logit model to estimate default prediction based on a distress model. Their data included over 2,000 US SMEs over the period 1994-2002. Their out-of-sample prediction was 30 percent more accurate than a generic corporate model. In another study, Grunert and Norden (2012) find that soft skills, such as experience and age of the borrower, as well as the size of the firm (as measured by the logarithm of sales), have more influence on bargaining power than quantitative measures such as financial ratios and credit scores in the US and Germany.

Berger and Udell (2002) examined the organizational structures and relationships of banks that lend to small businesses in the US. Their model identifies the loan officer as the main repository of information about the soft relationship between banks and small businesses. The soft nature of the information creates an agency problem due to the difficulty in transferring such information from the loan officer to bank management and other stakeholders.

According to Hernandez-Canovas and Martinez-Solano (2010), relationship lending is suitable for short-term loans and credit. Using data from a survey of Spanish SMEs, they analyzed the effect of the length of the firm-bank relationship on the availability of loans. They find that longer relationships enhance access to loans, but more guarantees or collaterals must be established.

Barro (1976) analyzed how collateral influences loan market interest rates. He argues that if lender valuation of the collateral is below that of the borrower's, then interest rates on the loan are appropriately weighted by the default probability to reflect the loss.

In another study, Booth and Booth (2006) find that the use of collateral reduces borrowing costs, and that large firms are less likely to have their loans secured. Using a model of divergent opinions, Chan and Kanatas (1985) showed that collateral and type of collateral presented by borrowers helps lenders' estimate their expected returns in a situation with asymmetric information.

Literature on discursive practices that undermine business prowess in developing countries is awash with analyses of how business practitioners in these areas tend to be culturally sensitive in their communication. In a study of Spanish-language letters by business administrators in Guatemala, Conway and Wardrope (2004) found out that Latin American firms do not follow conventional formatting as those used in Western countries. Conway and Wardrope's study indicated that Latin American business firms do not follow all the international conventions in business communication.

The above reviewed studies provide guidelines for model development in the next section.

III. DATA AND METHODOLOGY

A. Empirical Models: Logit and Probit

Logit and probit models are commonly used in the SME finance and default literature. Subsequently, we follow the literature (Cowling and Mitchell, 2003; Booth and Booth, 2006; and Grunert and Norden, 2012) by utilizing probit and logit models to estimate the loan default probability of SMEs in Ghana. Such models can be specified as

$$\Pr(Y = 1) = f(X'\beta)$$

where X is a vector of factors influencing default probability (Pr) and β is a vector of coefficients. Based on the literature from the previous section, X is categorized as either one of the following characteristics: borrower/SME, lender, loan, and economic conditions.

Borrower characteristics are essential in explaining loan defaults. It includes age of firm, size of firm, financial ratios, and profitability. One of these characteristics, firm size, is commonly measured by most banks in Ghana as turnover sales. Anecdotally, revenue from high turnover sales should increase the accounting liquidity of firms, including SMEs. However, it is possible that high sales may not necessarily translate to better turnover return. Given that the focus of this paper is on the default probability, an asset turnover ratio such as sales to total assets (TAT), which indicates management behavior with respect to revenue generation from assets, could also be a convenient measure of size.

According to Loffler and Maurer (2009), future defaults can be explained through a set of accounting ratios. Another financial ratio that could suggest the default potential of SMEs is leverage. Leverage ratio (Total Debt / Net Worth) measures a firm's usage of long term debt, which reflects the riskiness of the firm. Thus, high ratios could lead to defaults while low ratios indicate that the firm is not taking advantage of borrowing. Because SMEs in Ghana do not have as much access to credit as their large corporation counterparts, one would expect that SMEs have low leverage ratios. As for profitability, Altman and Sabato (2007) showed profitability (net profit) as a statistically significant factor in determining the distress level of a firm. They suggest that credit risk modeling should be done separately for SMEs and large corporates.

The loan officer's effectiveness in identifying risky loans depends on the time spent in that position and the strength of the established relationship. A discursive analysis of the factors contributing to the status quo indicate that there is a strong link between the use of specific language and words for business advertising and how clients conduct business. A different relationship is expected between SMEs and banks in Accra, the capital of Ghana, and Kumasi, its second largest city. In Kumasi, residents have a strong sense of community, which makes it more probable for a loan officer to issue a riskier

loan compared with a more cosmopolitan city such as Accra. A loan officer with years of experience less than average is 1, and 0 otherwise.

Loan size increases along with the facility amount, which in turn results in a higher default probability for SMEs (see Featherstone et al., 2006). In regard to collateral, lenders receive comfort from collateral (De la Pena and Fleisig, 2001), and the most preferred form of collateral in Ghana is landed property (Aryeetey et al, 1994). Collateral was required in order for the SMEs used in this study to secure a loan. The collateral presented were either owned by the SME or by a third party. In Ghana, many SMEs are unable to provide landed property as collateral, and banks discourage the use of other assets, such as stocks, plants, and machinery, through devaluation of them. Therefore, we are interested in knowing whether the use of a third party's landed property influences the SME's default potential. It is rational to expect that the default probability will increase using a third party's property.

Finally, it must be noted that all businesses are influenced by macroeconomic conditions. One macroeconomic variable that is particularly difficult to manage is inflation. During inflationary periods banks decrease access to credit and charge high interest rates to manage their risk (Abor and Biekpe, 2007). On the other hand, SMEs are unable to increase their product prices to cover rising input costs due to low demand for the products, which then leads to a cost-price squeeze. Consequently, default probability for SMEs is expected to be high during inflationary periods. Consumer Price Index in the year preceding the year of loan acquisition was used as a measure of inflation.

The probability of default is coded as a binary function with 1 suggesting a default. The marginal effects of nine SMEs with significantly different levels of the predictor variables will be estimated for comparison.

B. DATA

We try to achieve the objective of this study by collecting quantitative data from the financial statements of SME businesses that have a borrowing relationship with the prominent bank in question and consented for their information to be used in the study. Data available to us encompass the four broad characteristics above. In addition, to have a better understanding of the SMEs, qualitative data are collected using a questionnaire. Finally, website of banks in Ghana are analyzed for quality of information they provide to potential clients.

The observations used in this study were randomly drawn from a pool of organized SME businesses in the two largest cities in Ghana, Accra and Kumasi. Considering the lack of data on SMEs in Ghana and the difficulty in obtaining information from such

businesses, a modest sample of 100 businesses were drawn across several industries. Of the 100 SME businesses selected, 70 provided sufficient data for our study. Approximately 63 percent of the SMEs are located in Accra (Kumasi = 1, Accra = 2), and approximately 93 percent have been in business for over four years.

Table 1 offers a summary of all of the continuous predictor variables from which the ratios used in this study are generated. All of the surveyed SMEs were offered loans or overdrafts amounts ranging from as low as GHS15 thousand (US$8,000) to a maximum of GHS 2.1 million (US$1 million). The mean facility amount is about GHS362 thousand, while the mean net profit is about GHS340 thousand.

Table 1

Summary Statistics of Continuous Predictor Variables

Variable	N	Mean	Std. Dev.	Minimum	Maximum
Sales (000 GHS)	70	3875.2	7791.1	25	49197
Net Profit (000 GHS)	70	340.5	783.2	-266	5965
Facility Amount (000 GHS)	70	362.2	529.7	15	2100
Total Asset (000 GHS)	69	1268.7	1917.8	42.9	11056
Consumer Price Index (CPI)	70	12.49	3.9	8.7	19.3
Experience (years)	70	5.8	3.1	1	10

N is number of SMEs with sufficient data needed for the study.
Facility amount is either loans or overdraft.
Experience is loan officer's years of experience: coded as 1 if less than the mean (5.8), 0 otherwise.

VI. EMPIRICAL RESULTS

A. Collateral and Default Status

Out of the 70 SME businesses, 41 were non-defaulting customers. Seventy-five percent of the SMEs that presented their own property did not default, while 69 percent of those that presented third party properties defaulted. These results clearly underscore the importance of collateral ownership.

B. Regression Tests

The probit and logit estimation results provided in Table 2 suggest that the directionality and statistical significance of the variables hold in both models. We also

report the pseudo R² and other goodness-of-fit measures.

Table 2. Probit and Logit Models Estimation Results

	Probit		Logit	
	Estimate	Standard Error	Estimate	Standard Error
Intercept	-2.4067	1.4296*	-4.1032	2.5841
Net Profit	-0.0072**	0.0031	-0.0119**	0.0052
Total Asset Turnover	-0.0318	0.1782	-0.0724	0.3119
Facility Amount	-0.0026**	0.0012	-0.0043**	0.0020
Leverage Ratio	-0.0024	0.0066	-0.0042	0.0113
Lag_Inflation	0.1373**	0.0657	0.2326**	0.1180
Collateral (*own=1, 3rd party=2*)	1.0348**	0.4794	1.7304**	0.8543
City (*Kumasi=1, Accra=2*)	-0.2163	0.4600	-0.3227	0.7893
Loan Officer Experience	0.5678	0.5121	0.9411	0.8762
Pseudo R²	0.5135		0.5070	
AIC	63.68		64.29	

The first five variables (net profit to lag_inflation) are continuous while the rest are categorical variables.
Double asterisks (**) and an asterisk (*) indicate the estimated coefficient is statistically significant at 5 percent and 10 percent test level, respectively. The higher the Pseudo R² or Akaike Information Criteria (AIC), the better the model.

Statistically significant factors include net profit, facility amount, inflation, and collateral. Furthermore, the directionality of the statistically significant variables are as expected in addressing default potential. For instance, net profit has the same sign (negative) and significance level (10 percent) in both models. The results also confirm the importance of collateral ownership in loan default. The positive coefficient of collateral suggests that the probability of default increases whenever third party collateral is used as security.

The estimated coefficients are non-linear in the predictor variables. As a result, for each significant continuous variable, we further estimate the level where the default propensity erodes using the aforementioned regression models. Although the AIC indicates that the probit model is a slightly better fit, the logit model is used here as it is more suitable for odds ratio computations. The results are shown in Table 3.

African Journal of Accounting, Economics, Finance and Banking Research, Vol. 10. No. 10. 2016.

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Table 3. Mean Predicted Probability for Defaulting

	Significant Continuous Variables			*Default Probability*					
				Net Profit (NP)		*Facility Amount (FAMT)*		*Lag Inflation (L_CPI)*	
	NP	*FAMT*	*L_CPI*	*Margin*	*Std. Error*	*Margin*	*Std. Error*	*Margin*	*Std. Error*
1	-266	15	10.7	**0.8525**	0.08264	**0.4980**	0.0541	**0.2719**	0.0813
2	34	315	12.7	**0.5526**	0.0628	**0.3366**	0.0639	**0.3254**	0.0624
3	334	615	14.7	0.1065	0.1038	**0.1886**	0.1038	**0.3788**	0.0465
4	634	915	16.7	0.0045	0.0126	0.0851	0.0970	**0.4304**	0.0403
5	934	1215	18.7	0.0001	0.0006	0.0309	0.0571	**0.4793**	0.0457
6	1234	1515	20.7	3.72E-06	0.00002	0.0095	0.0244	**0.5249**	0.0563
7	1534	1815	22.7	1.06E-07	7.94E-07	0.0027	0.0087	**0.5669**	0.0674
8	1834		24.7	3.03E-09	2.74E-08			**0.6049**	0.0764
9	2134		26.7	8.64E-11	9.16E-10			**0.6387**	0.0822

Table contains probabilities of default for the statistically significant continuous variables in Table 2.
Margins are probabilities of default.
NP is net profit, FAMT is facility amount, and L_CPI is previous year's consumer price index.

The first three columns of Table 3 indicate the three continuous variables that are statistically significant. These variables grow at specific increments because of their descriptive statistics reported in Table 1. The next six columns report the default probability with its standard error.

As expected, the mean predicted probability of default for firms with a net profit of -266 (GHS '000) is 85.3 percent. The probability of defaulting erodes when the SMEs have a net profit above 34 (GHS '000). Following this rationale, we see that inflation has an enhancing effect on the default probability. The probability of default increases from 27.2 to 63.9 percent when the inflation rate increases from 10.7 to 26.7 percent. The high inflation rate is detrimental to business activities given that a large base of their customers may be price sensitive. Additionally, default probability decreases with the facility amount, which suggests higher facility amounts cater to the needs of SMEs.

Although the positive sign on the collateral coefficient (1.73) tells us that the propensity to default is higher for SMEs that use third party collateral, unlike the odds ratio, it does not reflect nor suggest the magnitude of default. The odds ratio for collateral is estimated to be 5.64 (i.e. $e^{1.73}$), suggesting that SMEs that use third party collateral are 5.64 times more likely to default.

C. DISCURSIVE ANALYSIS

Although the City dummy (capturing cultural differences between Accra and Kumasi)

and Loan Officer Experience are not statistically significant, the quality of information banks share with potential clients could influence a client's default potential. This is due to the negative city coefficient which suggests Kumasi SMEs are more likely to default than their Accra counterparts, and the positive coefficient of loan officer experience.

Textual and discourse analysis of business websites in Ghana indicate that banks used words specifically to appeal to local clients surfing the web. The wording by the lenders had language markers such as adjectives, pronouns and cultural references as rhetorical features to attract local clientele to their businesses. The content was mainly promotional leaning towards brand or image creation than providing necessary information for consumers to make informed decisions on when or whether to borrow money. Lending institutions used language that appealed to national cultural models rather than realistic prevailing international trends in business language, as noted by (Cardon, 2008). The lender websites analyzed indicate an attempt to attract local clientele by presenting culture-specific factors rather than providing business information for consumers. The lenders, therefore, miss out on the opportunity to cultivate a spirit of responsible borrowing (Kohl et al., 1993).

V. CONCLUSION

SMEs are often mentioned as a means of driving economic growth, reducing poverty, and improving standards of living. However, limited access to financing continues to be a major issue for SMEs. An obvious reason for the lack of financing is their higher risk of default, which is further exacerbated by asymmetric information. This paper contributes to the literature by attempting to estimate default probability using data available to most Ghanaian banks. Using logit and probit models to estimate the default probability of these SMEs, we find that inflationary periods and use of third party property as collateral contribute to a high probability of default while increasing net profit and facility amount decreases the probability of default.

The results of this study corroborate with the findings of other researchers, including De la Pena and Fleisig (2002) and Aryeetey et al. (1994) which are mainly qualitative studies. Furthermore, these findings offer insight to professionals in two areas. The first is the understanding of the implicit factors that affect default risk. A reduction in the default rate is most welcoming; hence, it is important for banks to either supply the asked facility amount (or close to it), or reject the loan application. Another important factor is the type of collateral. The types of collateral demanded by Ghanaian banks (namely landed property) are generally difficult for many SMEs to provide. Unfortunately, this then results in their reliance on third party properties, which have been shown to contribute to default. Banks need to revise their collateral requirements to ensure that SMEs have better access to loans. The second insight is that most banks use relationship lending, as corroborated by the PWC survey. Although loan officer

experience did not turn out to be statistically significant in our study, less experienced officers are found to be associated with more loan defaults. To allow loan officers to identify good borrowers from the onset, it is important for them to couple the established relationships with data driven credit tools. By alleviating the underwriting or riskiness of SMEs, the interrelationship between non-performance and financial information can be enhanced. It is also imperative that banks use business language that cultivates a spirit of responsible borrowing.

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