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**| RESEARCH ARTICLE**

## Does Loan Size Matter in How Collateral Characteristics Relate to Credit Access?

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**| ABSTRACT**

The study examined the moderating role of loan size on the relationship between collateral characteristics and access to credit by micro, small, and medium-sized enterprises (MSMEs) in the agricultural sector of the Ashanti Region of Ghana. In the agricultural sector, MSMEs engaged in crop, livestock, and fish farming constituted the population for the study. The study employed a quantitative research method alongside a causal research design. The Pearson multiple regression was employed to analyze the relationships among the study variables. The study found that collateral costs, registration, and insurance positively and significantly contribute to MSMEs' credit access. Whereas loan size does not moderate the effect of collateral cost on farmers' credit access, it negatively and significantly moderates the effect of collateral registration and insurance on credit access. Furthermore, loan size positively and significantly moderates the effect of collateral age on farmers' access to credit. The study was restricted to MSMEs in crop, livestock, and fish farming in the Ashanti Region of Ghana, thus making generalization to the country and beyond difficult. This study is important for decision-making concerning how farmers could take advantage of their collateral to secure appreciable loans in the Ashanti Region of Ghana. No empirical study has examined the moderating role of loan size on the relationship between collateral characteristics and credit access, aside from the fact that empirical studies dominate other sectors other than the agricultural sector.

**| KEYWORDS**

Access to Credit, Collateral Characteristics, Loan Size, MSMEs

**| ARTICLE INFORMATION**

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### 1. Introduction

Notwithstanding the various policy interventions targeted at mitigating credit limitations encountered by micro, small and medium-sized enterprises (MSMEs) in both the urban and rural regions of Ghana, inadequate credit accessibility persists as a significant impediment for numerous enterprises (Osei-Assibey, 2014). This could be ascribed to the inability of farmers to furnish collateral that possesses the required characteristics. Farmers across various regions of the globe exhibit a significant demand for credit, primarily to fulfill their capital requirements for enhancing their land, procuring machinery, seeds, breeding stocks, fertilizers, and compensating labor wages. In Ghana, the need for collateral arises in order to obtain credit (Pendame & Akotey, 2023). Financial institutions may not have access to all pertinent information regarding potential MSMEs, which would enable them to assess creditworthiness or the profitability of the intended use of credit (Hainz et al., 2013). The utilization of collateral has emerged as a crucial tool in addressing informational asymmetries and, consequently, resolving the issue of credit rationing. Moreover, the act of providing collateral as a means of guaranteeing repayment of loans is a prevalent and essential component of the credit application procedure. This is consistent with the assertion of Ghergina et al. (2020) that collateral-based lending is the predominant practice in Africa, where land and building are commonly regarded as a more appropriate type of collateral. These types of collateral are preferred investment options due to their fixed nature and the potential for significant appreciation over an

extended period. However, Domeher et al. (2018) argue that the absence of robust titles has the potential to compromise the abilities of these types of collateral to attract credit.

MSMEs operating within both formal and informal agricultural sectors play a crucial role in propelling worldwide economic expansion. According to Wehinger (2013), their significant contributions to job creation make them a driving force behind economic growth. In addition, Quartey et al. (2017) posit that MSMEs are considered to be a significant force in the global economy, as they account for more than 50% of private output, nearly 70% of employment, and 90% of businesses. According to Ocloo et al. (2021), small and medium-sized enterprises (SMEs) contribute to over 60% of the gross domestic product (GDP) and 70% of the total employment in low-income countries. By contrast, SMEs account for more than 95% of the total employment and 70% of the GDP in middle-income nations (Saifurahman & Kassim, 2022). Based on the findings of the Integrated Business Establishment Survey and the National Employment Report of 2015, it can be inferred that the majority of the Ghanaian population (59.9 %) is engaged in the informal sector, while the remaining 40.1% is employed in the formal sector. With respect to the agricultural industry, Ghana constitutes the majority of the workforce (55.8%), with the trading sector following closely behind (15.2%) (Ghana Statistical Service, 2019). Ghana Statistical Service further discloses that the agricultural sector's GDP growth rate at the national level was 17.5% in 2019, signifying a 4.6% increase from the previous year's growth rate of 4.8%. However, this growth rate fell short of the 2019 target of 6.0% and the projected growth rate of 5% outlined in the Agenda. The MSMEs sector is a significant area of interest due to its status as the primary source of employment in Ghana. This sector comprises 92% of businesses in Ghana and provides employment to roughly 85% of the labor force, and contributes 70% to Ghana's GDP (Abor & Quartey, 2010). From the above, it can be argued that MSMEs in the agricultural sector of Ghana merit great attention for the development of the sector and the Ghanaian economy.

However, the insufficiency of financial resources continues to pose a significant challenge to the owners and managers of agricultural MSMEs, particularly in emerging economies. This supports the argument put forward by Bello and Mustapha (2021) that small business customers are often deemed high-risk consumers, which results in most financial institutions not giving them priority when it comes to conducting business. According to Wassiuazzaman and Nurdin (2019), there is a significant deficit in funding available for MSMEs on a global scale. Meyer (2011) posits that inadequate access to financial credit in agriculture can be ascribed to risks linked to the agricultural industry, particularly among small-scale farmers. The absence of collateral to guarantee credit facilities and the misapplication of agricultural credit by farmers are contributing factors to the financial challenges faced by these farmers. The dismaying aspect pertains to the inclination of rural credit establishments towards land-owning farmers, who are typically required to provide tangible assets or real estate as security (Chen et al., 2023). Insufficient credit access is a primary constraint faced by MSME farmers operating within the Ashanti Region of Ghana, impeding their ability to effectively engage in agricultural pursuits. The present study argues that the availability of credit to farmers cannot be solely attributed to the possession of collateral security, as credit institutions may have a specific set of collateral requirements. Rather, the accessibility of credit is contingent upon the attributes of the collateral, including but not limited to the cost, registration, insurance, and age of the collateral.

In Ghana and across the globe, some studies have focused on collateral and asymmetric information in lending markets, collateral imposition and financial inclusion, determinants of access to credit, collateral registry and access to credit (for example, Osano and Languitone, 2016; Assogba et al., 2017; Chandio et al., 2017; Johnson, 2021; Loannidan et al., 2022; Saifurahman and Kassim, 2022; Mulume et al., 2022). These studies have, however, not specifically focused on the relationship between collateral characteristics (collateral cost, registration, insurance, and age) and farmers' access to credit. Studies in the Ghanaian context, such as Annang and Kabore (2015) and Pendame and Akotey (2023), have examined the determinants of access to credit, where they looked into the direct relationship between collateral security and credit access. To the researcher's knowledge, no study has focused on the moderating role of loan size on the relationship between collateral characteristics and access to credit. This study argues that the relationship between collateral characteristics and farmers' access to credit is not direct, and it may depend on the size of the loan to be provided.

The researcher is motivated by the fact that farmers in Ghana, particularly in the Ashanti Region, are faced with the problem of finance to operate and expand. By ensuring that collateral is appropriately insured and registered and taking into account factors such as the age and value of the collateral, it is possible to meet the collateral requirements necessary to obtain a significant amount of credit. Insufficient farm credit can result in missed opportunities for growth and development, thereby depriving farmers of the resources necessary to operate and expand (Ayesu, 2020). In line with this, Elum et al. (2017) advance that the provision of credit can play a pivotal role in determining the extent to which farmers can contribute towards the advancement of the economy.

This study contributes to the literature in two ways. First, it examines how collateral characteristics affect MSMEs' access to credit in the farming industry of the Ashanti Region of Ghana. Second, it examines how loan size influences the relationship between collateral characteristics and MSMEs' access to credit in the farming industry of the Ashanti Region of Ghana. The study fills the gap in the literature; researchers will be able to compare and contrast the findings with those of other researchers to come to a conclusion and offer recommendations for future studies. Again, the findings of the study will help the management of credit

institutions in developing a quality credit policy that will promote the growth of quality loans. This study will also assist MSME farmers in understanding what lenders are looking for, allowing them to meet lender requirements on time. This results in a shorter time between loan requests and receipts. The findings of the study may be relevant to the government in formulating policies to solve the credit issues faced by MSMEs from the perspective of collateral provision. The remaining part of the study proceeds as follows: theoretical and conceptual review, followed by research methodology, results and discussion, and conclusion and recommendation.

## **2. Literature Review and Hypothesis Development**

### **2.1 Theoretical Framework**

The establishment of a theoretical framework is crucial for this study, as it delineates the impact of collateral characteristics on credit accessibility and emphasizes the necessity of investigating potential variations in these characteristics under specific conditions. This study is underpinned by Credit Theory and Information Asymmetry Theory.

#### **2.1.1 The Credit Theory**

The credit theory was proposed by Stiglitz and Weiss (1992). This theory was devised to examine inefficiencies in financial markets. The theory posits that financial institutions prioritize not only the interest accrued from loans but also the potential risks associated with them (Gadzo et al., 2019). Consequently, the majority of financial establishments engage in the screening and monitoring procedures of potential borrowers prior to granting loans. Financial institutions possess highly significant data pertaining to the revenue and expenses of borrowers as well as their developmental trajectory by virtue of their management of the bank accounts of these borrowers (Sakwa et al., 2019). Despite possessing such information, partnerships between credit institutions and MSMEs are not exempt from imperfections. The credit market is unable to achieve clarity in the evolution of pricing (interest rates) due to inconsistencies in information among financial institutions.

The phenomenon of credit rationing persists when banks demand collateral, according to Stiglitz and Weiss (1992). They argue that an average borrower exhibits a preference for a reduced interest rate. This can be possible in the case of high-risk and trusted borrowers. According to Sakwa et al. (2019), high-risk borrowers are better positioned than individuals who have missed several payment periods. The credit theory argues that elevating security requisites may lead to adverse outcomes akin to augmenting loan interest rates. According to Gadzo et al. (2019), banks exclusively offer contracts that incorporate adjustments to interest rates and collateral requirements. According to the credit theory, the phenomenon of credit rationing is absent when the amalgamation of interest rates and collateral prerequisites is implemented.

The relevance of this theory to the study is that in order to cover up the risk associated with credit provision, farmers are requested to provide collateral in various forms depending on the credit policy of the financial institution. The theory further suggests that the value of a farmer's collateral may determine the cost and value of the credit. With the right collateral coupled with the satisfactory cost of credit, credit accessibility is easier. Hence, this theory adds clarity to the relationship between collateral characteristics and farmers' access to credit.

#### **2.1.2 Information Asymmetry**

The theory of information asymmetry arises when borrowers possess superior knowledge of their company's potential and risks compared to lenders (Richard, 2011). The theory stipulates that two parties may engage in the exchange of the same content of information but with varying quantities and quality. Asymmetric information is prevalent in the credit market, whereby managers or entrepreneurs of MSMEs possess substantially more knowledge regarding their financial position than credit institutions. Asymmetric information gives rise to two major outcomes, namely moral hazard and adverse selection (Ioannidou et al., 2022).

The concept of moral hazard pertains to a circumstance in which a single party makes a decision regarding the level of risk to undertake while being cognizant of the fact that in the event of unfavorable outcomes, the onus of responsibility will be borne by another entity (Gadzo et al., 2019). The issue of adverse selection, as posited by theory, arises due to a lack of symmetry in information between the credit institution and its customers, rendering it exceedingly difficult to differentiate between potential borrowers who are of good or poor credit behaviour (Richard, 2011). In situations where credit institutions face challenges in discerning between creditworthy and non-creditworthy borrowers, such as in the case of MSME farmers, it is probable that all borrowers will be subject to a uniform interest rate that is reflective of the collective risk profile. Credit institutions are increasingly prioritizing loan repayment due to uncertainty regarding the creditworthiness of MSMEs (Johnson, 2021). Therefore, the necessity of collateral requirement arises. Adverse selection leads to the replacement of good prospect borrowers with bad prospect borrowers, resulting in a decline in the overall quality of loan portfolios over time.

The importance of this theory to the study lies in the mismatch of information between MSME farmers who have applied for loans and their credit institution and MSMEs' use of contracted loans for unintended purposes. This explains why credit institutions require adequate collateral to cover existing risks.

## **2.2 MSME Farmers in Ghana**

The exact delineation of SMEs has been a subject of debate among scholars, with a consensus yet to be reached. SMEs in developing countries are classified by the United Nations Industrial Development Organisation (UNIDO) based on their workforce size, which is stratified into small (5-9) and medium (20-29) categories. In contrast, the National Board for Small Scale Industries (NBSSI) in Ghana employs a criterion for defining SMEs that takes into account the number of employees and the balance sheet of the enterprise (capped at US\$100,000, exclusive of property and buildings). As per the Venture Capital Trust Fund (VCTF) Act 2004 (Act 680 section 28), SMEs are characterized as an industry, project, undertaking, or economic activity that hires a maximum of 100 individuals and has a total asset base, exclusive of land and buildings, that does not surpass the cedi equivalent of US\$1 million in value. According to Oppong et al. (2014), the National Board for Small Scale Industries (NBSSI) has categorized MSMEs into four groups based on their number of employees. The first group consists of micro enterprises with fewer than five employees. The second group is small enterprises that consist of six to twenty-nine employees. The third group is medium enterprises, which consist of thirty to ninety-nine employees. The fourth group is made up of large enterprises that consist of 100 or more employees. Utilizing the categorization established by NBSSI (now Ghana Enterprise Agency), MSMEs are defined in this study as commercial entities that employ a workforce numbered from 1 to 99.

MSMEs are prevalent in Ghana's agricultural sector and make significant contributions to the country's economic growth through their farming operations. The agricultural industry is categorized into five distinct sub-sectors: crops, livestock, cocoa, fisheries, and forestry/logging, as reported by the Ghana Statistical Service (2019). In Ghana, the MSME sector can be classified into two distinct categories: urban and rural. The agricultural sector predominantly comprises of rural MSMEs. According to the Ghana Irrigation Development Authority, the agricultural land in Ghana is approximately 13.5 million hectares (Ferreira et al., 2022). However, only half of this land is presently utilized for cultivation, while only 222,978 hectares of land is under irrigation, accounting for a small fraction of the estimated 6.4 million hectares of cultivated area (Ferreira et al., 2022). The agricultural sector in Ghana's economy has a significant influence on poverty reduction compared to other sectors. It plays a crucial role in rural development and upholds cultural values, promotes social stabilization, ensures environmental sustainability, and serves as a cushion during economic shocks. The Ashanti Region's agricultural production significantly contributes to both the regional and national economies. The region's economy is primarily driven by the agricultural sector, which benefits from ample arable land.

## **2.3 Collateral Security**

Numerous research studies have consistently indicated that SMEs face considerable challenges when attempting to secure bank loans (Brixiola et al., 2020). The current issue at hand pertains to devising strategies to enhance or streamline individuals' ability to obtain bank credit (Assogba et al., 2017; Ayesu, 2020). The challenges faced by MSMEs in accessing bank credit are often attributed to their inability to provide satisfactory collateral. The level of satisfaction attached to collateral security has to do with its characteristics. The impediment to formal credit acquisition through the use of the landed property as collateral for enterprises is attributed to the land ownership structure and legislative framework for land title registration in Ghana (Domeher et al., 2018). As per the traditional land ownership system, communal ownership of real estate is prevalent, and legal title to property is not possessed by a majority of individuals. In line with this, Sakwa et al. (2019) advance that the availability of real estate as collateral is often restricted due to the requirement of a well-defined title, as legal ownership cannot be established without it.

It appears that companies possessing tangible collateral exhibit greater loan accessibility compared to those lacking such assets (Mulume et al., 2022). Consequently, a positive relationship exists between collateral and the overall performance of small and medium-sized enterprises (SMEs) (Anang and Kabore (2021)). Collateral is exclusively utilized in the computation of the loan loss provision necessary for non-performing loans, as it is deemed a supplementary means of repayment. It is imperative that securities are duly finalized in all aspects, encompassing appropriate cost, registration, and insurance.

## **2.4 Access to Credit**

In recent years, there has been growing interest among academics and policymakers in the subject of credit availability and debt financing for small businesses, as evidenced by the works of Kautonen et al. (2020). The significance of small firms in the economic development of nations has been widely acknowledged in academic literature (Gherghina et al., 2020). The acquisition of external loan financing for the purpose of business development and growth poses a challenge for managers and entrepreneurs of small firms in developing countries, as indicated by recent research (Khan & Anuar, 2018; Kautonen et al., 2020).

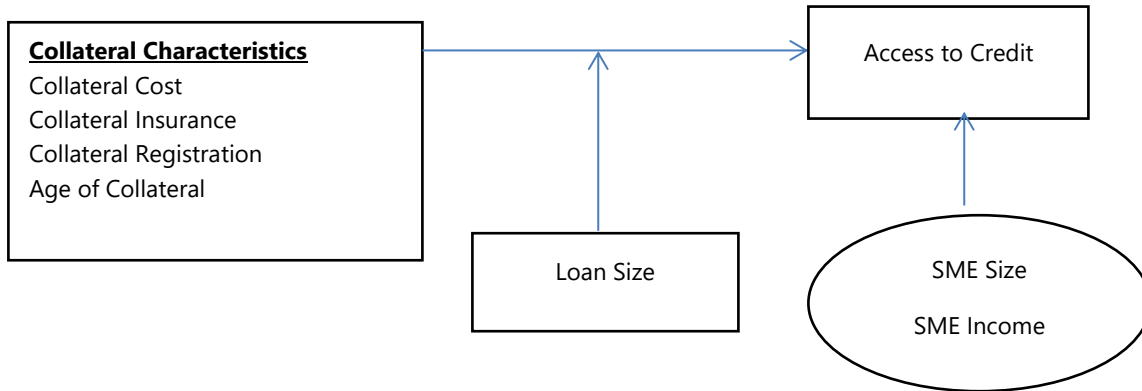
Credit refers to the capacity to obtain capital in exchange for a commitment to repay at a designated point in the future. Khan and Anuar (2018) define credit accessibility as the level of complexity involved in obtaining credit from lenders with the aim of augmenting business efficacy. Similarly, Wasiuzzaman and Nurdin (2019) have defined access to credit as the lack of any hindrances, whether related to price or non-price factors, in the utilization of credit. The present study conceptualizes credit accessibility as the provision of judicious lending opportunities to individuals for advantageous objectives such as initiating or enhancing a commercial venture. Scholarly discourse on access to finance can be bifurcated into two distinct streams. The first

stream pertains to formal sources of financing, which typically involve financial intermediaries, while the second stream pertains to informal sources of finance, which often encompass acquaintances, relatives, and trade creditors (Wasiuzzaman & Nurdin, 2019).

**2.5 Conceptual Framework**

The study has developed a basic conceptual framework consisting of dependent, independent and control variables, as well as moderating variables, in accordance with the research objectives and literature. The conceptual framework suggests that the effect of collateral characteristics on MSMEs’ access to credit can be moderated by loan size when enterprise size and income are controlled for. Figure 1 presents the conceptual framework.

Figure 1 Conceptual Framework



Source: author’s development (2023)

**2.6 Collateral Characteristics and Access to Credit**

Assogba et al. (2017) use the logit estimating method to investigate the factors that influence smallholder farmers' access to finance in North-East Benin. 120 small-scale farmers were surveyed for the research. According to the findings, smallholder farmers' ability to get loans depends on a variety of characteristics, including guarantor, collateral, and interest rate. In addition, the study reveals a negative relationship between collateral security and access to credit. This study was conducted in the context of Benin, and it focused on small-scale crop farms, aside from the fact that it ignored the moderating role of loan size.

The study conducted by Chandio et al. (2017) investigated the accessibility of credit for farmers in the Sindh province of Pakistan, with a focus on collateral or cash flow. Descriptive statistics and a probit regression model were utilized to identify the significant determinants of credit accessibility in the Sindh province of Pakistan. The findings of the probit regression analysis indicated that collateral has a positive effect on the accessibility of credit for farmers. Conversely, age was found to have a negative but statistically insignificant influence on farmers' credit accessibility. This study was conducted in the context of Pakistan and focused on collateral and credit access, ignoring the moderating role of loan size.

The study conducted by Anang and Kabore (2021) aimed to evaluate the determinants that affect the accessibility of credit among small-scale poultry farmers in the Sunyani West District. The data underwent both descriptive and inferential analysis. The findings indicate a significant relationship between collateral security and the accessibility of credit facilities for small-scale poultry farmers. This study focused on a variety of determinants, including collateral, and did not examine the moderating role of loan size.

The study conducted by Pendame and Akotey (2023) investigates the impact of a moveable collateral registry on the accessibility of credit for micro, small, and medium-sized enterprises in Malawi. The results suggest that the implementation of the registry in Malawi has resulted in a slight improvement in the ability of micro, small, and medium enterprises (MSMEs) to obtain bank loans. The utilization of real property as collateral continues to be the preferred option, and the capacity to repay the loan is the primary factor that banks take into account when evaluating whether to extend credit to micro, small, and medium-sized enterprises. This study was conducted in the context of Malawi, aside from the fact that no moderating role was examined.

The study conducted by Chen et al. (2023) investigated viable strategies aimed at enhancing households' credit accessibility. The study applied an endogenous switching probit model to investigate the potential of land transfer to alleviate credit constraints. The study revealed that households that engage in land transfers, whether in or out, experience a credit constraint reduction of 31.4% and 21.4%, respectively, compared to those who do not engage in such transfers. The act of engaging in land transfers has the potential to enhance the financial circumstances of borrowers by augmenting their income and offering assets as security, thereby mitigating both formal and informal limitations on credit. The study was conducted in the Chinese context, aside from the fact that it focused on land transfer and credit access, ignoring the moderating role of loan size.

From a different perspective, the present study looks at collateral characteristics and credit access, also focusing on the moderating role of loan size. Inadequate collateral, or lack of collateral, is defined as the absence of the required characteristics associated with collateral security, such as the type of collateral, the cost, registration, insurance, and age. Collateral security must possess these characteristics in order for a credit institution to accept it. From the above, it is hypothesized as follows:

**H<sub>1</sub>: collateral cost has a positive influence on credit access by MSMEs in the farming industry.**

**H<sub>2</sub>: collateral registration has a positive influence on credit access by MSMEs in the farming industry.**

**H<sub>3</sub>: collateral registration has a positive influence on credit access by MSMEs in the farming industry.**

**H<sub>4</sub>: collateral age has a negative influence on credit access by MSMEs in the farming industry.**

### ***2.7 The Moderating Role of Loan Size***

According to Duarte et al. (2017), the principal determinants of collateralization are the maturity and size of the loan. Research conducted both theoretically and empirically has demonstrated a positive relationship between the maturity of loans and the level of collateral requirements. Osano and Languitone (2016) further show that an increase in debt undertaken by a corporation results in a corresponding increase in the risk of default due to a higher degree of leverage. Subsequently, financial institutions have the option to demand supplementary collateral as a means of ensuring safety. In the view of Gama and Duarte (2015), the costs associated with pledging collateral can only be recuperated through economies of scale that are typically linked to larger loans. As a result, it is more prevalent to observe the practice of pledging collateral with larger loans as opposed to smaller ones. According to Gama and Duarte (2015), there is a higher probability of securing credit when required collateral securities are provided. However, Hainz et al. (2013) present dissimilar evidence that when loan size is too huge, credit access may be difficult. The major bank employs the requirement of collateral to establish the priority of its claims on the loan over those of other creditors, owing to the restricted frequency of asset pledging and the considerable cost of appraisals. Drawing on the above, it is hypothesized as follows:

**H<sub>5</sub>: loan size negatively moderates the effect of collateral cost on credit access by MSMEs in the farming industry.**

**H<sub>6</sub>: loan size negatively moderates the effect of collateral registration on credit access by MSMEs in the farming industry.**

**H<sub>7</sub>: loan size negatively moderates the effect of collateral insurance on credit access by MSMEs in the farming industry.**

**H<sub>8</sub>: loan size positively moderates the effect of collateral age on credit access by MSMEs in the farming industry.**

## **3. Research Methodology**

### ***3.1 Population and Sampling***

A population, as defined by Bryman (2016), is a collection of humans, events, or things that share observable features and meet a predetermined standard. The population for the study included MSMEs in the farming sector of Ghana. The Ghana Statistical Service Report (2019) classifies the agriculture sector of Ghana into five sub-categories: crops, livestock, cocoa, fisheries, and forestry/logging. Since the study aims to generalize findings to crop, livestock and fish farmers, the population for the study encompassed all MSMEs in crop, livestock and fish farming in the Ashanti Region of Ghana. The population size could not be determined because the MSMEs are scattered across Ashanti Region, and there was no record of registered MSME farms. The study focused on six districts out of the 43 districts in the Ashanti Region. These six districts included Kumasi Metropolis, Ejura Sekyeredumasi, Asante Akin Central, Bekwai Municipality, Offinso Municipality, and Mampong Municipality. These districts were selected because they are well known for crop, livestock and fish farming.

Because the population size for the study could not be determined, the sample size for the study was informed by Hair and Luka's (2014) assertion that, for a sample to be representative, it should be preferably greater than 100. Using this procedure, a total number of 352 MSMEs was used as the sample size. The details of MSMEs selection are provided in Table 1.

Table 1: Selection of MSMEs

<b>Districts</b>	<b>Micro Farms</b>	<b>Small Farms</b>	<b>Medium Farms</b>	<b>Total</b>
Kumasi Metropolis	12	20	17	<b>49</b>
Ejura Sekyeredumasi	27	22	9	<b>58</b>
Asante Akim Central	24	25	6	<b>55</b>
Bekwai Municipal	29	21	13	<b>63</b>
Offinso	27	22	19	<b>68</b>
Mampong	17	16	26	<b>59</b>
<b>Total</b>	<b>136</b>	<b>126</b>	<b>90</b>	<b>352</b>

Source: field survey (2023)

The 352 MSME farms were selected using the purposive sampling technique. This implies that farms were included in the study based on the availability of financial and management reports that could provide data, the willingness of farms to provide data, the location of the farm, and the size of the farm (micro, small or medium. According to Obisesan (2013), purposeful sampling refers to the procedure of deliberately choosing participants for a study based on certain criteria that qualifies them for inclusion.

### **3.2 Type of Research**

The present study employed the quantitative research methodology. The primary objective of quantitative research is to measure and quantify data by employing statistical analysis. Quantitative research encompasses various methodological approaches, including deduction, confirmation, theory/hypothesis testing, explanation, prediction, standardised data collecting, and statistical analysis (Saunders et al., 2016). Quantitative research is a systematic approach employed to investigate the association between variables with the aim of testing objective theories. The aforementioned variables can be quantified through the utilisation of various instruments, and the ensuing numerical data can be subjected to statistical analysis techniques, as noted by Akhtar (2016).

The study also made use of the causal research design because the objectives sought to interpret, synthesize and point to integrations and interrelationships among the various variables under study. Causal research is a type of research that aims to uncover the underlying causes and relationships between different variables (Creswell and Plano-Clark, 2011). It seeks to explain why a particular phenomenon occurs and how it relates to other factors. This type of research is typically used to test hypotheses or theories and to establish cause-and-effect relationships (Chauke et al., 2013).

### **3.3 Data for the Study**

Secondary data was retrieved from the financial and management reports of MSMEs in relation to credit access, cost of collateral, collateral registration, collateral insurance and age of collateral size of MSME, loan size, and income. Secondary data sources are favored because they are already prepared and are less expensive in terms of both time and money to acquire. Secondary data, according to Saunders et al. (2016), might come from either unpublished or published records.

With the support of three research assistants, 352 farms in the selected districts were consulted for audited financial reports, management reports and other financial records. While some farms provided us with their requested documents, others insisted that we compute data from their reports and leave reports behind. Notwithstanding this, data for all variables were gathered and crosschecked for accuracy with the assistance of farm managers. In all, 3 months were devoted to this exercise.

As regards data analysis, descriptive statistics for study variables were first provided using mean scores, standard deviation, minimum values and maximum values. Diagnostic tests such as multicollinearity and heteroscedasticity were conducted to confirm the absence of multicollinearity and heteroscedasticity issues. Because the dependent variable is categorical, the researcher used binary logistic regression instead of the more traditional ordinary least square (OLS) method. Logit is a reference to the natural logarithm of the likelihood (log chances) of falling into one of two categories for a certain data point (variable) (Chauke et al., 2013). The dependent variable is represented by a dummy variable where MSMEs that received bank credit are given 1 and 0 otherwise. Models with dichotomous dependent variables may benefit from this approach, which is quite similar to a linear regression model (Obisesan, 2013). Chauke et al. (2013) claim that the logistic distribution (logit) has an advantage over other regression approaches in the study of dichotomous outcome variables since it is an exceptionally flexible and simple-to-use model from a mathematical standpoint, and the findings can be meaningfully understood. Estimating odds ratios for each model independent variable may be done using the logistic regression coefficient.

### **3.4 Model Specification**

Past studies have employed numerous estimation techniques, including probit regression technique (see, for example, Chandio et al., 2017; Denkyirah et al., 2016), logistic regression (Assogba et al., 2017), and multinomial logit regression (Odu et al., 2011) to study the determinants of collateral and effect of collateral on access to the credit facility. In this present study, the dependent

variables (access to credit) are binary, and for that matter, the study used logistic regression as the estimation technique following the empirical work of Assogba et al. (2017), who adopted a similar technique for estimation. The functional form of the model assessing the effects of collateral characteristics on access to credit was specified in Equation 1.

$$CA = f(COC, COR, COI, COA, ES, EI, \dots) \dots \dots \dots (1)$$

The estimable form of the model assessing the effects of collateral characteristics on access to credit and the moderating role of loan size is specified in Equation 2.

$$CA_t = \beta_0 + \beta_1COC + \beta_2COR + \beta_3COI + \beta_4COA + \beta_5ES + \beta_6EI + \beta_7LS + \beta_8(COC*LS) + \beta_9(COR*LS) + \beta_{10}(COI*LS) + \beta_{11}(COA*LS) + \mu_t \dots \dots \dots (2)$$

Where

$\beta_0$  is an intercept ;  $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5,$  and  $\beta_{11}$  are the respective explanatory coefficients; (COC\*LS), (COR\*LS), (COI\*LS) and (COA\*LS) are interaction variables; CA represents credit Access; COC stands for cost of collateral; COR stands for registration of collateral; COI represents collateral insurance; COA stands for age of collateral; ES relates to enterprise size; EI relates to enterprise monthly income; and LS represents loan Size

### 3.5 Measurement of Variables

Measurement of study variables and expected links, supported by the literature, are provided in Table 2.

Table 2: Description of Study Variables

Variables	Description	Expected Sign	Source
Access to Credit	Dummy = 1 if the firm has access to credit and 0 if otherwise	Positive or negative	Isaga (2018), Duarte et al. (2017)
Collateral cost	Natural log of current market price of collateral	positive	Isaga (2018), Duarte et al. (2017)
Collateral Registration	Dummy = 1 if the firm has registered collateral to obtain an external loan and 0 if otherwise	positive	Isaga (2018)
Collateral Insurance	Dummy = 1 if the firm has insured collateral to obtain an external loan and 0 if otherwise	positive	Isaga (2018)
Collateral Age	The period from use of collateral to the year 2020	negative	Isaga (2018)
Firm Size	The size of SME in terms of total assets	positive	Duarte et al. (2017)
Income	Average of income from SME's operating activities from 2010 to 2020	positive	Isaga (2018), Sakwa et al. (2019)
Loan Size	Loan amount measured in Ghana Cedis	negative	Duarte et al. (2017)

Source: author's development (2023)

## 4. Results and Discussion

### 4.1 Descriptive Statistics of Secondary Data Variables

The mean, minimum, and maximum observations, as well as the standard deviation (SD) of the study variables, are projected in Table 3.

Table 3: Descriptive Statistics of Variables

Variable	N	Mean	Std. Dev.	Min	Max
CA	352	0.9091	0.4540	0	1
EA	352	20.2702	2.7320	7	25
EI	352	0.8344	0.1142	0	1
COC	352	5.8860	3.4174	8.2501	28.45552
ES	352	4.1873	1.8571	1.8893	6.2070
COR	352	0.9012	0.3833	0	1
LS	352	2.8233	2.6066	9.4610	26.3100
COI	352	0.7121	0.9276	0	1
COA	352	1.8194	1.9710	1	13

Source: author's calculation (2023)



From Table 3, the mean score for CA is 0.909. This mean score has a degree of variability measured using the standard deviation of 0.454. The minimum score recorded for CA is 0, and the maximum is 1, suggesting that CA ranges from 0 to 1. EI reports an average score of 0.834, looking at the responses provided. This average score has a degree of variability measured using the standard deviation of 2.732. The minimum frequency recorded for EI is 0, and the maximum is 1, suggesting that frequency ranges from 0 to 1. COC reports an average score of 5.886. This average score has a degree of variability measured using the standard deviation of 0.834. The minimum frequency recorded for COC is 8.25, and the maximum frequency is 28.45, suggesting that COC data ranges from 8.25 to 28.45, considering the response provided.

ES has an average score of 4.187, according to the responses. This average score has a degree of variability measured using the standard deviation of 1.857. The minimum frequency recorded for ES is 1.889, and the maximum is 6.207, suggesting that ES ranges from 1.889 to 6.207. COR has an average score of 0.901 per the responses provided. This average score has a degree of variability measured using a standard deviation of 0.383. The minimum frequency recorded for COR is 0, and the maximum is 1, suggesting that the frequency of responses in relation to COR range from 0 to 1. LS recorded a mean frequency of 2.23, according to provided responses. This average score has a degree of variability measured using the standard deviation of 2.606. The natural log of the minimum LS is 9.46, and the maximum is 26.33, suggesting that Loan Size ranges from 9.46 to 26.33.

**4.2 Diagnostic Tests**

Before using the regression model to verify the results, robustness tests such as heteroscedasticity and multicollinearity were done to preserve the quality of the study. This aids in the elimination or mitigation of data misspecification in order to produce a high-quality regression model.

**4.3 Multicollinearity**

Correlation analysis was employed to examine the presence of a relationship among the research variables. The coefficient value obtained through correlation analysis provides information on the magnitude and direction of the association between the variables. As per the findings of Chauke et al. (2013), coefficients that fall below the value of 0.5 are indicative of a weak correlation, while coefficients that exceed 0.5 but remain below 0.8 are suggestive of a moderate correlation. Coefficients that surpass the value of 0.8 are considered to indicate a strong correlation. The statistical significance of the relationship can be determined by the p-value. In the absence of contrary evidence, a P-value below 0.05 is considered statistically significant. Multicollinearity is said to exist between two variables when there is a strong correlation between them. Table 3 displays the correlation outcomes among the explanatory variables.

Table 3: Correlations Matrix

	CA	COC	COR	COI	COA	LS	ES	EA	EI
CA	1								
COC	0.049	1							
COR	0.157**	0.364**	1						
COI	0.029	0.386**	0.368**	1					
COA	0.128*	0.226**	0.479**	0.247**	1				
LS	0.09	0.255**	0.456**	0.135*	0.154**	1			
ES	0.323**	0.130*	0.260**	0.156**	0.006	0.234**	1		
EA	0.019	0.170**	0.134*	0.104	0.218**	0.141*	0.046	1	
EI	0.025	-0.198**	-0.344**	-0.208**	0.152**	0.376**	-0.059	-0.018	1

Source: author’s calculation (2023)

Table 3 indicates that the explanatory factors exhibit a weak to moderate correlation. This suggests that within the explanatory variables, there is no likelihood of multicollinearity influencing the results of the regression analysis. The variables, again, underwent VIF testing. A high VIF value for a variable indicates the presence of multicollinearity with other variables. As per the rule of thumb established by Saunders et al. (2009), a variable is considered to exhibit significant collinearity if its VIF value exceeds 10 and the tolerance level falls below 0.2. Table 4 displays the Variance Inflation Factor (VIF) and tolerance level of the explanatory variables.

Table 4: Variance Inflation Factor

	Collinearity Statistics	
	Tolerance	VIF
CA	0.82	1.219
COC	0.539	1.854
COR	0.751	1.331
COI	0.83	1.204
COA	0.787	1.271
LS	0.712	1.405
ES	0.72	1.389
EA	0.48	2.082
EI	0.409	2.443

Source: author's calculation (2023)

From Table 4, none of the variables has a VIF value of more than 10, indicating the absence of multicollinearity among the independent variables.

#### 4.4 Heteroscedasticity Test

In this study, the Breusch-Pagan test was employed to evaluate the issue of heteroscedasticity. At a confidence level of 95%, the existence of heteroscedasticity can be inferred if the p-value is significant (i.e., less than 0.05) unless there is evidence to the contrary.

Table 5: Breusch-Pagan Test for Heteroskedasticity

Chi-Square	3.21
Prob.	0.183

Source: author's calculation (2023)

According to Table 5, the p-value of 0.083 (8.3 percent) is more than 0.05 (5 percent), suggesting that the variables in the research are not heteroscedastic.

#### 4.5 Effect of Collateral Characteristics on Access to Credit

The study, under this section, focuses on the effect of collateral characteristics on access to credit using logistic regression. The results of the logistic regression are provided in Table 6.

Table 6: Logit Estimate of the Collateral Characteristics Affecting Access to Credit

<b>Dependent: CA</b>				
<b>Independent Variables</b>	<b>Coefficient</b>	<b>Standard Errors</b>	<b>z</b>	<b>P&gt; z </b>
COC	1.2622	0.3640	3.4676	0.0042
COR	0.3834	0.1401	2.7366	0.0941
COI	1.0511	0.3366	3.1270	0.0147
COA	-2.9835	0.7471	-3.9934	0.0020
ES	1.1824	0.7263	1.6280	0.2109
EI	0.9641	0.3241	2.9750	0.0611
LS	-0.5123	0.1548	-3.3094	0.0101
COC*LS	-0.2604	0.6824	-0.3816	0.6982
COR*LS	-1.8116	0.8366	-2.1654	0.0231
COI*LS	-1.1922	0.7177	-1.6611	0.0930
COA*LS	1.1252	0.5832	1.9294	0.0524
Constant	15.8907	2.1826	7.2806	0.0000
Number of observations	352			

Pseudo R <sup>2</sup>	0.5214
LR Chi squared	79.9500

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Source: author's calculation (2023)

As per the data presented in Table 6, a coefficient value of 1.26 signifies a positive relationship between the cost of collateral and farmers' credit access. The coefficient denotes that a marginal increase of 1% in the cost of collateral results in a proportionate enhancement of approximately 1.26% in credit accessibility. The statistical significance of this effect is established at a 1% level, given that the p-value of 0.004 associated with the t-statistic of 3.47 is below the predetermined level of significance of 0.01. As a result, the alternative hypothesis (H1) is accepted. The findings suggest that there is a significant positive effect of collateral costs on farmers' ability to obtain credit. This implies that in the Ashanti Region of Ghana when the cost of collateral for requested credit is elevated, farmers' access to credit is facilitated. This discovery supports the results of previous studies conducted by Chandio et al. (2017), Chen et al. (2023), and Kabore (2021), which demonstrated that the provision of collateral security has a positive effect on credit accessibility. The present discovery, however, is in opposition to the study conducted by Assogba et al. (2017), which demonstrated a negative effect of collateral security on the availability of credit.

The fact that the coefficient for the association between collateral registration and farmers' access to credit is 0.38 suggests that the relationship is positive. When all other factors are held constant, the coefficient of 0.38 indicates that collateral registration is responsible for approximately a 0.38% proportionate improvement in farmers' access to finance. Because the p-value of 0.09, connected with the t-statistic (2.74), is less than the significant value of 0.10, this effect is considered to be significant at the 10% level. H2 is supported. This suggests that collateral registration makes a significant contribution to the availability of credit. This suggests that farmers will have an easier time gaining access to financing from their respective financial institutions if they have registered collateral. This finding also supports those of Chandio et al. (2017), Chen et al. (2023), and Kabore (2021) but contradicts the finding of Assogba et al. (2017).

The coefficient of 1.05 indicates a positive link between collateral insurance and farmers' credit access. The aforementioned findings indicate that collateral insurance is likely to lead to a marginal increase of approximately 1.05% in the credit accessibility of farmers, assuming other factors remain constant. The statistical significance of the effect can be inferred from the p-value of 0.01, which is associated with the t-statistic of 3.13. This p-value is lower than the predetermined level of significance of 0.05, indicating that the effect is statistically significant at the 5% level. The acceptance of H3 has been confirmed. Hence, the presence of collateral insurance has a statistically significant and favorable impact on the ability to obtain credit. The provision of insured collateral affords farmers an increased likelihood of securing credit. This finding is consistent with those of Chandio et al. (2017), Chen et al. (2023), and Kabore (2021). However, it is inconsistent with that of Assogba et al. (2017), who found a negative effect of collateral security on access to credit.

Collateral age recorded a negative relationship with farmers' credit access considering its associated coefficient of -2.98. This suggests that every 1% increase in collateral age will lead to about a 2.98% deterioration in credit access. The p-value of 0.00 associated with the t-statistic of -3.99 is less than the significant value of 0.01, making the effect significant at the 1% level. H4 is accepted. Therefore, there is evidence of a significant negative influence of collateral age on credit access. This implies that when farmers' collateral age is too high, their chances of accessing credit are reduced. This is attributed to the fact that when the age of collateral is too high, as in the case of a vehicle or building, its value may reduce due to depreciation, obstructing farmers' chances of accessing credit or higher credit facilities. In the case of land as collateral, the negative finding suggests that land that has been secured for a very long time might have lost its ownership documentation, resulting in litigation that puts credit institutions off. This finding, again, is consistent with the finding of Assogba et al. (2017), who found a negative effect of collateral security on access to credit. However, it contradicts the findings of Chandio et al. (2017), Chen et al. (2023), and Kabore (2021).

Enterprise size and income recorded a positive relationship with farmers' credit access. However, farmers' income has a significant positive effect on credit access, whereas farm size has no significant positive effect on credit access. This implies that the size of a MSME farm does not contribute to the chance of accessing credit from a financial institution, but its monthly income does.

#### **4.6 The Moderating Roles of Loan Size**

From Table 6, loan size, as a moderator, reports a negative relationship with access to credit, considering its associated coefficient of -0.51. Increased loan size results in about a 0.51% reduction in the chance of securing a credit facility from a financial institution. This effect is significant at a 0.5% confidence level because the p-value of 0.01 is less than a 0.05 significant value. What this means is that a large loan size reduces a farm's chance of getting credit from financial institutions in the Ashanti Region of Ghana. This can be attributed to the fact that the loan size may be so large that the requested collateral might not cover the cost of the loan. Additionally, large loan size comes with higher risk, which might put the credit institution off.

Moreover, the coefficient of loan size as a moderator of the effect of the cost of collateral toward credit access is -0.26, and its p-value is 0.698, greater than 0.05. Upon examination of the results of the regression model with interaction terms, the estimated coefficient on the interaction variable (COC\*LS) is found to be negative but insignificant.  $H_5$  is confirmed. As a result, it can be established that loan size does not facilitate or mitigate the positive effect of the cost of collateral on farmers' access to credit from financial intuitions in the Ashanti Region of Ghana.

The coefficient of loan size as a moderating variable in the effect of collateral registration on credit access is -1.81. The moderating effect is significant at a 5% level as the p-value of 0.023 associated with the interaction term (COR\*LS) is less than 0.05.  $H_6$  is accepted, implying that the negative moderation found for loan size is naturally expected. Thus, there is evidence that loan size mitigates the positive effect of collateral registration on farmers' access to credit in the Ashanti Region. This implies that increased loan size reduces the ability of collateral registration to facilitate farmers' credit access. This is justified by the fact that when the loan size is too large, registered collateral might not take care of the default risk.

The interaction term (COI\*LS) has a negative coefficient (-1.19). This moderating effect is significant at 10%, looking at the p-value of 0.093 associated with the interaction term, which is less than 0.10.  $H_7$  is accepted, indicating that the negative moderating effect found for loan size is naturally expected. As a result, the study finds a negative moderating effect of loan size on the positive relationship between collateral insurance and credit access by crop, livestock, and fish farms in the Ashanti Region of Ghana. What this means is that loan size mitigates the positive effect of collateral insurance on farmers' credit access. The result also implies that increased loan size reduces the ability of collateral insured by farmers to attract credit facilities from financial institutions. Thus, loan size matters in the relationship between collateral insurance and credit access.

Table 6, however, proves that loan size positively and significantly moderates the negative influence of collateral age on farmers' credit access. This is evidenced by the coefficient of -1.13 and the p-value of 0.05 associated with the interaction term (COA\*LS). This implies that the loan size requested by farms in the Ashanti Region of Ghana is an influential mechanism in the relationship between collateral age and credit access. This also means that a high amount of the requested loan facilitates financial institutions' decision not to grant loans to farmers when the requested collateral is too old. This is in conformity with  $H_8$ . Thus, this finding is not surprising, as it is naturally expected.

## **5. Conclusion and Recommendations**

### **5.1 Conclusion**

In the context of lending, collateral typically pertains to the assurance and assets that a lender can rely on in the event that the borrower fails to fulfill their repayment obligations as stipulated in the loan contract. The topic of the effect of collateral characteristics on MSME farmers' access to credit in the Ashanti Region of Ghana has been examined with a focus on crop, livestock, and fish farmers. It was important to test the effect of collateral cost, registration, insurance, and age on farmers' access to credit. Evidence from the above concludes that the cost, registration, and insurance of requested collateral have a positive and significant effect on access to credit, whereas collateral age has a negative and significant effect on access to credit. In the farming industry of the Ashanti Region of Ghana, MSMEs' credit access is facilitated by the cost, registration status, insurance status, and age of the collateral they provide. Following is an investigation of the moderating role of loan size in the relationship between collateral characteristics and credit access. Whereas loan size negatively moderates the positive effect of collateral cost, registration, and insurance on credit access, it positively moderates the negative effect of collateral age on credit access. Thus, loan size is an influential mechanism that facilitates the ability of collateral costs, registration, and insurance to help MSMEs in the farming industry to access credit from financial institutions.

### **5.2 Limitation and Further Research**

The research was limited to SMEs in the agricultural industry, specifically crop, livestock and fish farming, despite the fact that the sample size could have been much greater to cover other sub-sectors in the agricultural sector of Ghana if not for time and financial constraints. As a result, further research into other sub sectors in the agricultural sector of Ghana or countrywide research is suggested. To improve generalizability, future research may also provide samples from other countries.

### **5.3 Recommendations**

Drawing on the above conclusions, the study recommends that MSMEs in the farming industry should cultivate the habit of registering and insuring their assets using legal procedures. With this, the age and cost of collateral can easily be traced during the period of credit access. Fixed assets that are too old, as in the case of vehicles, can be disposed of as new vehicles contribute effectively to business operations and can serve as good collateral for credit accessibility. Furthermore, consistent financial education for small and medium-sized businesses should be provided by the National Board for Small-Scale Industries (NBSSI) and other stakeholders to equip them with effective strategies for presenting collateral for credit. More importantly, MSME owners and managers in the farming industry will also have a basic understanding of financial and business management abilities,

especially over fixed assets, since fixed assets serve as collateral. In addition, a framework for helping SMEs register their firms and supporting them when they switch from one kind of industry to another should be developed.

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