

Gyimah, Kofi Nyarko; Akande, Joseph Olorunfemi; Muzindutsi, Paul-Francois

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*Corresponding author: Joseph Olorunfemi Akande, Accounting, Economics and Finance, University of Kwazulu-Natal College of Law and Management Studies, South Africa
E-mail: akande.joseph@gmail.com

Reviewing editor:
Mithun Nandy, Business Administration, Vidyasagar University, Medinipur India

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BANKING & FINANCE | REVIEW ARTICLE

Lending methodologies and SMEs access to finance in Ghana; the mediating role of credit reference information

Kofi Nyarko Gyimah¹, Joseph Olorunfemi Akande^{2*} and Paul-Francois Muzindutsi³

Abstract: A major challenge to SME growth has been access to credit meanwhile literature exploring the effects of lending methodologies on credit access has paid little attention to how credit referencing information can influence the relationship. The study assessed the mediating influence of credit reference information on the interaction between bank lending methodologies and SMEs access to credit in Ghana. Ordinary least square regression analysis was used to analyse 1061 questionnaires collected from businesses in the Accra, Ghana. Results show that two lending methodologies exist both of which impact access to finance with the interaction of credit referencing information enhancing the explanatory power. We concluded that credit referencing plays a role in ensuring that lending methodologies for SMEs access to finance in Ghana is enriched to increase access to credit. The study has implications for policymakers to bring financial technology that ensures financial information can be easily captured from SMEs. This then enhances their creditworthiness for integration into the formal banking system to improve access to credit.

Subjects: Banking; Business, Management and Accounting; Small Business Management; Entrepreneurial Finance

Keywords: Lending methodologies; SMEs; credit referencing information; access to credit; banking records; Ghana

1. Introduction

Every country's economic performance is largely determined by how quickly small and medium-sized businesses (SMEs) reach their full potential. SMEs account for almost 90% of all privately owned enterprises worldwide, with many of them located in developing nations (World Bank Group, 2018). SMEs play a significant role in most economies, according to academic and developmental research, and they are stated to be the driving force for most economies. SMEs, according to Cingano et al. (2016) generate the bulk of employment in developing countries by constructing additional industries to promote the development of any economy in the globe. Private entrepreneurial enterprises generate 90% of all jobs, accounting for around 52% of employment in most sub-Saharan African nations (Agbola & Amoah, 2019). Small firms, for example, account for 60% of all jobs and 47% of private-sector turnover in the United Kingdom (FSB, 2019). SMEs account for 92 percent of all registered firms in Ghana (Amoah, 2018), producing about 85 percent of employment and contributing 75 percent of the country's GDP until oil production began.

There is enough evidence globally that attests that SMEs face difficulty accessing credit (Wang, 2016). Despite these acknowledgments, SMEs find it difficult to access funds from banks because they operate mostly in the informal sector and lack the needed information, thus increasing the risk of lending to them. This is a result of increased credit risk and transactional costs for the banks (Beck et al., 2015). Low capacity or inexperience of the owner/managers (Kayanula and Quartey, 2000); unfavorable business environment (Peci et al., 2012) and the actual impact of the economic crisis of 2006–2009 on economies of countries (Cingano et al., 2016) are other reasons highlighted as contributing to banks' inability to lend to SMEs. The contemporary debate, on the other hand, has focused on topics such as credit data availability and bank lending procedures (Beck et al., 2018). In Ghana, the lack of financing for SMEs is apparently deeply rooted (PwC Ghana Banking Survey, 2019). A publication by African Development Bank on Ghana's economic outlook cited the lack of access to finance by SME businesses to explain the slow growth in economic activities in Ghana (IDEV, 2019). The lack of access to finance by SMEs in Ghana has been attributed to the fact that most SMEs operate informally and cannot produce quantitative information that is perceived to be more reliable as such the introduction of credit referencing into the financial architecture (BOG, 2019). Credit reference information shows an applicant's credit history so that banks and other institutions that provide goods and services on credit can determine the credit worthiness of an applicant (Triki & Gajigo, 2014). If credit reference indicates that an applicant has paid his or her debts and other obligations in a timely and appropriate manner, a credit provider will be more inclined to approve the requested application. With credit reference information banks are able to access better and comprehensive data on borrowers at lower cost to enhance evaluation, selection and monitoring which helps to positively influence the level of credit especially when the economy experiences economic growth (Loaba & Zahonogo, 2019).

Our paper offers theoretical as well as managerial contributions to banks' lending relationships with SME clients. From the managerial aspects, the research findings could enable policymakers, lending institutions, borrowers, and other stakeholders in the credit market to acknowledge the immense contribution of credit reference agencies in making available credit information, reducing the problems brought about by asymmetric information. Additionally, by focusing on the substitutive and complementarity between the traditional lending methodologies of banks and credit reference information, the finding would reveal whether combining the two lending methodologies would help increase access to finance in general and to SME firms.

2. Literature and research hypotheses

SMEs rely primarily on banks as their traditional internal source of external finance, and the unavailability of bank financing has hindered their growth. According to the Organisation for Economic Co-operation and Development (OECD, 2017), SMEs' access to bank lending registered slower growth in 2015 than in previous years in countries such as Chile, Colombia, and Malaysia. Serbia and Turkey, South-Eastern Asia and the Pacific hence making SME firms financially constrained. Similar studies in Ghana and some African countries identified a slow growth to access to banks' credit, thus impeding the development, economic growth, and political stability of such economies (Fowowe, 2017).

As a means of mitigating the problem of access to finance to SME firms, the Bretton Wood Institutions, that iWorld Bank (WB) and its affiliate institutions, proposed the setting up of credit reference bureaus to collate and share information on the borrower in evaluating credit applications which they believe will help mitigate the problem (Triki & Gajigo, 2014). Credit information sharing (mostly referred to as credit referencing) has been touted as a mechanism to help reduce information differences and has consciously been introduced by these international bodies in collaboration with the central banks of most developing economies (Gehrig & Stenbacka, 2007). Documented benefits of credit referencing include reducing the problem of access to finance to SMEs caused by asymmetric information (Kusi et al., 2015). Behr and Sonnekalb (2012) assert that credit referencing information allows lending institutions to identify borrowers with good credit history to enhance credit accessibility and growth in SME financing. Bos et al. (2016) find that

credit information sharing enhances the quantity and quality of loans in general and is specially made available to SMEs.

2.1. Bank lending methodologies and access to credit

The ability of a bank to overcome the problem of asymmetric information depends on the choice of or a combination of lending methodologies applied. Traditionally, banks have used two primary methodologies: relationship lending methodologies and transactional lending methodologies (Ferri et al., 2019). Lending relationship relies on the use of information gathered from the regular dealing with bank clients such as deposit, transferring, and receiving money and other personnel interaction with clients (Bartoli et al., 2013). Transactional-based lending is when banks base their lending decision on “hard” information based on the client’s quantitative data. Such information is gathered from the client’s balance sheet and other financial and accounting information (Stein, 2002). Several studies, including Ferri et al. (2019), Bolton et al. (2016), and Sette and Gobbi (2015) have indicated that banks that have relied solely on the use of transactional lending methodology are likely to reduce the number of loans made available to their customer as against banks that use relationship lending methodology. Li et al. (2019) finds that the adoption and use of relationship lending reduce asymmetric information, thus increasing credit availability to firms.

2.2. The relationship-based and transaction-based lending methodologies

Effectively assessing credit applicants is seen as an essential component of the overall process to reduce credit risk. It is critical not only to banking institutions involved in the credit market but also to the economy (Win, 2018). This has necessitated much research by both economics and academic scholars in search of an appropriate methodology using different theoretical underpinnings and methodologies. One significant component of financial transactions identified by literature is the reliance on financial institutions’ information in decision-making. This has made banks a repository of information about the creditworthiness of borrowers. Such information is primarily soft and is seen as very valuable to banks in making lending decisions (Fosu et al., 2020; Guérineau & Léon, 2019). As a result, some data hitherto resided with banks can now be moved outside the bank and shared with other banks through credit reference bureaus (Bartoli et al., 2013). Therefore, a banks’ decision to use or rely on soft or hard information (or both) depends on the availability of the information and the advantages that such information will bring to the bank.

Transaction-based lending methodologies are those which are primarily based on hard financial information. Empirical literature has it that firms’ access to credit depends on how informationally transparent the firms can make available hard information about their firms (M.A. Petersen & Rajan, 2002). It must then be expected that firms that cannot produce much hard information will find it difficult to access credit. Therefore, firms’ access to credit is premised on how much information is available to the financial market regarding small businesses (Cowling et al., 2012). Thus, small firms that are seen to be informationally transparent (i.e. those that can produce formalised records) have a higher probability of having their loan request approved (Faulkender & Petersen, 2006). One major feature of transactional lending methodology is that information about clients can be relatively verified easily, observed, and transmitted through internal communication channels with the financial institution. It includes Collateral-Based Lending, Financial Statement Lending, credit Scoring, and Viability-Based Lending methodologies. Kira and He (2012) finds that the unavailability of adequate financial information leads to information differences among lenders and borrowers, leading to credit rationing.

For several years researchers and policymakers have sought to investigate the problem of information differences, all aimed at reducing its effect on lending to SMEs. One methodology that has been identified in the literature as capable of reducing the effect is relationship lending. Relationship lending is a technique designed to address the problem of information asymmetry between lenders and borrowers (Berger et al., 2016). The value of relationship lending becomes manifest as SMEs are seen to be informationally opaque coupled with the lack of credit history, the impossibility of credibly verifying the quality of the loan application and the lack of separation

between ownership of the firm and management (Ferri & Murro, 2015). It has a screening mechanism and a monitoring strategy capable of reducing the opacity of information associated with SME firms (Berger & Udell, 2006). With this method, the lender bases a substantial part of the lending decision on information obtained about the borrowing firm and its owner(s) held by the firm and other shared information received from credit reference bureaus.

A recent study by Ferri et al. (2019) using EU-EFIGE Bruegel-UniCredit survey data covering 14,759 manufacturing firms across seven European countries, surveyed European firms to ascertain the use of lending methodologies and determine whether lending methodologies, when used together, are capable of predicting a trade-off between availability and pricing of credit. Six European countries were involved in the survey, Germany, France, Italy, Spain, United Kingdom, Austria and Hungary. Stratified sampling was used to ensure firms in all representative countries had an equal chance of selection into the sample. Questionnaires were used in the data collection, and they covered different areas such as firm ownership, workforce characteristics, financial condition, bank-firm relationship and balance sheet information. The study found that soft (relationship lending information) and hard (transactional lending information) when used together in making lending decisions, does have a significant effect on the probability of a firm (big or small) experiencing credit rationing.

Banks in Ghana mostly make use of relationship lending technologies (BoG, 2019). Loan officers interact with SME client owners to build relationships based on trust and reputation (Sarpong-Kumankoma & Osei, 2013). This helps in producing soft information, which the bank depends on in its lending to SMEs. This is supplemented mainly through collateral or guarantees from the owner by using his assets or the business as a source for complex information. It stands to reason that both hard and soft information has been the existing methodology used by the bank. The question that needs to be answered therefore is that, if these two lending methodologies are found to increase access to credit why then are firms including SME businesses still experiencing the problem of access to finance? Hypothesis H1 is therefore constructed based on the argument that there is no significant relationship between lending methodologies and access to credit.

H1: the use of transaction-based and relationship-based lending methodologies has no significant relationship with access to credit.

2.3. Credit referencing as a moderator to access to credit

The aftermath of the period of the credit crunch has seen the activities of banks and other lending institutions come under severe scrutiny (Bernanke, 2018). Crotty (2009) sees the reason for this to be the role of these institutions in most countries' economic development. This is more prevalent in emerging economies where information asymmetries remain rife, making screening and monitoring costs of lending very high (Greenidge & Tiffany, 2010). Lending in emerging economies has been very challenging to banks in particular and lending institutions in general. The reason being that these institutions are severely exposed to credit risk, which affects their profitability enormously (Karbo and Adamu, 2009). Credit risk is the risk of not receiving anticipated cash flows due to default by a client on a debt obligation (Sandada & Kanhukamwe, 2016). Credit risk is seen as one of the significant causes of bankruptcy and distress among banks (Osei-Assibey & Bockarie, 2013). To reduce the effect of credit risks on the activities of banks and other lending institutions, the emphasis has been to improve on the financial infrastructure of emerging economies to include: (i) the establishment of secured transaction legislation and registries, (ii) the adoption of modern insolvency and creditor rights regimes, (iii) development of efficient digitalised payment systems, (iv) strong accounting and auditing practices within the banking sector, and (v) setting up of credit information systems (World Bank Group, 2018). Therefore, it is not surprising that credit referencing systems have been introduced in most emerging economies including Ghana in an

attempt to improve the banking lending system. Assuming that the credit market really needs credit referencing information to improve access to credit, we develop the hypothesis H2.

H2: credit referencing information highly moderates the relationship between transaction-based and relationship-based lending methodologies and access to credit.

3. Methodology

3.1. Design, population and sampling

The data for this study were gathered using a quantitative method. The correlational technique was employed to test some connections, while the phenomenological approach was used to investigate expert perspectives. Cross-sectional survey was adopted to collect and analyze data for individual business at a point in time. The study participants were Accra-based SMEs who had obtained loans from one or more banks. The city of Accra has the highest population of businesses, including SMEs. As of the year 2019, the number of actively registered SMEs in Accra was 34,093 (Ghana Statistical Service, 2020). Accra was chosen for the current study because it hosts most of Ghana's SMEs (Ghana Statistical Service, 2020) and also have the largest concentration of Banks. Hence, a convenience sample of this area is representative of the national population of SMEs. Data from the registrar Generals Department indicate an active population of 8055 registered SMEs in Accra. A figure of 1061 was selected as the accessible population. This total figure was arrived at after excluding from the target population SME owners who were not willing or would not be available to participate in the study. The simple random sampling method was adopted. This technique is a probability sampling strategy that ensures that every member of the population has an equal chance of being chosen for the sample (Allwood, 2012). Because all population members have the same chance of being selected for the sample, the simple random sampling strategy determines the most representative sample. The number of people who were part of the study's accessible population is shown in Table 1.

3.2. Methods and model

Prior to hypothesis testing, an exploratory study was carried out. The mean and standard deviation were used to describe continuous data such as credit referencing. To examine the scale's reliability and validity, factor analysis (i.e., principal components extraction method) was performed to determine key psychometric parameters. Cronbach's alpha coefficient was calculated to assess the scales' internal consistency in accordance with Kelava protocols (2016). The average variance extracted (AVE) and Mean Shared Variance (MSV) construct validity indicators were then estimated using confirmatory factor analysis (MSV). The one-sample t-test was performed to test the first hypothesis, with a test value equal to the composite median as the test value. This was done to examine the extent to which lending methodologies are applied by Ghanaian banks. The second hypothesis is tested by fitting the baseline and ultimate models. This is done to ensure that the regression coefficients of the two models are compared to know what impact the covariates may have made on the primary relationship.

3.3. Variables and operationalization

The quantitative part of this study involved three main variables, namely transaction-based, relationship-based lending methodologies and credit referencing. Lending methodologies were measured in accordance with Essel et al. (2019); Addae-Korankye (2014) as different schemes of lending applied by the banks that have a unique set of lending criteria. As a result, a 5-point Likert scale with levels of strongly disagree, disagree, somewhat agree, agree, and strongly agree was used to assess it. There were three components to the scale. The first component examined information on collateral, financial transactions, and banking experience and was made up of seven items. The second factor comprised five items and measured personal characteristics of the owner. The final factor measured previous borrowing and ability to repay loans. Credit referencing was measured as the SME's perceived importance of credit referencing by agencies. It was a measure of 12 indicators associated with a 5-point descriptive anchor: strongly disagree (1),

disagree (2), somehow agree (3), agree (4), and strongly agree (5). The total amount of money (in Ghana cedis) received by the SME in loans from financial institutions was used to measure their access to credit. This measure was chosen over others because it is an objective method that indicates the amount of money the SME had acquired from lending institutions.

Other variables measured were SME characteristics and control variables. The control variables measure was company size (i.e. the number of employees, Anton, 2019), operational capital (i.e. the business's capital in Ghana cedis), Ibhagui and Olokoyo (2018); industry experience (i.e. the number of years the company has been operating, Coad (2018)), and loan acquisition experience (i.e. the number of years the company had successfully acquired loans from financial institutions Akolaa (2018)). The selection of these variables was based on previous studies of (Essel et al., 2019) which have evidenced that each of these variables can influence lending methodologies and their relationship to access to credit.

4. Data analysis 4.1.

Participants descriptive analysis

The objective of this study was to examine the association between CRI and bank lending methodologies on SMEs access to credit in Ghana. The participants in this study were SMEs represented by CEOs and managers. SMEs provided data for the quantitative facet of this study. Of the 1061 questionnaires administered to the SMEs, 899 were completed and returned by participants. Thirty (30) questionnaires were not completed at all and were therefore removed. For 21 of the questionnaires returned, respondents did not respond to questions or items of a whole scale (e.g., lending methodologies). As such, those 21 questionnaires were also dropped. Therefore, 80% of the questionnaires administered were analysed. Analysis of the data showed majority of participants in the study were men. The difference in the proportions of male and female participants implies that findings of this study may not be generalized to the general population and could better represent the opinions of men. The result as shown in Table 2 suggests that all the age groups were represented in the study, which provides a basis for generalizing findings to all age groups (Garson, 2012).

Table 2 shows that all of the participants had at least a senior high school diploma, indicating that the sample had some formal education. Participants with at least a basic education qualification, according to certain researchers (Asiamah et al., 2017a; Cresswell, 2003), have a higher ability to think logically and deliver accurate responses, especially in English. As a result of the sample's educational profile, participants possessed the knowledge and ability to provide accurate responses. In terms of business ownership, the majority of SMEs were sole proprietorships. Because there were so many sole proprietorships in this study, the findings may be particularly applicable to SME firms. Essel et al. (2019) claim that sole proprietorship firms form the majority of

Table 1. Study population and sample sizes

Sector	General population	Target population	Accessible population	Sample
Research and development	2,211	564	544	226
HR services	1,231	421	401	196
Agric processing	908	231	277	123
Tourism	1,011	432	403	196
Beverage manufacturing	803	133	109	86
Manufacturing (others)	1,891	673	620	234
Total	8,055	2,454	2,354	1,061

SMEs in Ghana. Table 2 also reveals that the services category had the highest proportion of businesses participating in the survey. Service-based businesses, agricultural businesses, and manufacturing businesses make up Ghana's SMEs sector (Essel et al., 2019). As a result of the foregoing statistics on the sample's sectoral distribution, the important categories that characterize Ghana's SMEs sector are therefore represented in this study.

According to the statistics, every SME that participated in this study had been in operation for at least one year, and at least 60 percent of the sample had been in operation for at least six years. Table 2 shows that all businesses had extensive experience in their respective industries, a significant amount of banking experience on which to base their responses, and had obtained a credit facility at least once. This indicates that the SMEs in the sample had prior experience with banking loans and were familiar with the criteria and techniques used in lending. This shows that all SMEs that participated in the survey had used bank credit facilities and so had gained some understanding about bank lending.

Since the Likert scale used contained five descriptive anchors ranging from 1 to 5, the extent to which a lending approach is used increases from 1 to 5. This means that the highest possible mean score on this scale is 5. Furthermore, the median of each indicator represents the middle value of an ascending order distribution of its values. This interpretation is in accordance with Asiamah et al. (2019), who used the same descriptive anchors to analyse the level of emotional intelligence in a sample. Table 3 shows that all of the scale's elements earned reasonably high mean scores, indicating that they represent lending methodologies used by SMEs.

The summary data on credit referencing information are shown in Table 4. With reference to the above-mentioned interpretation by Asiamah et al. (2019), all of the items in Table 3 produced rather high mean scores. As a result, CRI accounted for almost 86 percent of the entire scale score, which is higher than the variable 'CRI's 50th percentile. In addition, the medians of the variables in Table 4 are fairly near to their respective means.

4.2. Analysis of data distribution and Normality Test

Table 5 depicts a distribution analysis of the important variables. Summary statistics and the Shapiro-test Wilk's are used to examine the data distribution. Shapiro-test Wilk's looks at the data's univariate normality and includes pertinent graphs. Skewness and kurtosis values of -0.49 and -0.87 , respectively, were compensated for using lending techniques. Skewness and kurtosis values of -0.44 and -0.86 were likewise accounted for by CRI. Garson (2012), posit that skewness and kurtosis values falling between -3 and $+3$ are satisfactory and indicate that there are no significant outliers in the data. Each variable further accounted for a Shapiro-Wilk's statistic ≥ 0.8 ($p < 0.001$).

4.3. Reliability and validity measures

Table 6 shows findings from the EFA for CRI with promax rotation. Since the scale used to measure CRI is a unidimensional construct, a single-factor extraction method was specified. Thus, as Table 6 indicates, only one factor was extracted, with each item producing a factor loading ≥ 0.5 (0.63 – 0.97). The total variance produced by the factor is 66.3% , which represents a high model fit (Keleva, 2016). The EFA results above suggest that the scales used to measure lending methodologies and CRI were internally consistent. Even so, further analysis was conducted to affirm the reliability and validity of the two measures.

Table 7 shows the composite reliability, Cronbach's alpha, and average variance extracted from the EFA. The extant literature indicates that Cronbach's alpha is a measure of internal consistency whereas composite reliability (CR) is an estimate of scale reliability (Asiamah et al., 2019; Keleva, 2016). Furthermore, Cronbach's α confirms satisfactory internal consistency at $\alpha \geq 0.7$. It can be seen that this condition is met for each domain as well as the whole construct in Table 7. Besides, construct validity is achieved at $CR \geq AVE$ (Average variance extracted) while discriminant validity

Table 2. Basic owner and business characteristics

Variable	Level	Frequency	Percent
Gender	Male	552	65%
	Female	296	35%
	Total	848	100%
Age	26–35	96	11%
	36–45	232	27%
	46–55	324	38%
	Over 55	196	23%
	Total	848	100%
Education	High school	152	18%
	Diploma/Bachelor's degree	228	27%
	Master's	468	55%
	Total	848	100%
Ownership	Sole ownership	536	63%
	Partnership	172	20%
	Co-operate	140	17%
	Total	848	100%
Business category	Wholesale/retail	208	25%
	Manufacturing	196	23%
	Agriculture	100	12%
	Services	344	41%
	Total	848	100%
Business age	1–5 yrs	56	7%
	6–10 yrs	232	27%
	11–20	208	25%
	Above 20	352	42%
	Total	848	100%
Bank experience	1–5 yrs	56	7%
	6–10 yrs	200	24%
	11–20	284	33%
	Above 20	308	36%
	Total	848	100%

Source: Survey data, (2021).

is achieved at $AVE \geq 0.5$ for lending methodologies. CR, AVE and MSV values were not computed for CRI for a couple of reasons. These statistics are computed based on information from theoretical factors extracted in EFA (Slocum-Gori et al., 2010). As indicated above, since a one-factor scale was obtained there is no basis for AVE, MSV, and CR to be computed. Secondly, Keleva (2016) indicated that internal consistency assessed with Cronbach's alpha coefficient is enough for a unidimensional scale since convergent validity and discriminant validity for such as scale cannot be computed with a single source primary data. These thoughts explain why only Cronbach's alpha was computed and shown for CRI in Table 7.

4.4. Hypotheses testing

To evaluate the extent to which the two lending methodologies are used by banks in lending to customers, descriptive statistics and the one-sample t-test are used. The researchers draw an existing approach by Altman and Royston (2006) to determine the extent of use of these lending methodologies. The median and average scores of lending approaches, as well as their two

Table 3. Summary statistics on lending methodology and its indicators

Variable	Min.	Max.	Mean	Median	SD
I was asked if I had a collateral	3	5	4.36	5.00	0.72
I was asked to provide my balance sheet information	3	5	4.33	4.00	0.73
I was interviewed on the policy, philosophy and performance of my business	3	5	4.35	5.00	0.73
I was asked to provide a copy of my business plan	3	5	4.32	4.00	0.75
I was asked to provide or discuss my financial performance target	3	5	4.32	4.00	0.74
I was asked about the historical records of my sales	3	5	4.35	4.00	0.71
I was asked about any debts I had	3	5	4.36	5.00	0.72
I was asked about the recognition of my business	1	4	3.18	3.00	0.85
Collateral and banking records	23	39	33.58	35.00	5.16
I was asked about my age	1	4	3.21	3.00	0.81
I was asked about my gender	1	4	3.15	3.00	0.84
I was asked if I was married	1	4	3.17	3.00	0.86
I was asked of my highest education	1	4	3.21	3.00	0.86
I was asked to indicate my experience in the business	3	5	4.35	5.00	0.73
The number of years the business had been in operation was ascertained	3	5	4.32	4.00	0.75

(Continued)

Table 3. (Continued)

Variable	Min.	Max.	Mean	Median	SD
I was made to provide information on the ownership structure	2	5	4.29	4.00	0.80
I was asked about the size of my business	2	5	4.31	4.00	0.78
I was asked to describe the structure of the industry I operated in	2	5	4.28	4.00	0.81
I was asked to indicate the number of years I had banked with the bank	3	5	4.32	4.00	0.75
I was asked to indicate if I had received a loan from the bank in the past	3	5	4.29	4.00	0.76
I was asked to indicate how many times I had received loan in the past from the bank	3	5	4.33	4.00	0.73
Personal and business characteristics	32	56	47.24	48.00	7.21
Lending Methodology	55	95	80.82	81.00	12.08

Source: Survey data (2021).

domains, were calculated in this vein. Scores above the median, according to Altman and Royston (2006), indicate a high level of application of the lending methodologies, and vice versa. As a result, the one-sample t-test was utilized to see if the variable's average score was substantially higher than its median.

The hypothesis (H1) tested is that the use of transaction-based lending (represented by Collateral Business Records, CBRs) and relationship-based (represented by Personal and Business Characteristics, PBCs) lending methodologies have no significant relationship to access to credit. This hypothesis has two sub-hypotheses as follows:

H1a: the average score associated with CBRs is significantly higher than the median score of this variable.

H1b: the average score associated with PBCs is significantly higher than the median score of this variable.

Table 4. Summary statistics on credit reference information and its indicators

Variable	Min.	Max.	Mean	Median	SD
The procedure for obtaining bank loan has been simplified by the introduction of the use of credit referencing information	3	5	4.43	5.00	0.64
Banks are responsive to SME financing needs.	3	5	4.20	4.00	0.70
Sharing of credit information has reduced loan processing costs and increased lending volume significantly	3	5	4.41	4.00	0.64
Sharing of credit information has reduced interest rates charged on loans by commercial banks	3	5	4.18	4.00	0.71
Credit information sharing from Credit Reference Bureaus rewards and promotes good credit track record for firms.	2	5	4.39	5.00	0.70
Credit information sharing acts a deterrent to loan default.	3	5	4.24	4.00	0.70
Credit information sharing has impacted positively on loan repayment	3	5	4.42	5.00	0.66
Credit information sharing has effectively reduced non-performing loans on the institution's financial statement	2	5	4.12	4.00	0.79
Credit risk information	24	40	34.40	36.00	4.52

Note: SD—standard deviation.

Source: Survey data (2021).

Table 5. Tests of data distribution and normality

Variable	Mean	SD	Skewness	Kurtosis	Shapiro Wilk's Test
Lending Methodologies	80.82	12.08	−0.492	−0.87	0.912
Credit reference information	34.4	4.52	−0.441	−0.86	0.895

**** $p < 0.001$.**

Source: Survey data (2021).

Table 6. Factor loadings and variance of credit reference information from EFA

Statistics	Factor loading
Eigenvalue (5.34)	
Variance (% total = 66.34)	
Indicator	
(1) The procedure for obtaining bank loan has been simplified by the introduction of the use of credit referencing information	0.97
(2) Banks are responsive to SME financing needs.	0.96
(3) Sharing of credit information has reduced loan processing costs and increased lending volume significantly	0.96
(4) Sharing of credit information has reduced interest rates charged on loans by commercial banks	0.51
(5) Credit information sharing from Credit Reference Bureaus rewards and promotes good credit track record for firms.	0.69
(6) Credit information sharing acts a deterrent to loan default.	0.94
(7) Credit information sharing has impacted positively on loan repayment	0.95
(8) Credit information sharing has effectively reduced non-performing loans on the institution's financial statement	0.63

Source: Survey data (2021).

Table 7. Psychometric properties of lending methodologies and credit risk information scales

Variable	Factor	Cronbach's alpha	Composite reliability	Average variance extracted	Maximum shared variance
Lending methodologies	Factor 1	0.937	0.954	0.621	0.212
	Factor 2	0.935	0.944	0.619	0.204
	Whole scale	0.966	—	—	—
Credit risk information	Whole scale	0.926	—	—	—

Source: Survey data (2021).

Table 8. Summary statistics on lending methodologies and their indicators

Variables	Scale			Mean	
	Minimum	Maximum	Median	Statistic	SD
Collateral and banking records	8	40	24	33.58	5.16
Personal and business characteristics	12	60	36	47.24	7.21
Lending methodologies	20	100	60	80.82	12.08

Source: Survey data (2021).

If this hypothesis is confirmed, then the extent of lending methodologies can be said to be high. Table 8 shows descriptive statistics associated with the above hypotheses.

The entire scale (i.e. lending methodology) gave an average score that is 81 percent of the maximum score of 100 and 13% of the median. CBRs were responsible for 84% of the maximum score and 140% of the median, whereas PBCs were responsible for 79% of the maximum score and 131% of the median. As a result, these proportions confirm that the variables' average scores are higher than the median. A one-sample t-test was employed to test the above assumptions, as shown in Table 9.

In Table 9, the test value of the t-test is the median of the variable involved. The test associated with CBRs is significant ($t = 54.08$, $p = 0.000$), which suggests that the mean score of CBRs is significantly larger than its median. The test is also significant for PBCs ($t = 45.39$, $p = 0.000$) and lending methodologies ($t = 50.2$, $p = 0.000$). The first hypothesis and its sub-hypotheses are, therefore, confirmed. In other words, the extent of the application of the lending methodologies was high.

The second hypothesis tested is that credit referencing information highly moderates the relationship between CBRs and PBCs and access to credit. This hypothesis also has two sub-hypotheses as follows:

H2a—the effect of lending methodologies on access to credit is moderated by Collateral Business Records (CBRs).

Table 9. The one-sample t-test for a high level of application of lending methodologies

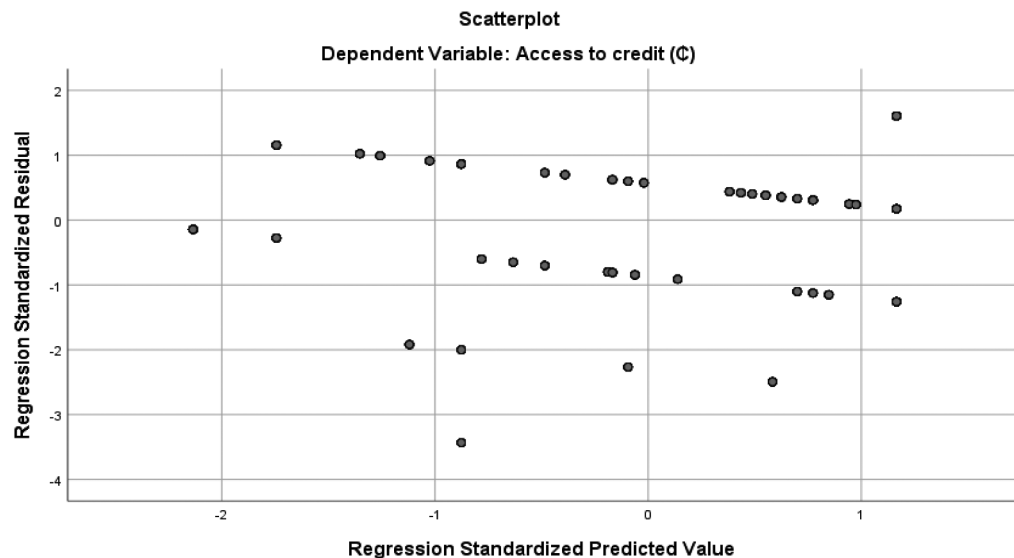
Variable	Test value	t	df	p	Mean difference	95% CI	
						Lower	Upper
Collateral and banking records	24	54.077	847	0.000	9.58	9.23	9.93
Personal and business characteristics	36	45.392	847	0.000	11.24	10.75	11.72
Lending methodology	60	50.199	847	0.000	20.82	20.00	21.63

^a. Value equal to the median in Table 5.10; CI—confidence interval.

Source: Survey data (2021).

Figure 1. Standardised residuals and predicted values (the effects of lending methodologies on access to credit).

Source: Survey data (2021).



H2b—the effect of lending methodologies on access to credit is moderated by Personal Business Characteristics (PBCs).

The second hypothesis is tested using OLS regression analysis, which is recognised as the best method for modelling linear associations as it minimises the sum of the squares in the difference between the observed and predicted values of the dependent variable (Nunkoo & Ramkissoon, 2012; Nusair & Hua, 2010). To use this method, five primary requirements need to be met by the data (Cheng, 2001). Firstly, the dependent variable should be normally distributed for OLS to be suitable (Garson, 2012; Nusair & Hua, 2010). Interestingly, the normality of the data has been confirmed in the exploratory analysis. The second requirement is that the variables of interest should be linearly related (Garson, 2012).

Figure 1 shows a scatter plot of the standardised residuals and standardised predicted values. This plot establishes linearity and homoskedasticity (another requirement for regression) for the OLS models fitted in this analysis (Nunkoo & Ramkissoon, 2012). Following Garson (2012), this plot assesses linearity and homoskedasticity for the OLS model assessing the effects of the lending methodologies (whole construct) on access to credit. It can be seen that the scatter plots show no “funnel shape”, which is the pattern produced if the homoscedasticity assumption is violated (Garson, 2012). Similarly, the scatter plot represents a shapeless cluster, which describes a linear relationship (Nunkoo & Ramkissoon, 2012). Thus, linearity and homoskedasticity are met for the primary regression models fitted. With the above results, a basis is set for performing OLS regression analysis.

The third and fourth requirements are the independence of regression errors (i.e., a lack of correlation between the errors and values of the predictors) and absence of multicollinearity assumptions (Garson, 2012). The independence of error requirement was met for each regression model with a Durbin-Watson statistic ranging between 1.5 and 2.4, with the value 2 being a perfect indicator of independence of errors (Garson, 2012; Nusair & Hua, 2010). On the other hand, multicollinearity was met with Variance Inflation Factor (VIF) values not greater than 5 (Garson, 2012). A significant correlation between the dependent variable and at least one predictor is the final requirement for performing OLS regression (Nunkoo & Ramkissoon, 2012). Table 10 revealed a significant correlation between access to credit and at least one of the predictor variables, which provides a basis for performing OLS regression.

In Table 10, CBRs is positively correlated with lending methodologies ($r = 0.312$, $p = 0.000$, two-tailed), access to credit ($r = 0.494$, $p = 0.000$, two-tailed) and CRI ($r = 0.27$, $p = 0.000$, two-tailed). This result suggests that access to credit improved with perceived CBRs. PBCs is also positively correlated with lending methodologies ($r = 0.313$, $p = 0.000$, two-tailed), access to credit ($r = 0.485$, $p = 0.000$, two-tailed) and CRI ($r = 0.238$, $p = 0.000$, two-tailed). It can be seen that many of the covariates, which represent business characteristics, are also significantly correlated with lending methodologies and its two domains.

Table 11 shows regression results associated with the test of the second hypothesis (i.e. H2). This hypothesis states that CRI increases the strength of the relationship between lending methodologies and access to credit. This hypothesis is tested by fitting the baseline and ultimate models. In the baseline model in which covariates are not captured, the interaction term (i.e. CRI*Methodology) has a positive influence on access to credit ($\beta = 0.35$; $t = 10.85$; $p = 0.000$). In Table 10, the effect accounted for by lending methodologies alone is 0.32, which is smaller than 0.35 (the mediation effect). Thus, there is an increase in the effect size due to the influence of CRI. In the ultimate model of Table 12, however, the interaction term has no significant influence on access to credit facilities. This result implies that CRI has no significant mediation influence on the effect of lending methodologies and access to credit if the business characteristics are controlled for.

In the ultimate model, CRI*CBRs has a positive effect on access to credit ($\beta = 0.56$; $t = 4.71$; $p = 0.000$). In the ultimate model of Table 11, the effect size accounted for by CBRs is 0.39. With an effect of 0.56 produced by CRI*CBRs, it is understandable that CRI has increased the effect of CBRs from 0.39 to 0.56, a 44% increase in the effect size. Hence, H2a is supported by the data. CRI*PBCs have a negative effect on access to credit ($\beta = -0.51$; $t = -4.11$, $p = 0.000$), which suggests that access to credit reduces as this interaction effect increases. In the ultimate model of Table 12, PBCs alone accounted for an effect size of -0.21 on access to credit. This effect further reduces to 0.51, which means a reduction by 143% in the effect size (of PBCs) due to CRI has taken place. The second sub-hypothesis (H2a) is, therefore, supported by the data.

5. Discussion of findings

This study aimed to examine the mediating influence of CRI on the interaction between lending methodologies represented by CBRs and PBCs on access to credit. In this study, two main research objectives were formulated, namely:

- (1) to establish the relationship between transaction-based (CBRs) and relationship-based (PBCs) lending methodologies and access to credit.
- (2) to examine the mediating effect of credit referencing information (CRI) on SME's access to finance in Ghana

Our data analysis showed that both Collateral Based Records (CBRs) and Personal Business Characteristics (PBCs) methodologies are sufficiently used by the banks, though CBRs were more important and frequently used (Angori et al., 2019; Duarte et al., 2017). This result came from the one-sample t-test, which confirms that the extent of use of both methodologies was high. This result is congruent with the reasoning of the World Bank Group (2018) that lending methodologies or criteria better work together as a complementary set. This is to say that the two methodologies play unique roles and that failing to apply both makes a lending process vulnerable to credit risks.

In the baseline model in which business characteristics were not controlled for, CRI had a positive effect on access to credit, which means that access to credit increased as the perceived level of credit risk referencing increased. The ultimate result, however, is the ultimate model, which adjusts for the business characteristics. In this model, CRI instead had a positive effect on access to credit, which is the reverse of the relationship confirmed in the baseline model. By the results from the ultimate model, it can be said that CRI reduces the likelihood of an SME accessing finance

Table 10. Correlation matrix of relevant variable

Variables	#	1	2	3	4	5	6	7	8	9	10	11	12
CBRs	1	1	.904**	.967**	.312**	.494**	.270**	.479**	.446**	.216**	.238**	0.056	.251**
PBCs	2		1	.983**	.313**	.485**	.238**	.501**	.534**	.107**	.143**	0.061	.338**
Lending methodologies	3			1	.320**	.501**	.258**	.504**	.509**	.156**	.187**	0.06	.309**
Access to credit (C)	4				1	.262**	.283**	.230**	.239**	.137**	.084*	.117**	.489**
CRI	5					1	.521**	.381**	.300**	.301**	.364**	.242**	.533**
Number of employees	6						1	.320**	.285**	.220**	.288**	0.059	.370**
Business age	7							1	.915**	.071*	.135**	.168**	.198**
Experience with bank	8								1	0.005	.095**	.115**	.153**
Fixed assets	9									1	.918**	.191**	.123**
Current assets	10										1	.160**	.089**
Annual sales 2019	11											1	.189**
Net income 2019	12												1

** $p < 0.001$; * $p < 0.05$; CBRs—collateral and business records; PBCs—personal and business characteristics; CRI—credit referencing information.

Source: Survey data (2021).

Table 11. The mediating influence of CRI on the relationship between lending methodologies and access to credit

Model	Predictor	Coefficients			95% CI	Tol.	Model fit				
		B	SE	B(t)			R ²	Adjusted R ²	Change in R ²	Durbin-Watson	F
1 ^a	(Constant)	2.51	0.10	(24.12)**	±0.41		0.122	0.121	0.001	—	117.67**
	CRI*Lmethodology	0.04	0.00	0.35(10.85)**	±0.01	—					
2 ^b	(Constant)	4.18	0.26	(16.17)**	1.01		0.359	0.352	0.007	1.88	52.2**
	CRI*Lmethodology	-0.01	0.01	-0.06(-1.52)	±0.02	0.45					
	Covariate										
	Number of employees	0.00	0.02	0.01(0.18)	±0.09	0.64					
	Business age	-0.23	0.05	-0.33(-4.44)**	±0.21	0.14					
	Experience with bank	0.23	0.05	0.31(4.33)**	±0.21	0.15					
	Fixed Assets	0.23	0.05	0.36(4.84)**	±0.19	0.14					
	Current Assets	-0.28	0.04	-0.48	±0.17	0.14					
	Annual Sales 2019	-0.09	0.05	-0.06(-1.88)	±0.18	0.86					
	Net Income 2019	0.17	0.03	0.23(5.85)**	±0.11	0.52					

† ***p* < 0.001; ^a baseline model without covariates; ^b ultimate model with covariates; SE—standard error; CI—confidence interval (of B), CRI—credit referencing information; Tol.—tolerance; Tolerance ≥0.1 for each predictor.

Source: Survey data (2021).

after considering business size (in terms of the number of employees), business age, and other business attributes. Over the years, studies assessing the relationship between CRI and access to credit facilities have produced mixed findings; while some studies have confirmed a positive association (Brown et al.), others have found a negative association (Uchida, 2011)

It can be said that the inclusion of business or borrowers' characteristics in the ultimate regression model was a necessary step toward estimating the actual effect of CRI on access to credit facilities. This view emphasises that inconsistencies in the results of previous studies could be due to research design differences. For instance, none of the studies reported above had adjusted for borrower characteristics in testing the relationship between CRI and access to funds. A few confounding variables were controlled for (Angori et al., 2019;), but the list of confounders considered was not as exhaustive as the list of business characteristics considered in this study.

According to Asiamah et al. (2019), confounding or mediating variables are factors that could affect the primary relationship and should therefore be carefully selected. This assertion meant that not every variable can cause confounding or mediation and confounding or mediation is not always possible. This idea forms the basis of their provision of a methodology for identifying confounding variables for a model through a theoretical lens. While the current study followed this procedure to select business characteristics that are likely to affect the primary relationship with access to credit, most previous studies did not adjust for confounders at all, while some adjusted for an incomplete or irrelevant set of confounding variables. This study, therefore, provides a sterling example of how statistical analysis can affect the internal validity of findings. No doubt, the current study provides a more precise accuracy of the effect of CRI on access to credit, which is in the ultimate model. Finally, the current evidence reinforces the need for researchers to adjust for the relevant set of confounding variables in testing relationships in finance and other disciplines employing cross-sectional designs.

Table 12. The mediating influence of CRI on the relationship between lending methodologies and access to credit

Model	Predictor	Coefficients			95% CI	Model fit				
		B	SE	B(t)		R ²	Adjusted R ²	Change in R ²	Durbin-Watson	F
1 ^a	(Constant)	2.51	0.1	(24.10) **	±0.41	0.122	0.119	0.00	1.78	58.47**
	CRI*CBRs	0.03	0.03	0.12 (1.04)	±0.12					
	CRI*PBCs	0.04	0.02	0.23 (1.99)	±0.09					
2 ^b	(Constant)	2.13	0.12	(17.79) **	±0.47	0.318	0.311	0.01	1.871	43.43**
	CRI*CBRs	0.15	0.03	0.56 (4.71)**	±0.13					
	CRI*PBCs	−0.1	0.02	−0.51 (−4.11) **	±0.09					
	Covariate									
	Number of employees	0.05	0.02	0.07 (2.16)*	±0.09					
	Business age	−0.22	0.06	−0.31 (−4.0)**	±0.22					
	Experience with bank	0.35	0.06	0.47 (5.97)**	±0.23					
	Fixed Assets	0.25	0.05	0.38 (4.99)**	±0.20					
	Current Assets	−0.22	0.05	−0.38 (−4.89) **	±0.18					
	Annual Sales 2019	0.01	0.05	0.01 (0.2)	±0.18					
	Net Income 2019	0.34	0.03	0.45 (12.26) **	±0.11					

t ***p* < 0.001; **p* < 0.05; *a* baseline model without covariates; *b* ultimate model with covariates; SE—standard error; CI—confidence interval (of B), CBRs—collateral and business records; PBCs—personal and business characteristics; CRI—credit referencing information; Tolerance ≥0.1 for each predictor.

Source: Survey data (2021).

6. Summary and conclusion

The current study also contributes to literature on SME access to finance by identifying the distinctive problems encountered by small business owners in their quest to source finance for their businesses, the distinction is important in that SMEs especially those in developing economies like Ghana mostly depend on informal sources of funding and thus do not fully appreciate the lending methodologies and the demand from banks and other formalised lending institutions. The study showed that although the determinants of access to credit may constrain most SME owners from accessing credit, the introduction, use and application of credit referencing information in conjunction with the identified lending methodologies largely help to reduce the problems of information differences that has been identified in several empirical literature from a number of countries as the most difficult hurdle impeding SME access to credit. The following conclusions are therefore arrived at based on the study objectives.

On the mediating role of CRI in the relationship between lending methodologies and access to credit, we conclude that after controlling for the confounding variables, CRI did not mediate the relationship

between CBRs, PBCs and access to credit. After adjusting for confounding variables, CRI positively mediated the relationship between CBRs and access to credit, which means that the intervention of CRI increased the relationship between CBRs and access to credit. CRI increased the relationship between PBCs and access to credit after adjusting for the confounding variables. Thus, the relationship between the whole construct (i.e. complementarity) of lending methodologies and access to credit was not mediated by CRI, but CRI mediated the relationships between its dimensions and access to credit.

Therefore, the study recommends that SME firms must strive to develop and strengthen their relationship with their bankers by frequently visiting the credit risk management team to discuss future plans and report the current progress the company is making financially. SMEs owners must ensure they develop a personal business relationship with their bankers and undertake transactions with its accounts more frequently to improve business relationships and discuss their future financial plans with the credit risk team to find out prioritized lending criteria and methodologies. These activities are the primary steps for aligning the business's operations with the lending process to meet lending criteria in future. SMEs therefore would have to take some steps to take advantage of CRI by ensuring that they do not default in paying back their loans. That is, SMEs must avoid loan defaults, especially in an economy where credit reference bureaus regulate lending and borrowing activities by providing credit reference information.

Future researcher in this area may seek to identify other confounding variables not considered in the research analysis, which affects the dependent variable and may cause either an increase or decrease in variance in SMEs access to credit.

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Author details

Kofi Nyarko Gyimah¹

Joseph Olorunfemi Akande²

E-mail: akandeo.joseph@gmail.com

ORCID ID: <http://orcid.org/0000-0001-8445-8905>

Paul-Francois Muzindutsi³

¹ Department of Accounting and Finance, Pentecost University, Accra, Ghana and a PhD candidate of University of KwaZulu-Natal, Westville, South Africa.

² Department of Accounting Science, Walter Sisulu University, Mthatha, South Africa.

³ Finance Division, School of Accounting, Economics and Finance, University of KwaZulu-Natal, Westville, South Africa.

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