


# Agricultural trade credit: Evidence from smallholder primary producers in Ghana

**Author:**Stanley Kojo Dary<sup>1</sup> **Affiliation:**

<sup>1</sup>Department of Economics,  
Faculty of Social Science and  
Arts, Simon Diedong Dombo  
University of Business and  
Integrated Development  
Studies, Wa, Ghana

**Corresponding author:**

Stanley Dary,  
sdary@ubids.edu.gh

**Dates:**

Received: 17 Feb. 2022

Accepted: 28 June 2022

Published: 16 Nov. 2022

**How to cite this article:**

Dary, S.K., 2022, 'Agricultural  
trade credit: Evidence from  
smallholder primary  
producers in Ghana',  
*Journal of Economic  
and Financial Sciences*  
15(1), a768. [https://doi.  
org/10.4102/jef.v15i1.768](https://doi.org/10.4102/jef.v15i1.768)

**Copyright:**

© 2022. The Author.  
Licensee: AOSIS. This work  
is licensed under the  
Creative Commons  
Attribution License.

**Orientation:** Players in the agricultural value chain such as input suppliers, farmers (producers), traders (middlemen), processors or manufacturers and exporters do receive credit and extend credit, in the form of trade credit, as part of their transactions.

**Research purpose:** The purpose of the study is to examine agricultural trade credit, particularly the factors that influence the receipt and extension of agricultural trade credit in smallholder farmer settings.

**Motivation for the study:** The study is motivated by the limited understanding of trade credit activity in smallholder farmer settings in developing countries.

**Research approach/design and method:** It is a cross-sectional quantitative study. It utilised the Ghana Living Standards Survey Round 7 dataset (GLSS 7). The data contains 18653 observations, and a multinomial logit model (MNL) was employed in the data analysis.

**Main findings:** The results show that trade credit receivable (where farmers extend credit to buyers) is more important relative to advance payment (where farmers receive credit from buyers). The receipt of advance payment is influenced by a farmer holding a preharvest contract, practising monocropping and coming from a smaller household. Age, marital status, literacy, crops sales value, national origin, marketing channels, type of crops and urban location are found to be significant explanatory factors of trade credit supply.

**Practical/managerial implications:** Trade credit, particularly input credit and advance payment, can help primary agricultural producers to mitigate their production credit constraints. However, a well-functioning agribusiness environment that will lower the risks associated with trade credit activity is very crucial.

**Contribution/value-add:** The study extends the frontiers of knowledge in agricultural financing by generating empirical evidence on trade credit activity in smallholder farmer settings in a developing country context.

**Keywords:** trade credit; trade credit receivable; advance payment; primary agricultural production; agricultural marketing; smallholder farmers; multinomial logit; Ghana.

## Introduction

### Orientation

Aside from personal finance, trade credit is believed to be the oldest form of credit in the world (Baker 1970). Unlike conventional credit, trade credit is credit that is usually bundled with the sale or purchase of goods, making it inherent in transaction relationships involving the exchange of goods (Emery 1984; Nadiri 1969). Trade credit is therefore a short-term financing arrangement where goods are bought and sold, and payment or receipt of payment is deferred to a later date. Trade credit can be extended by input sellers upstream to producers by selling inputs and accepting delayed payment. In the financial records of the input suppliers and producers, this will appear as trade credit receivable and trade credit payable, respectively. Trade credit can also be extended by producers to customers (buyers) downstream. This will appear in the financial records of the producers and buyers as trade credit receivable and trade credit payable, respectively. Finally, trade credit can take the form of advance payment from buyers to producers preceding the delivery of the goods. This has been described by Daripa and Nilsen (2011) and Mateut (2014) as reverse trade credit because the buyer is extending credit to the producer/supplier instead of the reverse.

**Read online:**

Scan this QR  
code with your  
smart phone or  
mobile device  
to read online.

Trade credit use in agriculture is not uncommon, although the agricultural sector has been found to be less intensive in trade credit activity, with cash sales dominating agricultural produce sales (e.g. Cuevas et al. 1993; Emery 1984; Fafchamps 2000; Fafchamps, Pender & Robinson 1995). Agricultural trade credit may become an increasingly important source of financing in sustained low-margin environments and where producers are credit-rationed in the capital market (McKee, Jacobs & Kagan 2020). According to Pearce (2003), traders, processors, input suppliers and exporters are the primary source of credit to poor agriculture-dependent households, with credit provided as part of input supply and agricultural produce purchase transactions. According to Quartey et al. (2012), middlemen are key stakeholders in the marketing and credit delivery process in agriculture, but their role has received less emphasis. Middlemen often provide supplier- and buyer-trade credit against future crop harvests at predetermined prices. The role of middlemen in credit supply in agriculture is especially important, as agricultural production is considered highly risky by traditional financial intermediaries. Such credits are characteristically seasonal and short-term in nature. Thus, trade credit can originate from input dealers (suppliers), farmers (producers), and buyers; they can also be the receivers of trade credit.

Advance payment and supplier credit from input dealers is the primary source of finance for agricultural production in many countries (Pearce 2003). Market traders (middlemen), cooperatives, and other institutional buyers can make advance payment for farm produce through pre-harvest contracts. The advance payment can be in the form of inputs such as seeds, agrochemicals (fertiliser, weedicides, insecticides), ploughing services and fuel provided to farmers on credit terms or pure cash advances, with repayment at harvest in the form of produce (Baker 1970; McKee, et al. 2020; Pearce 2003; Smith, Stockbridge & Lohano 1999). Input dealers can supply inputs on credit terms to farmers at the start of the farming season and receive cash repayment or repayment in the form of farm produce as determined by the contract. Farmers also extend credit to the buyers of their produce through credit sales.

## Research purpose and objectives

There is limited empirical evidence of trade credit activity in the production and marketing of primary agricultural produce (e.g. Pearce 2003; Poole, Seini & Heh 2003; Quartey et al. 2012). Most studies on agricultural trade credit are focused on the agro-food processing or agro-food manufacturing sector (e.g. Alarcón 2011; Dary & James 2018, 2019; Kihanga et al. 2010; Nguyen 2011). Against this background, the present study is focused on trade credit use in primary agricultural production and marketing and is set out to (1) examine the extent of trade credit use in smallholder primary producers in Ghana and (2) determine the factors influencing the receipt and extension of trade credit among smallholder primary producers. This study will bring to the fore the importance, or otherwise, of trade credit in smallholder production and marketing in a developing country context and may inform policies on

agricultural financing, particularly, and the agribusiness environment, generally.

The rest of the article is organised as follows. The 'Theoretical underpinnings and literature review' section contains the literature review and theoretical underpinnings of the study. The research methods employed are presented in 'Research design' section. The 'Results' section presents and discusses the empirical results, and the 'Conclusion and practical implications' section concludes the article and provides policy implications.

## Theoretical underpinnings and literature review

Various theories have been put forward to explain the existence of trade credit and the basis for the extension and receipt of trade credit. The oldest of the trade credit theories is the financing theory, which explains that trade credit exists because of financial market imperfections (Emery 1984; Schwartz 1974). The other theories of trade credit, which are nonfinancial, include: (1) transaction cost theory, which explains that parties to a transaction can lower transaction costs through offering trade credit (Ferris 1981); (2) marketing theory, which posits that firms use trade credit as a means to drive sales (Nadiri 1969); (3) quality guarantee or quality verification theory, which posits that transacting parties can solve information asymmetries by allowing goods to be verified for quality before payment is made (Long, Malitz & Ravid 1993; Smith 1987); (4) price discrimination theory, which explains that firms can indirectly engage in price discrimination through offering of trade credit (Brennan, Maksimovic & Zechner 1988); (5) long-term relationship theory, which explains that firms can attract and build long-term relationship with customers by offering trade credit (Long et al. 1993); and (6) tax theory, which posits that trade credit can be used as a channel to manage tax liabilities, particularly deferment of tax liabilities to enhance cashflow (Brennan et al. 1988; Brick & Fung 1984). The theoretical basis for advance payment and trade credit receivable, the two types of trade credit examined in this study in relation to agricultural production and marketing, are explained below.

## Advance payment

Buyers may be motivated to make an advance payment, long before taking delivery of their goods, for several reasons. The agricultural product may be a speciality product, and making advance payment may encourage production and guarantee the product supply in a timely manner and in required quantities (Baker 1970). According to Pearce (2003), using advance payment can help buyers to secure farm produce of sufficient quality and quantity. Moreover, a production or supply contract with advance payment may help to reduce the buyers' transaction costs of searching for producers to aggregate the required quantities of the produce (transaction cost theory). Making advance payments may help a buyer to build a long-term relationship with producers. Offering credit as part of trading relationships helps build client

loyalty and (mutual) dependence, and it reduces the cost of client selection and monitoring over time (Pearce 2003). It may also be a means to ensuring product quality (Baker 1970), as posited by the quality verification theory.

A guaranteed market for farm produce through advance payment may help to reduce producer risks. The advance payment usually comes to farmers in the form of inputs supply. The farmers may be facing credit constraints in accessing the necessary inputs for production, and offering advance payment can help to mitigate such credit constraints (Pearce 2003), as posited by the financing theory. McKee et al. (2020) indicate that agricultural cooperatives provide member-producers with trade credit, especially when producers face credit constraints from formal financial intermediaries to finance their short-term input needs. Buyers for supermarket chains use input credit to increase their influence over production processes and to ensure that quality and food safety standards are met (Pearce 2003); this is explained by market power theory and quality guarantee theory.

### Trade credit receivable

Producers may extend credit to their buyers downstream through credit sales of produce. As stated by Pearce (2003), traders may also require farmers to extend trade credit, which may result in farmers receiving credit from traders at the beginning of the season and then providing credit to traders in turn at the end of the season. Aryeetey and Nyanteng (2006, cited in Quartey et al. 2012:6) state that trade credit receivable (advances of goods on credit) is the most common form of credit. Farmers or suppliers deliver their produce to retailers or wholesalers in the early part of the day and expect repayment in the latter part of the day. The repayment can also take place after a few days (Quartey et al. 2012). Producers extending trade credit to buyers is usually done as a marketing strategy, customer relationship building strategy, quality guarantee strategy and transaction cost management strategy. The overarching objective is usually to increase sales. For agricultural cooperatives, offering trade credit to buyers downstream enables them to increase their volume of sales (McKee et al. 2020), as explained by the marketing theory.

There are costs inherent in trade credit-tied transactions, including transaction costs and the risk of delayed repayment beyond a contractually agreed period or default in repayment altogether. The opportunity cost may also be greater for producers or firms granting trade credit. This has been acknowledged in the extant trade credit literature (e.g. McKee et al. 2020; Pearce 2003). For instance, farmers who have received advance payment can engage in side-selling in cases where there are many buyers in the product market. With many buyers in the product market, the opportunity costs to farmers for defaulting a purchase agreement is very low (Pearce 2003). Hence, trade credit supply decisions must be based on cost-benefit analysis (McKee et al. 2020).

## Research design

### Research approach

The study employed a quantitative research approach in examining the factors influencing the receipt and extension of trade credit among smallholder farmers in Ghana. According to Criswell (2014), in examining how an outcome variable is influenced by certain factors (variables), as in this study, the appropriate design is a quantitative design, where quantitative data and analytical methods are employed.

### Research methods

The methods employed in this study are discussed below under the following headings: data description and processing, variable description and method of data analysis.

### Data description and processing

The study employed data from the latest round of the Ghana Living Standards Survey 7 (GLSS 7). The data was collected in 2016–2017 and made available in 2018 by the Ghana Statistical Service (GSS), an organisation that administers the GLSS. The GLSS is a nationwide survey of Ghanaian households, and hence the resulting dataset is nationally representative (GSS 2018). The survey covers about 15000 households in urban and rural Ghana. Even though the GLSS 7 covered many issues relating to population, education, health, employment, migration, income and poverty, it places a special focus on agriculture and hence contains key information on household agricultural production and marketing.

The GLSS data comes in multiple data files, and depending on the type of study, some data files need to be combined to create the required dataset as in this article. The general household data file (Module A) was match-merged with the agricultural data file (Module B), using the household identifier 'hid' and appropriate Stata merge commands. The general household data file was the 'master dataset', and the agricultural data file was the 'using dataset'. Before the match merger, all duplicate identifications (IDs) resulting from observations from other household members such as spouses, children, grandchildren, and others were dropped, leaving only observations from the household heads. The unit of analysis is the household head. After the merger, all unmatched observations were dropped from the match-merged dataset. The unmatched observations ('master only') represent household heads who were not engaged in agricultural activities. The merged dataset contains 18653 observations, as some household heads are engaged in more than one crop enterprise. However, the sample size varies with the type of analysis due to missing data in some variables.

### Description of variables

The variables and their definitions are presented in Table 1. The dependent variable, trade credit, is categorical: 1 = no trade credit (cash sales), 2 = receipt of advance payment from

buyers and 3 = sale of agricultural produce on credit (trade credit receivable). The independent variables include farmer's age, farmer's sex, farmer's marital status, farmer's literacy, household size, farmer's national origin, farming system, sales value of harvested crops, marketing channels, location (rural or urban), crop classification category and regional dummies. The definitions and measurements of the variables are presented in Table 1.

### Method of data analysis

The estimation method employed is a multinomial logit model (MNL), because the dependent variable is in three categories (no trade credit, advance payment, and trade credit receivable) and unordered. The basic MNL is of the form:

$$U_{ij} = \beta_j' X_i + \gamma' Z_{ij} + \varepsilon_{ij}, \quad [\text{Eqn 1}]$$

where  $U_{ij}$  represents the utility of household head  $i$  for choice  $j$ , where  $j=1$  is cash sales (no trade credit),  $j=2$  is advance payment and  $j=3$  is trade credit receivable.  $X_i$  is the sociodemographic characteristics of household heads,  $Z_i$  represents characteristics of the choices or options and  $\beta_j$  and  $\gamma$  are parameters to be estimated. Finally,  $\varepsilon_{ij}$  is the error term.

Farmer household heads are assumed to be utility maximisers; hence, a farmer household head  $i$  will choose option  $j$  if the utility from option  $j$  is the largest of all the utilities. That is,  $P(U_{ij} > U_{ij}')$

**TABLE 1:** Variables and measurement.

Variable	Definition	Measurement
TC	Involvement of trade credit in marketing agricultural produce	1 = no trade credit (cash sales), 2 = advance payment and 3 = trade credit receivable
MKC	Marketing channels	Dummies created for farmgate, market traders (middlemen), direct consumer sales, state trading organisation, cooperative, preharvest contract and other marketing channels
SEXHHH	Sex of household head	1 if male, 0 otherwise
InAGEHHH	Age of household head	Natural logarithm of the age of household head in years
MARITALST	Marital status of household head	1 if married and 0 if cohabiting, divorced or separated, widowed and single
InHHSIZE	Household size	Natural logarithm of household size plus 1
FarmSyst	Farming system	1 if monocropping, 0 otherwise
Nationality	Nationality of household head	1 = if Ghanaian by birth, 0 otherwise
LITERACY	Whether household head ever attended school	1 if a household head has ever attended school, 0 otherwise
Cropsalesv	Crops sales value	Natural logarithm of crop sales value (GHS)
Crop class	Type of crops cultivated	Dummies created for cereal crops, leguminous crops, tree and fruit crops, roots and tuber crops, vegetable crops, grass crops and other crops
UrbanLoc	Location in an urban area	1 if urban location, 0 otherwise
REG	Region	Dummies created for Central region, Volta region, Eastern region, Ashanti region, Brong-Ahafo region, Northern region, Upper East region, Upper West region, Western region and Greater Accra region

The utilities  $U_{ij}$  are unobservable, but the choices ( $j=1, 2, 3$ ) of farmer household heads are observable:

$$y_{ij} = \begin{cases} 1 & \text{if household head } i \text{ chooses option } j \\ 0 & \text{otherwise} \end{cases} \quad [\text{Eqn 2}]$$

The probability that a farmer household head  $i$  chooses option  $j$  is given by:

$$P(y_{ij} = j | \beta_j, \gamma, X_i, Z_{ij}) = \frac{\exp(\beta_j' X_i + \gamma' Z_{ij})}{\sum_{k=1}^J \exp(\beta_k' X_i + \gamma' Z_{ik})}. \quad [\text{Eqn 3}]$$

For identification, one of the  $j$  options must be set to zero and thus made the reference or base category. If option  $\beta_j$  is equal to zero ( $\beta_j=0$ ), it means that option  $J$  is the reference or base option and provides the reference point for all other alternative options:

$$P(y_{ij} = j | \beta_j, \gamma, X_i, Z_{ij}) = \frac{\exp(\beta_j' X_i + \gamma' Z_{ij})}{\sum_{k=1}^{J-1} \exp(\beta_k' X_i + \gamma' (Z_{ik} - Z_{iJ}))} \quad [\text{Eqn 4}]$$

for  $j = 1, \dots, J-1$ .

In the estimation, ( $j=1$ ) (no trade credit) is used as the reference category.

### Ethical considerations

Secondary data was utilised in the research, with no interaction with human or animal participants. The Ghana Statistical Service follows ethical protocols in collecting its data. All personal identifier information has been removed before making the data publicly available.

## Results

### Sociodemographic characteristics of farmers

The sociodemographic characteristics of farmers are presented in Table 2. The average age of farmers in the sample

**TABLE 2:** Sociodemographic characteristics of farmers.

Variable	Obs	Mean	Standard deviation	Min	Max
Sex of household head	18 653	0.8044	0.3967	0	1
Age of household head	18 653	48.8917	15.4103	17	99
Household size	18 653	7.9481	4.3210	1	15
Married	18 653	0.7238	0.4471	0	1
Literacy	18 653	0.5150	0.4998	0	1
Nationality	18 653	0.9865	0.1152	0	1
Urban location	18 653	0.1108	0.3138	0	1
Central region	18 653	0.0655	0.2474	0	1
Volta region	18 653	0.0916	0.2885	0	1
Eastern region	18 653	0.0877	0.2829	0	1
Ashanti region	18 653	0.0387	0.1929	0	1
Brong-Ahafo region	18 653	0.0806	0.2722	0	1
Northern region	18 653	0.1837	0.3873	0	1
Upper East region	18 653	0.2064	0.4047	0	1
Upper West region	18 653	0.1864	0.3894	0	1
Western region	18 653	0.0536	0.2251	0	1
Greater Accra Region	18 653	0.0058	0.0759	0	1

Source: Analysis based on GLSS Data from Ghana Statistical Service (GSS), 2018, *Ghana living standard survey 7: (2016–2017)*, Ghana Statistical Service, Accra  
GLSS, Ghana Living Standards Survey.



is about 49 years and the mean household size consists of eight people. About 72.4% of the farmers are married, 51.5% are literate (have ever attended school) and 98.7% have Ghanaian national origin. Most of the farmers are located in rural Ghana as only 11.1% are located in urban Ghana. Most of the farmers are located in the three northern regions of Ghana: Upper East Region (20.6%), Upper West Region (18.6%), and Northern Region (18.4%). The Greater Accra Region is the least contributor to the farmer population, contributing 0.6%, approximately.

### Trade credit activity and agricultural marketing channels

The results (Table 3) show that cash sales dominate agricultural commodity marketing among smallholder farmers in Ghana. About 84.6% of produce sales do not involve trade credit; that is, it is on a cash basis. The rest of the sales, 15.4%, are on a trade credit basis, with 14.0% representing sales of commodities on credit terms (trade credit receivable) and 1.4% representing advance payment to farmers by input suppliers or traders.

With regard to marketing channels for farm produce (see Table 4), selling through market traders (middlemen or women) is the most important channel, as indicated by 61.7% of the farmers. Other important marketing channels include direct consumer sales (13.4%) and farm gate buyers (10.4%). Very few farmers received preharvest contracts (1.6%) or sold their produce through farmer cooperatives (2.9%). In addition, a bivariate analysis was undertaken to ascertain whether variations existed between the type of trade credit activity and agricultural marketing channels used by farmer household heads. The results are reported at the bottom of Table 4. The Pearson chi-square statistic is asymptotically

**TABLE 3:** Trade credit activity among smallholder farmers.

TC	Frequency	Percent frequency
1. No trade credit (cash sales)	6946	84.61
2. Advance payment	117	1.43
3. Trade credit receivable	1146	13.96
<b>Total</b>	<b>8209</b>	<b>100.00</b>

Source: Analysis based on GLSS Data from Ghana Statistical Service (GSS), 2018, *Ghana living standard survey 7: (2016–2017)*, Ghana Statistical Service, Accra  
GLSS, Ghana Living Standards Survey; TC, trade credit.

**TABLE 4:** Trade credit and agricultural marketing channels.

Marketing channels	Trade credit			Total
	No trade credit (cash sales)	Advance payment	Trade credit receivable	
Pre-harvest contractor	60	27	42	129
Farm gate buyer	659	13	178	850
Market trader (middlemen)	4425	52	587	5064
Consumer	994	13	93	1100
State trading organisation	536	5	146	687
Cooperative	157	5	75	237
Other channels	114	2	25	141
<b>Total</b>	<b>6945</b>	<b>117</b>	<b>1146</b>	<b>8208</b>
Pearson chi <sup>2</sup> (12) = 589.400***				

Source: Analysis based on GLSS Data from Ghana Statistical Service (GSS), 2018, *Ghana Living Standard Survey 7: (2016–2017)*, Ghana Statistical Service, Accra  
GLSS, Ghana Living Standards Survey.

\*\*\* is significance at 1% level.

significant at the 1% level, suggesting that there is a significant association between the type of trade credit activity and the agricultural marketing channels used by farmer household heads.

### Farming systems, crop enterprises and crops sales value

The farmers practise monocropping as well as mixed cropping. However, most farmers (58.6%) practise mixed cropping as opposed to monocropping (41.4%) (Table 5). Mixed cropping is a sustainable land management (SLM) practice as it improves the soil, enables farmers to maximise the use of their land and helps farmers to diversify their crop enterprises. The mean crop sales value in nominal terms is small, about GHS981.43 (see Table 5). This perhaps tells the story of why most farming households in Ghana, particularly smallholder farmers, fall under the 'low-income' household brackets.

The various crops cultivated by farmers in the sample are classified into seven groups as shown in Table 6. Cereal crops such as maize, rice, millet, and sorghum are by far the most cultivated crops in Ghana, as 48.1% of the farmers cultivate them. This is not surprising, as cereals form the core of Ghanaian diets and serve as feed for animals, particularly poultry. In recent times, sorghum has assumed importance as an industrial crop for the brewery industry. Leguminous crops (beans or peas and groundnuts or peanuts) are the second most cultivated crops in Ghana, with 19.6% of farmers cultivating them. Tree and fruit crops and root and tuber crops occupy the third and fourth positions, respectively, as the most cultivated crops in Ghana. The root and tuber crops stated by farmers include cassava, cocoyam, potatoes, sweet potato, yam and tiger nuts. The tree and fruit crops mentioned include avocado pear, bananas, limes, lemons, mangos, oranges, tangerines, pawpaw, pineapples, plantain, watermelon, coconut, cola nut, oil palm, rubber, cocoa and coffee.

**TABLE 5:** Farming system and crops sales value.

Variable	Obs	Mean	Standard Deviation	Min	Max
Farming system	18.652	0.4142719	0.4926091	0	1
Crops sales value (GHS)	18.647	981.4309	3524.108	0	213.750

Source: Analysis based on GLSS Data from Ghana Statistical Service (GSS), 2018, *Ghana living standard survey 7: (2016–2017)*, Ghana Statistical Service, Accra  
GLSS, Ghana Living Standards Survey.

**TABLE 6:** Classification of crop enterprises.

Crop category	Frequency	Percent frequency
1. Cereal crops	8967	48.07
2. Leguminous crops	3650	19.57
3. Tree and fruit crops	2444	13.10
4. Roots and tuber crops	2330	12.49
5. Vegetable crops	1037	5.56
6. Grass crops (sugarcane)	38	0.20
7. Other crops	187	1.00
<b>Total</b>	<b>18 653</b>	<b>100.00</b>

Source: Analysis based on GLSS Data from Ghana Statistical Service (GSS), 2018, *Ghana living standard survey 7: (2016–2017)*, Ghana Statistical Service, Accra  
GLSS, Ghana Living Standards Survey.

## Determinants of agricultural trade credit use

Table 7 presented the results of the multinomial logistic regression. The base (reference) category relative to which the determinants of advance payment and trade credit receivable are interpreted is the no trade credit category (cash sales). The Wald chi-square statistic, 14964.90, is significant at the 1% level, indicating the regression model is well fitted. The marginal effects (dy/dx) and their corresponding robust standard errors (SE) are reported in the Table. The MNL model must meet the independence of irrelevant alternatives (IIA) assumption. The IIA assumption states that ‘characteristics of one particular choice alternative do not impact the relative probabilities of choosing other alternatives’ (Vijverberg 2011:1). In this study, the Hausman Test (HM Test), which is the most frequently used IIA test (Vijverberg 2011), was employed. The null hypothesis (H0) is usually stated as odds (outcome-J vs. outcome-K) are independent of other alternatives. This means that in deciding between any two of the three types of trade credit,

information about the remaining type of trade credit has no impact in the choice. The test results (see Table A1) show that the IIA has not been violated, and hence the estimated model has met the asymptotic assumptions of the MNL model.

The variables significantly associated with advance payment relative to cash sales (no trade credit) are household size, monocropping farming system, preharvest marketing channel and being located in the Upper East region. The results suggest that an increase in household size by one reduces the probability of receipt of advance payment by 0.6% (1% level). Engaging in a mono-cropping farming system increases the probability of receiving advance payment by about 0.6% (5% level). Relative to sales of farm produce directly to consumers, the probability of receiving advance payment is 4.2% (1% level) higher for farmers who hold preharvest sales contracts. Compared to farmers located in the Greater Accra region, farmers located in the Upper East region are 16.8% less likely to receive advance payment.

**TABLE 7:** Determinants of agricultural trade credit use: Multinomial logit results.

Variables	Advance payment		Trade credit receivable	
	dy/dx	Robust S.E.	dy/dx	Standard Error
Sex of HH	-0.0056	0.0036	0.0164	0.0106
Log of age of HH	0.0001	0.0001	0.0005**	0.0003
Log of household size	-0.0062***	0.0021	0.0043	0.0060
Marital status of HH	-0.0000	0.0031	-0.0481***	0.0088
Literacy	0.0037	0.0030	0.0160*	0.0092
Farming system (monocropping)	0.0058**	0.0028	-0.0113	0.0082
Log of crops sales value	-0.0006	0.0012	0.0355***	0.0030
Nationality	0.0063	0.0138	0.0587*	0.0341
MKCFgate	0.0021	0.0056	0.0668***	0.0160
MKCTrader	-0.0008	0.0043	0.0262*	0.0137
MKCSO	-0.0082	0.0083	0.0734***	0.0189
MKCCoop	0.0071	0.0080	0.1445***	0.0224
MKCPreharv	0.0415***	0.0060	0.1347***	0.0234
MKCOther	0.0035	0.0104	0.1483***	0.0293
Cereal crops	0.0045	0.0153	-0.1084***	0.0330
Leguminous crops	0.0022	0.0153	-0.1113***	0.0336
Tree and fruit crops	0.0019	0.0157	-0.1856***	0.0350
Root and tuber crops	0.0068	0.0154	-0.0754**	0.0335
Vegetable crops	-0.0043	0.0164	-0.0486	0.0345
Grass crops	0.0257	0.0178	-0.0225	0.0675
Urban location	-0.0060	0.0041	0.0353***	0.0103
Central region	-0.0122	0.0110	0.0455	0.0321
Volta region	-0.0029	0.0109	-0.0153	0.0319
Eastern region	-0.0083	0.0110	0.1089***	0.0311
Ashanti region	-0.0034	0.0113	-0.0063	0.0327
Brong-Ahafo region	-0.0060	0.0109	-0.0105	0.0318
Northern region	-0.0096	0.0113	-0.1337***	0.0334
Upper East region	-0.1684***	0.0190	-0.0059	0.0339
Upper West region	-0.0122	0.0115	-0.0943***	0.0338
Western region	-0.0078	0.0117	-0.0416	0.0341
Constant	-3.865**	1.971	-4.028***	0.6023
Wald chi-square	14964.90***	-	-	-
Log pseudolikelihood	-3370.7057	-	-	-
Pseudo R <sup>2</sup>	0.1383	-	-	-
Observations	8.204	-	-	-

Source: Analysis based on GLSS Data from Ghana Statistical Service (GSS), 2018, *Ghana living standard survey 7: (2016–2017)*, Ghana Statistical Service, Accra

\*, \*\*, and \*\*\* is significance at 10%, 5% and 1% level, respectively.

GLSS, Ghana Living Standards Survey; HH, household.

With regard to sales of farm produce on credit terms to buyers (trade credit receivable) relative to cash sales (no trade credit), age of household head, marital status of household head, literacy, total crops sales value, national origin, marketing channels, type of crops, urban location and regions (Eastern region, Upper East region and Upper West region) are significant explanatory factors. Age is significant and positively related to the supply of trade credit, meaning that as farmers advance in age, the probability of supplying trade credit will increase. An increase in farmers’ age by one will lead to an increase in the probability of supplying trade credit by 0.1%. Farmers who are married are 4.8% less likely to supply trade credit to their buyers downstream relative to farmers who are single, divorced or separated, widowed and cohabiting. Being literate is marginally significant (10% level) in explaining the extension of trade credit; that is, it increases the probability of extension of trade credit by 1.6%. The results show that the probability of farmers supplying trade credit increases with the total sales value of their produce. Farmers with higher crops sales value are 3.6% more likely to sell their farm produce to buyers downstream on credit terms. The national origin of farmers is also marginally significant (10% level) in explaining the extension of trade credit to buyers. Relative to farmers of non-Ghanaian origin, farmers of Ghanaian origin are about 5.9% more likely to sell their farm produce on credit terms to buyers.

Relative to sales of farm produce directly to consumers, farmers who sell their farm produce through the farmgate, market traders (middlemen), state trading organisation, cooperative, preharvest contract and other marketing channels significantly increases the probability of supplying trade credit by 6.7%, 2.6% (10% level), 7.3%, 14.5%, 13.5% and 14.8%, respectively. The probability of farmers selling on credit decreases by 10.8%, 11.1%, 18.6% and 7.5% for cereal crops, leguminous crops, tree and fruit crops and root and tuber crops, respectively, relative to crops in the ‘other’ category (e.g. wood lot, tobacco, cotton, kenaf). Farmers who

are in urban areas in Ghana are 3.5% more likely to sell their farm produce on credit terms, relative to their counterparts located in rural areas. Finally, relative to farmers in Greater Accra region, farmers in Eastern region are 10.9% more likely to sell on credit while farmers in Northern region and Upper West region are 13.4% and 9.4%, respectively, less likely to sell on credit terms.

## Discussion

Ghana's agriculture is characterised by smallholder production; about 80% of the farmers are smallholder farmers (Essegbey & Maccarthy 2020). The results of this study confirm that Ghana's agriculture is indeed largely a rural phenomenon. Among smallholder farmers in Ghana, selling agricultural produce on a cash basis is most predominant, as opposed to credit sales (trade credit receivable). In addition, advance payment for primary agricultural produce is very low. The results suggest that, overall, the two categories of credit studied in this article are very low among smallholder farmers in Ghana. This is consistent with the findings elsewhere, in which the agricultural sector offers less trade credit relative to other sectors (e.g. Cuevas et al. 1993; Emery 1984; Fafchamps 2000; Fafchamps et al. 1995). If the agricultural products offered for sale are in small quantities at a time, the probability of sales on trade credit terms may diminish. If the farmers are pushed to sell farm produce to meet a personal or household urgent need and hence require immediate cash, they will not sell on credit terms. In general, because agricultural commodities are perishable, they are more likely to be sold on a cash basis as opposed to a credit basis (e.g. Cuevas et al. 1993; Long et al. 1993).

Smallholder farmers use various channels to market their produce, including sales through preharvest contracts, farmgate, market traders, consumers, state trading organisations and agricultural cooperatives. However, the dominant marketing channel is the market trader (middleman), and most trade credit activity is associated with this marketing channel. Most of the consumers of agricultural goods are located outside the agricultural producing areas, and the market traders (middlemen) serve as a link between consumers or firms and producers by moving into the farming areas to aggregate and bring the farm produce to the major markets for sale.

The results show that agricultural trade credit activity, whether advance payment or sales of good on credit (trade credit receivable), is driven by a multiplicity of factors and not a single factor. The finding that holding a preharvest production and sales contract increases the probability of receiving advance payment is consistent with the findings of Dary (2018) in the informal sector in Ghana. In the study, holding supply or production contracts was significantly associated with the receipt of trade credit from buyers.

Mateut (2014), Mateut and Zanchettin (2013) and Baker (1970) have underscored the importance of advance payment

in incentivising production of certain goods and reducing seller uncertainty. Other factors driving the receipt of advance payment are as follows: (1) smaller farming households, suggesting small resource holdings or resource-constrained farming households, increase the demand for agricultural prefinancing, and (2) engagement in a monocropping farming system, suggesting specialisation in agricultural production and increase in the scale of production of crops, which may increase the willingness of potential buyers to prefinance production for a guaranteed supply of the farm produce. Studies have shown that access to credit in general increases the technical efficiency of farming and therefore farm productivity (Missiame, Nyikal & Irungu 2021; Nkegbe 2018).

In terms of sales of agricultural produce on credit terms (trade credit receivable), experienced, married, literate and higher sales output agricultural producers are more willing to market their agricultural produce on trade credit terms. According to Elliehausen and Wolken (1993), firms with large volumes of inventories may offer more trade credit. In terms of nationality, it is not also surprising that Ghanaian farmers are more likely to sell on trade credit terms relative to non-Ghanaian farmers. This is because Ghanaian farmers may be more familiar with the buyers and can determine their creditworthiness ex-ante and/or can easily enforce the purchase contracts, ex-post. Among Tanzanian rice traders, Hermes et al. (2015) found that frequent interaction between suppliers and buyers and ethnicity exert positive influence on trade credit supply, as they help to reduce information asymmetry. Farmers located in urban areas have a higher probability of selling their agricultural produce on credit, suggesting that competition may be higher in urban markets, leading to the offering of trade credit as a competitive strategy or marketing tool. Also, in instances of payment default, contract enforcement mechanisms may be more available to farmers in urban areas than in rural areas.

A limitation to the study is that not all categories of trade credit could be examined due to data limitations. The study could not examine trade credit from input suppliers to farmers (trade credit payable), which is the situation where farmers obtain agricultural inputs from input suppliers upstream, and payments are deferred to a later date. This was not captured in the GLSS 7 dataset but could be an important source of credit for farming (see e.g. Pearce 2003; Quartey et al. 2012), especially among smallholder farmers in developing countries. Future studies on agricultural trade credit in smallholder farmer settings should address this limitation.

## Conclusion and practical implications

This study was motivated by the limited empirical evidence of trade credit activity in the primary agricultural sector that may inform policy and practice. The study used household agricultural data from the GLSS 7 in the analysis. On the



extent of trade credit involvement in smallholder production, the study concludes that the marketing of agricultural produce in smallholder farmer settings is largely on a cash sales basis, because they produce and sell in small quantities to meet their immediate cash needs. It will only be meaningful to sell on trade credit terms if large quantities of the farm produce are involved and the farmer has proximity with the buyer, and interactions are frequent to enable monitoring and enforcement of contracts. Therefore, the involvement of smallholder farmers in Ghana in trade credit activity as either recipient of trade credit (advance payment) from buyers downstream or grantors of trade credit (trade credit receivable) to buyers downstream is highly limited. This is largely due to the noncommercial nature of many smallholder producers. That is, smallholder production is still at the subsistence level to a larger extent. Trade credit activity is expected to increase in the primary agricultural production sector if production is commercialised. Commercial production will enable farmers to enjoy the benefits of trade credit.

On factors that influence the receipt and extension of trade credit among smallholder primary producers, the study revealed that there is a multiplicity of factors involved, from the farmer or household characteristics to farming characteristics and location characteristics. There is variation in the factors that affect the advance payment type of trade credit and the factors that affect trade credit extension (trade credit supply) in smallholder production. Farmers are more likely to receive trade credit which can mitigate their credit constraint if they enter preharvest contracts with buyers and specialise in producing certain crops as against mixed cropping. Specialisation in production can enable farmers to commit more land and resources to produce a single crop and produce quantities that may meet the demands of large buyers who may have the financial resources to make advance payment. Trade credit, particularly input credit and advance payment, can help primary agricultural producers to mitigate their production credit constraints. However, a well-functioning agribusiness environment that will lower the risks associated with trade credit activity is very crucial.

## Acknowledgements

The author acknowledges Prof. Paul K. Nkegbe for his valuable input on testing for the independence of irrelevant alternatives (IIA) assumption.

## Competing interests

The author declares that he has no financial or personal relationship(s) that may have inappropriately influenced him in writing this article.

## Author's contributions

The entire content of the article is the work of the author.

## Funding information

The author received no financial support for the research, authorship and/or publication of this article.

## Data availability

The data that support the findings of this study are available on request from the Ghana Statistical Service.

## Disclaimer

The views expressed in the submitted article are those of the author and not an official position of the institution.

## References

- Alarcón, S., 2011, 'The trade credit in the Spanish agro-food industry', *Mediterranean Journal of Economics, Agriculture and Environment (New medit)* 10(2), 51–57.
- Baker, C.B., 1970, 'Agricultural trade credit', *Illinois Agricultural Economics* 10(2), 11–14. <https://doi.org/10.2307/1348846>
- Brennan, M., Maksimovic, V. & Zechner, J., 1988, 'Vendor financing', *Journal of Finance* 43(5), 1127–1141. <https://doi.org/10.1111/j.1540-6261.1988.tb03960.x>
- Brick, I.E. & Fung, W.K., 1984, 'The effect of taxes on the trade credit decision', *Financial Management* 13(2), 24–30. <https://doi.org/10.2307/3665443>
- Criswell, J.W., 2014, *Research design: Qualitative, quantitative and mixed methods approaches*, 4th edn., Sage, Thousand Oaks, California.
- Cuevas, C.E., Fafchamps, M., Hanson, R.J., Moll, P.G. & Srivastava, P., 1993, *Case studies of enterprise finance in Ghana*, no. 56875, pp. 1–124, The World Bank, Washington, DC.
- Daripa, A. & Nilsen, J., 2011, 'Ensuring sales: A theory of inter-firm credit', *American Economic Journal: Microeconomics* 3(1), 245–279. <https://doi.org/10.1257/mic.3.1.245>
- Dary, S.K., 2018, 'Access to trade credit by informal firms in Ghana: Does locating in industrial cluster and holding production/supply contract matter?', *Ghana Journal of Development Studies* 15(2), 141–167.
- Dary, S.K. & James, H.S. Jr., 2018, 'Trade credit supply in African agro-food manufacturing industry: Determinants and motives', *Agricultural Finance Review* 78(3), 312–329. <https://doi.org/10.1108/AFR-03-2017-0017>
- Dary, S.K. & James, H.S. Jr., 2019, 'Does investment in trade credit matter for profitability? Evidence from publicly listed agro-food firms', *Research in International Business and Finance* 47, 237–250. <https://doi.org/10.1016/j.ribaf.2018.07.012>
- Elliehausen, G. & Wolken, J., 1993, 'An empirical investigation into motives for demand for trade credit', Staff Studies 165, Board of Governors of the Federal Reserve System, Washington, DC.
- Emery, G.W., 1984, 'A pure financial explanation for trade credit', *Journal of Financial and Quantitative Analysis* 19(3), 271–285. <https://doi.org/10.2307/2331090>
- Essegbey, G.O. & Maccarthy, D.S., 2020, *Situational analysis study for the agriculture sector in Ghana*, viewed 16 February 2022, from [https://agnes-africa.org/wp-content/uploads/2020/09/Situational-Analysis-of-the-Agriculture-Sector-in-Ghana\\_July-2020\\_Final.pdf](https://agnes-africa.org/wp-content/uploads/2020/09/Situational-Analysis-of-the-Agriculture-Sector-in-Ghana_July-2020_Final.pdf).
- Fafchamps, M., 2000, 'Ethnicity and credit in African manufacturing', *Journal of Development Economics* 61(1), 205–235. [https://doi.org/10.1016/S0304-3878\(99\)00068-1](https://doi.org/10.1016/S0304-3878(99)00068-1)
- Fafchamps, M., Pender, J. & Robinson, E., 1995, *Enterprise finance in Zimbabwe*, RPED case study series, The World Bank, Washington, DC.
- Ferris, J.S., 1981, 'A transactions theory of trade credit use', *The Quarterly Journal of Economics* 96(2), 243–270. <https://doi.org/10.2307/1882390>
- Ghana Statistical Service (GSS), 2018, *Ghana living standard survey 7: (2016–2017)*, Ghana Statistical Service, Accra.
- Hermes, N., Kihanga, E., Lensink, R. & Lutz, C., 2015, 'The determinants of trade credit use: The case of the Tanzanian rice market', *Applied Economics* 47(30), 3164–3174. <https://doi.org/10.1080/00036846.2015.1013607>
- Kihanga, E., Lensink, R., Lutz, C. & Hermes, N., 2010, *Determinants of trade credit demand and supply in the Tanzanian rice market: A structural modelling approach*, viewed 18 April 2021, from <https://ssrn.com/abstract=1674842>
- Long, M.S., Malitz, I.B. & Ravid, A., 1993, 'Trade credit, quality guarantees, and product Marketability', *Financial Management* 22(4), 117–127. <https://doi.org/10.2307/3665582>
- Mateut, S., 2014, 'Reverse trade credit or default risk? Explaining the use of prepayments by Firms', *Journal of Corporate Finance* 29, 303–326. <https://doi.org/10.1016/j.jcorpfin.2014.09.009>
- Mateut, S. & Zanchettin, P., 2013, 'Credit sales and advance payments: Substitutes or complements?', *Economics Letters* 118(1), 173–176. <https://doi.org/10.1016/j.econlet.2012.10.020>



- McKee, G., Jacobs, K.L. & Kagan, A., 2020, 'Trade credit use in agricultural cooperatives: Pricing and firm performance', *Journal of Cooperatives* 35, 74–101.
- Missiame, A., Nyikal, R.A. & Irungu, P., 2021, 'What is the impact of rural bank credit access on the technical efficiency of smallholder cassava farmers in Ghana? An endogenous switching regression analysis', *Heliyon* 7(5), e07102. <https://doi.org/10.1016/j.heliyon.2021.e07102>
- Nadiri, M.I., 1969, 'The determinants of trade credit in the US total manufacturing sector', *Econometrica: Journal of the Econometric Society* 37(3), 408–423. <https://doi.org/10.2307/1912790>
- Nguyen, L.T.U., 2012, 'Trade credit in the rice market of the Mekong delta in Vietnam', PhD dissertation, University of Groningen.
- Nkegbe, P.K., 2018, 'Credit access and technical efficiency of smallholder farmers in Northern Ghana: Double bootstrap DEA approach', *Agricultural Finance Review* 78(5), 626–639. <https://doi.org/10.1108/AFR-03-2018-0018>
- Pearce, D., 2003, 'Buyer and supplier credit to farmers: Do donors have a role to play?', *Rural finance innovation case study*, Consultative Group to Assist the Poor (CGAP), Washington, DC.
- Poole, N., Seini, A.W. & Heh, V., 2003, 'Improving agri-food marketing in developing economies: Contractual vegetable markets in Ghana', *Development in Practice* 13(5), 551–557. <https://doi.org/10.1080/0961452032000166483>
- Quartey, P., Udry, C., Al-Hassan, S. & Seshie, H., 2012, *Agricultural financing and credit constraints: The Role of Middlemen in Marketing and Credit Outcomes in Ghana*, International Growth Center Agricultural Marketing Project, Institute of Statistical, Social and Economic Research, University of Ghana, Accra.
- Schwartz, R.A., 1974, 'An economic model of trade credit', *Journal of Financial and Quantitative Analysis* 9(4), 643–657. <https://doi.org/10.2307/2329765>
- Smith, J.K., 1987, 'Trade credit and informational asymmetry', *The Journal of Finance* 42(4), 863–872. <https://doi.org/10.1111/j.1540-6261.1987.tb03916.x>
- Smith, L.E., Stockbridge, M. & Lohano, H.R., 1999, 'Facilitating the provision of farm credit: The role of interlocking transactions between traders and Zamindars in crop marketing systems in Sindh', *World Development* 27(2), 403–418. [https://doi.org/10.1016/S0305-750X\(98\)00140-5](https://doi.org/10.1016/S0305-750X(98)00140-5)
- Vijverberg, W., 2011, *Testing for IIA with the Hausman-McFadden Test*, Discussion paper no. 5826, Institute for the Study of Labor (IZA), Bonn, Germany.

Appendix starts on the next page →

## Appendix 1

**TABLE A1:** Hausman tests of independence of irrelevant alternatives assumption.

Number	chi <sup>2</sup>	df	<i>p</i> > chi <sup>2</sup>
1	-3.905	30	-
2	13.788	13	0.389
3	1.655	5	0.895

Source: Analysis based on GLSS Data from Ghana Statistical Service (GSS), 2018, *Ghana living standard survey 7: (2016–2017)*, Ghana Statistical Service, Accra  
GLSS, Ghana Living Standards Survey.