

University of Groningen

Trade credit in the Tanzanian rice market

Kihanga, E.P.

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version

Publisher's PDF, also known as Version of record

Publication date:

2010

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Kihanga, E. P. (2010). *Trade credit in the Tanzanian rice market*. [Thesis fully internal (DIV), University of Groningen]. University of Groningen, SOM research school.

Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

Chapter 5

Determinants of Trade Credit Period

5.1 Introduction

In our discussion of the determinants of trade credit in chapter 3, we focused on the amount of trade credit. In this chapter we extend the discussion of trade credit issues by focusing on the determinants of the trade credit period. By trade credit period we mean the length of time (measured in days) after the delivery date before a customer has to pay for the goods. Trade credit period is an important issue concerning cash management as it has a significant impact on the firm's cash flow (see Walker and Petty II, 1986). A longer trade credit period reflects the length of time that the capital (finance) provided by the supplier remains with the buyer before it is returned to the supplier. To that effect, a longer trade credit period may enable retailers to properly match the expected inflow and outflow of cash. Conversely, a longer trade credit period may negatively affect a supplier's cash flow. In particular, a longer trade credit period may tie up the supplier's capital and thus reduce the firm's profitability. As such, the length of the trade credit period is something which firms have to consider with respect to trade credit transactions.

One of the pressing issues with regards to the trade credit period is that it varies widely among customers, even for customers of the same supplier (Iglesias et al., 2007; and Wilson, 2008). The variation in the length of trade credit periods raises the question why do trade credit periods differ?.

There are very few studies that focus on factors that determine the

credit period. Few studies that have directly or indirectly investigated the determinants of trade credit period include Paul and Boden (2008), and Wilson and Summers (2002) for UK firms; Giannetti et al. (2008) for US firms; Ge and Qui (2007) for Chinese firms; Iglesias et al. (2007) for Spanish firms; and Fafchamps (1997 and 2000) for Zimbabwean manufacturing firms. Most studies on the trade credit period focus on the firms in developed countries and in countries that have characteristics that are similar to those of developed countries – except Fafchamps (1997). Apparently, at present there is no study that investigates the determinants of trade credit period in Tanzania.

Wilson (2008) and Iglesias et al. (2007) have already argued that credit periods vary across industries and countries. Kirkman (1979) in Borde and McCarty (1998) for example, provided evidence that the average trade credit period in the US is shorter (30 days) than in the UK (45 days). The variation in the length of credit periods among the customers in Tanzania is especially evident in the rice market. For example, the result in chapter 2 made it clear that while some retailers in the rice markets get credit for a period of less than seven days, other retailers get 20 days.

This chapter aims to provide two contributions to the existing literature: (i) first, this chapter aims to provides an empirical evidence of the factors which determine the variation in the length of trade credit among the customers in the context of Tanzania. (ii) second, this thesis contributes by combining the individual firm characteristics factors that reflect the bargaining power of selling and buying firms in a one model. The literature argues that, trade credit period may be influenced by the firms characteristics relating to the bargaining power of selling firm (e.g. Walker and Petty II, 1986) and or buying firms (e.g. Giannetti et al., 2008, Paulo and Borden, 2008). Yet previous studies have not considered

the possibility of combining these factors in a one model due to lack of information from one of the parties involved in the trade transaction.

The remainder of this chapter is organized as follows. Section 5.2 provides a brief discussion on the types of credit terms in general. This section discusses also the type of credit terms that is used in the Tanzanian rice market in particular. Next, section 5.3 provides an overview of the literature on the determinants of credit periods. The analysis in this section gives an overview of the factors that are likely to cause the variations of trade credit periods. Section 5.4 explains the methodology and the variables used in the analysis. Section 5.5 presents an econometric framework and the estimation technique; in this section, the empirical model is specified. In section 5.6 the results are presented and discussed. In section 5.7 we compare the determinants of trade credit use and trade credit period. Our comparison is focused on the significant variables from each model. The aim of this comparison is to understand whether the same variables that influence the amount of trade credit use also influence the length of trade credit period. Finally, section 5.8 presents the conclusions and recommendations for future research.

5.2 Types of Credit Terms and Variations

There are two main types of credit terms¹⁶ under which trade credit can be given (Ng et al., 1999; Walker and Petty II, 1986; and Pike et al., 2005). One type is called net credit term or net period. Net period refers to the trade credit period given to the customer *without* a discount (Wilson, 2008). In this type of credit period, a buyer is required to pay for the goods delivered within the agreed date (e.g. 30 days after delivery). A debt which is not paid within that agreed date is known as an overdue debt, and the debtor might be charged interest on the amount due

Another type of credit term involves the credit period *with* discount. In this case a buyer obtains a certain discount on the total bill if he/she pays before or on the due date (Ng et al., 1999; Pike et al., 2005). Credit period with discount can be quoted like this: “2/10, net 30 days” – which means that a discount of 2 per cent of the total bill will be given if a buyer pays within ten days. On the other hand, if a buyer pays after the discount period (he/she pays within 30 days but after ten days), no discount is given. In this case, a buyer pays the full amount of the debt and incurs the cost of using trade credit for the period beyond the discount date. If the buyer in this example does not pay within the discount period of ten days, he/she incurs the cost of using trade credit for 20 days (30 minus 10 days). Although a credit period with discount may lead to quicker debt collection, many suppliers do not offer it to the customers. Bowlin et al. (1990) argue that a cash discount has negative effects on the profit margin of the selling firms because it is a price reduction.

In the rice markets of Tanzania, the common type of credit period which customers get from their suppliers is a credit period without discount. In this market there is wide variation of the length of the credit period among the customers. Table 5.1 presents the trade credit periods that have been observed among customers (retailers) in the Tanzanian rice markets

¹⁶ Credit terms refer to the period after which a payment must be made.

Table 5-1: A summary of trade credit periods (in days) by rice retailers

Credit duration	Number of retailers	Percentage
1-5	3	1.27
6-10	90	37.97
11-15	125	52.74
16-20	19	8.02
Total	237	100

Source: Survey 2008

As can be seen from Table 5.1, the largest proportion of retailers (52.74%) gets credit periods of 11 to 15 days. Some retailers (37.97%) get trade credit period of 6 to 10 days. The smallest proportion of retailers (1.27%) gets of 1 to 5 credit periods. The longest credit period in the rice market is 20 days.

5.3 Determinants of Credit Period: An Overview of the Literature

In this section, we turn our focus to the factors that are likely to influence the length of the trade credit period. In general, Fafchamps (1997) argues that the variation in credit periods reflects differences in the supplier's own circumstances as well as differences among the customers. More specific, the business characteristics of the buyer (Giannetti et al., 2008) and seller (Walker and Petty II, 1986) which reflect the bargaining power¹⁷ may explain the length of the trade credit period. Moreover, the trade credit period is said to depend on: the volume of transactions (Arnold, 2002; and Walker and Petty II, 1986); ethnicity (Fafchamps, 2000); the length of the relationship of the trading partners (Iglesias et al.,

¹⁷ Bargaining power refers to the ability of one party to a transaction to influence the terms and conditions of that transaction in its favour (Argyres and Liebeskind, 1999). In most cases the more powerful firms may force another party of the transaction to accept the terms (Kumar et al., 1995)

2007); product characteristics (Wilson, 2008; Paul and Boden, 2008); whether a transaction is domestic or export (Wilson, 2008; Neale and Schmidt, 1991); and the frequency of transaction (Wilson and Summers, 2002; Summers and Wilson, 2003). In the following subsections we explain each factor in turn.

5.3.1 Business characteristics of the buyer

Several studies point to the relationship between the buyer's firm size and the trade credit period. They suggest that the length of the trade credit period depends on the size of the buying firm. Paul and Boden (2008), Fafchamps (1997), and Giannetti et al. (2008) associate the size of the buying firms with bargaining power. They argue that due to their size, large firms may have bargaining power over their suppliers to influence the credit period. Large firms have adequate financial resources; they can buy from other suppliers if a supplier refuses to give them a longer trade credit period. If these customers leave, the supplier's sales may drop substantially. Consequently, the supplier may be forced to offer a longer credit period in order to continue the business relationship with these customers (Paul and Wilson, 2007). Fafchamps (1997 and 2000) has provided empirical work that supports this hypothesis. He found that large firms get longer credit period from their suppliers.

Trade credit period can also be influenced by the age of the buying firm (Giannetti et al., 2008). In many studies firm age is used to explain the extent to which it is reputable and experienced in trade. Older firms are argued to be more experienced and are thought to be less likely to default or delay payments. Therefore, suppliers prefer to maintain the business relationship and provide these firms with longer trade credit periods (e.g. Wilson and Summers, 2002). In a similar vein, it can be argued that younger firms are less experienced and may have more

difficulty selling their products on the retail markets and repaying the debts on the agreed date. Knowing that younger buying firms may not pay on the agreed credit period, suppliers will strategically give them a shorter credit period in order to put pressure on the buyers to pay within the agreed period or with a minimum delay. Walker and Petty II (1986) argue that firms that often pay a little late will get a shorter trade credit period from their suppliers.

Empirical findings on the effect of age on the trade credit period provide us with mixed results. For example, empirical findings by Ge and Qui (2007) show that the age of the buyer is positively and significantly related to the length of the trade credit period. However, the findings of Fafchamps (1997 and 2000) reveal that the age of the buying firm is negatively related to the trade credit period.

5.3.2 Business characteristics of the supplier

The literature stresses the importance of taking into account the financial status of the selling firm when investigating the determinants of the credit period. Walker and Petty II (1986), for example, argue that the financial position of the supplier should be considered because it has an important impact on the length of the credit period a customer is allowed. Some studies have used the size of the business (firm size) to reflect on the financial condition as well as the bargaining power. Although it makes sense to believe that small firms have less financial resources and therefore are expected to offer a shorter trade credit period, some authors (e.g. Wilson, 2008) argue that when trading with large buyers small businesses may be required to extend longer trade credit periods. Large buying firms provide potential for a long-term relationship and large orders in the future (Paul, 2008). Such characteristics may encourage the selling firms to concede to the buying firm's request and grant them a

longer credit period. Pike et al. (2005) and Fafchamps (1997) also found that smaller firms sometimes provide a longer trade credit period to their customers.

With regards to the effect of firm age, it is argued that younger selling firms may be dependent on retailers for the distribution of their product, as those firms have little experience on the market (see also Iglesias et al., 2007). These firms will need to allow for longer trade credit periods because customers buying from such firms, especially large and well-established customers, will use their bargaining power and negotiate a longer credit period (Wilson and Summers, 2002; and Iglesias et al., 2007).

While younger firms may be forced to grant a longer trade credit period, older selling firms are more likely to give a shorter trade credit period to their customers. Older selling firms are experienced in the market; have larger bargaining power over younger buyers; they have many cash customers and may have less difficulty selling the goods. These firms are less dependent on the trade credit customers. Consequently, they can use their bargaining power to offer the goods for a shorter trade credit period to the customers taking trade credit. Similarly, since older selling firms have many customers and are experienced in the wholesale rice market, they can sell their goods quickly and replenish the stock more often. As they have to replenish their stock more often, the timing of cash flows becomes more important. If a selling firm expects to pay its own bills sooner, it is likely that it will give a shorter credit period in order to match the expected receipts and outflows (Walker and Petty II, 1986). This argument sounds more plausible for wholesalers who do not get trade credit from their principal suppliers. Empirical findings by Pike et al. (2005) reveal that the firm age of the seller is negatively related to the trade credit period.

5.3.3 Volume of purchases

Several other studies have discussed the importance of the volume of transactions to the duration of trade credit. Walker and Petty II (1986) argue that if a buyer purchases small quantities, he/she will get shorter trade credit periods. The idea is that the buyer pays back the debt from his/her own sales earnings. For this reason, suppliers assume that customers buying small quantities will be able to sell the goods within a shorter period and pay the debt. Giving a shorter credit period for small quantities may also be one of the ways to discourage them to buy small quantities (see also Tu et al., 2008).

On the other hand, a longer trade credit period is important in case the customer's volume of purchase is large (Neale and Schmidt, 1991). A large quantity will take a longer time to be sold and for the buyer to repay the debt (Arnold, 2002).

5.3.4 Frequency of Transaction

The frequency of purchase refers to the number of times a buyer places orders per given period. Frequent purchases may lead to shorter credit periods if buyers are selling their goods more quickly (Summers and Wilson, 2003). In contrast to this, Giannetti et al. (2008) observe that longer trade credit periods are given to more frequent purchasers. There is no clear explanation in the literature why frequent purchases are related to longer trade credit periods. Intuitively, one could explain this result: if frequent purchasers are allowed to accumulate invoices, then a frequency of transaction would be positively related to a longer trade credit period.

5.3.5 Ethnicity

Ethnicity has long been considered as an important factor in facilitating business transactions and fostering reciprocal help among the community. Ogawa (2005) argues that the "...urban informal sector tends to be made

up of closed groups of relatives, people of the same origin and ethnic groups, and that these group members give reciprocal help in their urban livelihood and in doing business cooperatively”. According to Zerfu et al. (2008) and Silverman and Case (2001), members of an ethnic group support group members simply because they belong to the same ethnic group. Tsuruta (2003) and Omari (1987), for example, found that people of the same tribe residing in cities of Tanzania tend to form networks based on a shared ethnicity with the intention to help each other. When people of the same ethnic origin develop a close relationship with each other, trust is easily created (Fukuyama, 1995; Cornell and Welch, 1996). An ethnicity network may be an important factor to influence the length of credit periods among customers. Fafchamps (2000), for example, examined the impact of ethnicity and found that black Africans in Zimbabwe are granted shorter credit periods. He classified owner/managers as Black Africans, Asians, or Europeans. Ethnicity prevails also among the Africans themselves. Sociologists, for example, have noted that African entrepreneurs prefer to do business with members of their own ethnic group (e.g. Macharia, 1988; Himbara, 1994).

Looking at how ethnicity influences the length of the trade credit period is relevant for Tanzania. Tanzania is one of the countries in Africa with a large number of tribes. Statistical evidence shows that in the country there are about 120 ethnic groups with different vernacular languages (Omari, 1987). Of the total population, 99 per cent are indigenous Africans, and 1 per cent are Asians and Europeans.

In line with the aforementioned literature, we argue that urban ethnicity is an important factor that influences the length of the trade credit period. Customers from the same tribe as their suppliers are likely to get a longer credit period because these customers are seen as more trustworthy. We focus on urban ethnicity because different ethnicity

networks are found in cities.

5.3.6 Length of relationship

The trade credit period may also depend on the length of the relationship between a supplier and a buyer (Iglesias et al., 2007). The length of a relationship may be an important factor in controlling the opportunistic behavior of the buyer. In the early stages of the relationship, a shorter trade credit period may be offered (Fafchamps, 2000) if a supplier decides to give a trade credit to a customer. However, when the relationship has lasted for some time, the uncertainty concerning the customer will be lower. Therefore, a retailer may get a longer trade credit period. In the study by Fafchamps (1997) for Zimbabwe, customers mentioned the importance of the length of their relationship with suppliers in getting a long trade credit period. In particular, it was stressed that a buyer having a longer relationship with a certain supplier will get a longer trade credit period.

5.3.7 Product characteristics

The length of the trade credit period will also depend on the characteristics of the product sold (Wilson, 2007). For example, Paul (2008) argues that if the quality is difficult to inspect at the moment of purchasing the buyer may be given a longer credit period in order to be able to inspect the quality. It is also argued that firms that sell differentiated products will give their customers a longer trade credit period. Giannetti et al. (2008) found that the majority of the firms in their sample buying differentiated goods mainly have a payment period of more than ten days.

5.3.8 Whether the transaction is local or internationally

In some literature (Walker and Petty II, 1986; Neale and Schmidt, 1991; and Wilson, 2008) it is stressed that the length of the trade credit period

depends on whether the transaction is domestic or international. In particular, it is argued that a longer trade credit period is given for exports than for domestic sales (Wilson, 2008; Wilson and Summers, 2002) as export transactions requires many formalities. Both shipment and clearing procedures may take a long time. These authors further argue that the length of the trade credit period for export may vary according to the country of destination

5.4 Description of the Methodology and Variables

In this section, we present the methodology and variables we use in the model. The methodology used to obtain the data for this chapter is similar to the methodology described in chapters 3 and 4. We started our data collection by conducting a pilot study. After conducting the pilot study, we carried out a survey in the Tanzanian rice markets from January to August 2008.

In this chapter, trade credit period (*Tcperiod*) is the dependent variable. We measure the trade credit period by the number of days a customer is given by his/her specific supplier to repay the debt after the goods are delivered. Next to the measure of the dependent variable, we measure the variables that affect the trade credit period (i.e. explanatory variables). Some explanatory variables relate to firm characteristics of the buyer (retailer). Firm size and age are used as a proxy of the firm characteristics. The size of the firms (*Lfsizer*) is measured by the log of the value of total assets. We expect a positive relationship between *Lfsizer* and the credit period. The age of the buying firms (*Lfager*) is measured by the number of years a firm has been in existence. We expect a positive relationship with the credit period.

Characteristics of the selling firm are also included as explanatory

variables of trade credit duration. It is argued that the trade credit period may depend on the size and age of the selling firm. We measure the firm size of the supplier as the log of the value of the total assets (*Lfsizew*). A positive relationship between the firm size of the seller and the trade credit period is expected. We measure the firm age (*Lfagew*) of the seller by the log of years that the firm has been in business. The firm age of the seller is expected to be negatively related with the trade credit period.

Having measured the variables that proxy the characteristics of buying and selling firms, we measure other variables that have been explained in the literature as being important in explaining trade credit period. One of these variables is related to the volume of transaction. We measure the volume of transaction by the natural log of the volume of purchase per order (*Lvopu*). A positive relationship between *Lvopu* and the trade credit period is expected. A frequency of transaction is also included as one of the predictors of the trade credit period. We measure the frequency of transaction (*Fpu*) by the number of times a retailer buys from a specific wholesaler per month. A negative relationship is expected between the frequency of transaction and the trade credit period. Another variable we include in the model is ethnicity. We measure the variable ethnicity (*Ethn*) by asking whether the buyer and supplier belong to the same tribe. We expect a positive relationship between ethnicity and the length of trade credit period. The length of relationship between the trading partners is also a predictor of the credit period. The length of relationship (*Lrelatn*) indicates the extent to which trading partners know each other. We measure the variable by the number of years a retailer has been a customer of the supplier. Finally, we control for some variables that have a significant effect on trade credit use in chapter 3. In particular, we control for the variable *Cswitch*, which is a proxy for the existence of competition; *Fasizer* and *Mstar* which are used to proxy for the financial

requirements of the buying firm. We include those variables to control for the fact that they also may influence the duration of trade credit customers may obtain from their suppliers.

While we acknowledge the existence of some other factors that may affect a length of trade credit period, our data set does not provide such information. For example, a product characteristic is not included in the analysis because we only have one type of product (i.e. rice). Finally, we do not include the variable that relates to whether the sale is domestic or for exports, because we only have information on domestic transactions. Table 5.2 provides the summary of all variables we included in the analysis.

Table 5-2: Definition of Variables used in the chapter

Variable	Definition
<i>Tcperiod</i>	Length of trade credit period for goods purchased on credit
<i>Tc</i>	Dummy (0/1) = 1 if retailer gets trade credit from a supplier
<i>Ethn</i>	Dummy (0/1) = 1 if a retailer and a wholesaler belongs to the same tribe
<i>Lvopu</i>	Natural log for order quantity (volume of purchases)
<i>Lfsizer</i>	Natural log of total assets of retail business
<i>Fpu</i>	Number of times a retailer purchase from a wholesaler per month
<i>Lfager</i>	Natural log of firm age for retail business
<i>Lfsizew</i>	Natural log of total assets of wholesale business
<i>Lfagew</i>	Natural log of firm age for wholesale business
<i>Fasizer</i>	Number of persons in the retailer's family
<i>Lrelatin</i>	Number of years a retailer has been a customer of a wholesaler
<i>Cswitch</i>	1 if a wholesaler perceives that a customer will switch if trade credit is not given
<i>Mstar</i>	Dummy (0/1) = 1 if retailer is married and 0 otherwise
<i>Female</i>	Dummy (0/1) = 1 if retailer is female and 0 otherwise
<i>Nsup</i>	Number of suppliers from which a retailer obtain rice

5.5 Econometric Framework and Estimation Technique

Having discussed and defined the variables, we turn our attention to the econometric framework and estimation techniques we use in this chapter. In our model, trade credit period (*Tcperiod*) is observed only if a customer has received trade credit (*Tc*). In this case, there is a potential sample selection problem that needs to be taken into account. For this reason, we use Heckman's two-step estimation model to estimate the determinants of trade credit period. Heckman's two-stage estimation procedure is used because it allows for the sample selection for the firms that actually receive trade credit and it corrects the sample selection bias problem (Heckman, 1979).

Heckman's two-stage estimation procedure involves two equations: a selection equation and an outcome equation. The selection equation (model) in this chapter relates to the probability that a retailer has received trade credit. Thus, a retailer has received trade credit if $Tc = 1$; he/she has not been granted trade credit if $Tc = 0$. The selection equation is specified as follows:

$$\left\{ \begin{array}{l} Tc_i^* = \chi_i' \alpha + \varepsilon_i \\ Tc_i = 0, \text{ if } Tc_i^* \leq 0; \\ Tc_i = 1, \text{ if } Tc_i^* > 0 \end{array} \right\} \text{ Selection equation} \quad (5.1)$$

Where: Tc = Retailer has received trade credit or not; χ = explanatory variables, α = coefficient; ε_i = error terms and $i = 1 \dots N$, where N is a number of firms retained in the sample

The outcome equation in our analysis concerns the length of the trade credit period. In econometric terms, the outcome equation is specified as follows:

$$\left\{ \begin{array}{l} Tcperiod_j^* = \lambda_i' \beta + \mu_i, \text{ if } Tc_i = 1 \\ Tcperiod_j \text{ not observed if } Tc_i = 0 \end{array} \right\} \quad \text{Outcome equation} \quad (5.2)$$

Where: *Tcperiod* = the number of days given to repay the goods purchased on credit; β = vector of parameter estimates for the independent variables; λ = vector of independent variables; $i = 1 \dots N$, where N is the number of firms retained in the sample and μ_i is the error terms

Model (5.1) represents the first stage equation for which the dependent variable (*Tc*) is dichotomous. The variable *Tc* in this model determines whether or not *Tcperiod* is observed. *Tcperiod* is observed only if $Tc = 1$. In the Heckman two-step estimation procedures, the selection equation is estimated first. This equation is estimated in order to estimate the probability that a given retailer has received trade credit from a supplier in the last transaction. Thus, we estimate a Probit model with independent variables χ , coefficient α , and an error term ε . The estimation of the first-stage equation generates the vector inverse mills ratio from parameter estimates (Cameron et al., 2009), which is used as an instrument in the second equation. The explanatory variables (χ) for the selection equation are: *Lvopu*, *Ethn*; *Lfsizer*; *Laccsr*; *Fpu*; *Lrelatn*; *Nsup*; *Female*; *Lfager*; *Fasizer*; and *Mstar*. These variables have been used in the first stage equation because are argued to have an influence on the trade credit demand. The measures of these variables are also presented in table 5.2.

Model (5.2) represents the second-stage equation (outcome equation). In the second step, we model the expected value of the trade credit period

(*Tcperiod*), given that *Tcperiod* is observed. Thus, for values of $T_c = 1$, we observe *Tcperiod*. To estimate the model, *Tcperiod* is regressed on the explanatory variables λ and the vector of inverse mills ratios from the selection equation. By using the variables mentioned in table 5.2, we specify the full model for *Tcperiod* as follows:

$$Tcperiod_j^* = \alpha + \beta_1 Ethn + \beta_2 Lvopu + \beta_3 Lfsizer + \beta_4 Lfager + \beta_5 Lfagew + \beta_6 Fpu \\ \beta_7 Lfsizew + \beta_8 cswitch + \beta_9 Mstar + \beta_{10} Fasizer + \beta_{11} Lrelatn + \mu_i \quad (5.3)$$

5.6 Estimation Results

This section presents estimation results for the determinants of the length of the trade credit period. Heckman-two stage estimation procedure has been applied. The results of the second stage estimation are presented in table 5.3. Moreover, the results of the first stage estimation are presented in table 5.4 (the included variables are derived from the analysis presented in chapter 3). We start by testing whether the sample selection bias exists by computing the inverse mills ratio. The null hypothesis of the test is that there is no selection bias (Christofides et al. 2003): thus, $E[\mu_2 / \mu_1] = 0$. As can be seen from the Table 5.3, the coefficient for the inverse mills ratio is significant, confirming the existence of a sample selection bias and the relevance of applying the Heckman two-stage estimation procedure. Since the coefficient of Mills lambda (i.e. inverse mills ratio) is the product of Rho and Sigma (Cameron et al., 2009), the existence or absence of a sample selection bias can also be confirmed by observing the correlation coefficient between the error terms in both outcome and selection equations (Rho), and the standard error of the residual of the outcome equation (Sigma = σ). As can be seen from Table 5.3, the value for both Rho and sigma (σ) are quite large, confirming the

presence of selection bias and the appropriateness of the Heckman two-stage selection model.

**Table 5-3: Heckman two stage regression: Second stage
(Dependent variable = Tcperiod)**

Indep. Var	[1]	[2]	[3]	[4]
<i>Ethn</i>	0.093 (0.004) ***	0.085 (0.008) ***	0.071 (0.018) **	0.069 (0.022) **
<i>Lvopu</i>	0.365 (0.001) ***	0.368 (0.001) ***	0.353 (0.001) ***	0.340 (0.001) ***
<i>Lfsizer</i>	-0.068 (0.105)	-0.069 (0.093) *	-0.047 (0.227)	
<i>Lfager</i>	0.145 (0.015) **	0.101 (0.027) **	0.102 (0.025) **	0.082 (0.050) **
<i>Fpu</i>	-0.041 (0.284)	-1.020 (0.308)	-0.041 (0.284)	
<i>Lfsizew</i>	0.010 (0.771)			
<i>Lfagew</i>	-0.111 (0.015) **	-0.112 (0.006) ***	-0.116 (0.004) ***	-0.114 (0.005) ***
<i>Mstar</i>	0.006 (0.879)			
<i>Lrelatn</i>	-0.013 (0.348)	-0.860 (0.390)		
<i>Cswitch</i>	-0.082 (0.106)	-0.075 (0.133)	-0.074 (0.144)	
<i>Fasizer</i>	-0.006 (0.434)			
<i>Constant</i>	0.971 (0.142)	1.012 (0.040) **	1.111 (0.026) **	0.261 (0.187)
<i>Mill -Lambda</i>	0.161 (0.079) *	0.202 (0.013) **	0.185 (0.028) **	0.109 (0.080) *
<i>Wald Chi2 (19)</i>	211.82			
<i>Prob</i>	0.000			
<i>Wald Chi2 (9)</i>		180.93		
<i>Prob</i>		0.000		
<i>Wald Chi2 (7)</i>			180.44	
<i>Prob</i>			0.000	
<i>Wald Chi2 (5)</i>				159.64
<i>Prob</i>				0.000
<i>Rho</i>	0.695	0.842	0.775	0.472
<i>Sigma (σ)</i>	0.232	0.240	0.239	0.230
<i>No. Obs</i>	271	272	274	274

Legend: *p*-values of the estimates between the parentheses; *, **, *** imply significant level at 10%, 5% and 1% respectively.

The estimation results for the trade credit period in Table 5.3 show that only four variables are significant. First, retailers belonging to the same tribe as their suppliers obtain a longer trade credit period. This finding confirms the hypothesis that customers belonging to the same ethnicity as

their suppliers are more likely to get a longer trade credit period. This result also confirms the importance of the urban ethnicity network in Tanzania.

Second, large volume of purchase is also an important factor in getting a longer trade credit period. The coefficient of the variable *Lvopu* is positive and significant related to trade credit period. A large volume of stock may take a longer time to complete selling. Since most retailers pay their debts from the earnings of sales, retailers buying in large quantity get a longer trade credit period in order to allow them to sell the goods and repay the debt after they have completed selling.

Third, we find evidence for the fact that the length of trade credit period is influenced by the retailer's experience in the retail market (i.e. age of the retail firms). Especially older retail firms obtain a longer trade credit period from their suppliers. Experienced buyers have a lower risk of defaulting. Consequently, most suppliers prefer to have them as customers. Knowing that suppliers prefer to have them as customers, they use their bargaining power to obtain a longer credit period. This result supports the bargaining power hypothesis of the customer. It is also consistent with the empirical literature (e.g. Ge and Qui, 2007), which found a positive and significant relationship between firm age and the trade credit period.

Finally, we find evidence for the fact that the credit period depends on the age of the selling firm. The variable firm age of the supplier (*Lfagew*) is negative and significant, implying that older wholesale firms offer shorter trade credit periods to their customers. Consistent with the bargaining power theory, this result suggests that older selling firms have stronger a bargaining power over younger buyers which makes them to shorten the length of the trade credit period. Another explanation for this observation may be that, due to their experience in the market, older

wholesale firms are likely to sell their stock faster. Consequently, they give a shorter trade credit period in order to get the money from their debtors and pay for the purchases of new stock. This argument can also be supported by the findings in chapter 2 that rice wholesalers do not get trade credit from their principal suppliers. This means that cash generated from the sale of rice is important to finance the purchase of new stock

Table 5-4: First Stage Heckman Selection Model (Dependent Variable=TC)

Indep Var	[1]	[2]	[3]	[4]
<i>Lvopu</i>	0.382	0.475	0.501	0.501
	(0.145)	(0.064) *	(0.047) *	(0.047) **
<i>Lfsizer</i>	-1.469	-1.394	-1.397	-1.397
	(0.001) ***	(0.001) ***	(0.001) ***	(0.001) ***
<i>Lfager</i>	0.024			
	(0.953)			
<i>Nsup</i>	0.333	0.348	0.345	0.345
	(0.017) **	(0.014) **	(0.014) **	(0.014) **
<i>Ethn</i>	0.315	0.210		
	(0.245)	(0.411)		
<i>Fpu</i>	1.044	1.027	0.970	0.970
	(0.001) ***	(0.001) ***	(0.001) ***	(0.001) ***
<i>Mstar</i>	-0.005			
	(0.989)			
<i>Lrelatn</i>	0.162	0.160	0.162	0.162
	(0.111)	(0.073) *	(0.061) *	(0.061) *
<i>Female</i>	-0.476	-0.416		
	(0.136)	(0.175)		
<i>Fasizer</i>	0.096			
	(0.116)			
<i>Laccsr</i>	0.192			
	(0.745)			
Constant	14.748	13.594	13.582	13.576
	(0.001) ***	(0.001) ***	(0.001) ***	(0.001) ***
No. Obs	271	272	274	274

Legend: p-values of the estimates between the parentheses; *, **, *** imply significant level at 10%, 5% and 1% respectively

5.7 Comparison of Determinants of Trade Credit use and Duration

In this section we compare the results for the determinants of trade credit use in chapter 3 to the determinants of the trade credit period. We do so by comparing the significant variables from each estimation model. We aim at examining whether the same variables, which have a significant influence on the amount of trade credit use, also have a significant influence on the length of the trade credit period. As can be seen from the table 5.5, there are few variables that affect both the amount of the trade credit and the length of the trade credit period. In general, we find that only three (3) variables out of eight (8) variables have significant effect on the amount of the trade credit use and also on the length of the trade credit period.

In particular, the volume of transactions is positively and significantly related to both trade credit use and duration. This implies that firms buying in large quantities get a large amount of trade credit and longer trade credit periods. In addition to this observation, the table shows that firm age of the wholesaler (*Lfagew*) has a significant influence on both the amount of trade credit provision and the length of the trade credit period. In particular, older selling firms give less trade credit to their customers and for a shorter period. Furthermore, we observe that the effect of ethnicity is significant to both the amount of trade credit use and the trade credit period, confirming that retailers buying from the suppliers belonging to their own tribe obtain large amount of trade credit and for a longer trade credit period.

With regards to other variables, table 5.5 shows that they do not influence both amount of trade credit and the length of the trade credit period. However, we find similarities with regard to the signs of these variables used in both two models except for the variable *Fasizer*

Table 5-5: Comparisons of the results

Variables	Determinants of trade credit use		Determinants of trade credit period	
	Significant	Sign	Significant	Sign
<i>Lvopu</i>	s	+	s	+
<i>Lrelatin</i>	s	+	n/s	-
<i>Fpu</i>	s	+	n/s	-
<i>Ethin</i>	s	+	s	+
<i>Cswitch</i>	s	+	n/s	-
<i>Lfagew</i>	s	-	s	-
<i>Lfager</i>	n/s	+	s	+
<i>Mstar</i>	s	-	n/s	-
<i>Fasizer</i>	s	+	n/s	-
<i>Lfsizer</i>	s	-	n/s	-

Note. The results presented in this table for the determinants of the trade credit use are taken from the reduced form estimations technique. Moreover, the results for the determinants of trade credit duration are taken from Hickman estimation technique. The letter *s* implies that the variable is significant and *n/s* means the variable is not significant.

5.8 Conclusions

In this chapter we have analyzed the determinants of the trade credit period. Our main objective has been to identify the factors that lead to variations in the length of the trade credit periods. ‘Trade credit period’ in this study has been defined as the time a buyer is given to pay the bill after the goods have been delivered. The Heckman two-step estimations reveal the factors that determine the length of the trade credit period. Four main factors have been found. First, retailers (buyers) are granted a longer trade credit period if they belong to the same tribe as their suppliers. For Tanzania, with a large diversity of ethnic groups this outcome was expected, particularly in cities where ethnic networks prevail.

Second, empirical evidence also shows that retailers who buy in large quantities get a longer trade credit period. Since most retailers are financially constrained, they depend on the earnings they get from the sale of rice to pay back trade credit. Thus, retailers who buy in large quantities get a longer trade credit period, as selling such large quantities takes a longer time.

Third, trade credit period in the Tanzanian rice market is also influenced by the experience in the rice trade of both selling and buying firms. The experience in the trade is reflected by the age of the firms. As shown in the empirical evidence, older buying firms obtain a longer credit period than younger firms. The experience in the rice trade gives older buying firms a stronger reputation and more bargaining power, which lead to them obtaining a longer trade credit period from their suppliers.

Finally, older selling firms offer a shorter trade credit period. This suggests the bargaining power of older sellers over the younger buyers. Older selling firms have more experience in the wholesale market and are well-known by many customers. Their experience in the trade makes them sell their goods faster, enabling them to replenish the stock more often. Consequently, they give a shorter trade credit period in order to get the money within the short period and to pay for the purchase of new stock.

In general, our results suggest that a retailer would get a longer trade credit period if he/she increases the size of purchase; he/she is a member of the ethnic network in which his/her supplier belongs and if he/she is well reputable and has long experience in the rice retail trade

