The Determinants of Trade Credit: Evidence from Nigeria

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Abstract

Trade credit is an important component of corporate finance in many countries. This paper empirically investigates the determinants of trade credit in the Nigerian context. The empirical evidence presented suggests that the affect of institutional loans on demand for trade credit is much stronger indicating that firms are credit constrained and hence switch to trade credit financing. The econometric analysis showed that high level of operating income, retained earnings, depreciation provision gives the firms a strong leverage hence would not switch on to trade credit financing.

1 Introduction

Amount and terms of trade credit demand vary substantially across firms and industries and a substantial body empirical research exists that attempts to explain this variation [1](Vaidya, 2011)**.** In the face of the global economic downturn coupled with the myriads of monetary and banking reforms embarked upon by the regulatory authorities which has resulted into tightened monetary and fiscal policies, study has revealed the importance of trade credit as an alternative source of short-term financing for firms. Trade credit can reveal how larger firms with better and easier access to capital and financial markets help out smaller and weaker firms by providing them with short-term working capital in form of supplier credit. In addition, trade credit also show how larger firms can remain in business by creating channels through which their products can be sold instead of experiencing build-up of unsold inventories.

The important role of trade credit has been generally recognized as an important component of corporate finance in many countries. Rajan and Zingales [2](1995) report

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that trade credit accounted for 17.8% of total assets of American firms in the early part of 1990s. Kohler, Britton and Yates [3](2000) report that in the U.K. 70% of total short term debt extended to firms and 55% of total short term credit received by firms was in the form of trade credit. Deloof and Jegers [4](1999) report that in 1995accounts receivable formed 16% of total assets and accounts payable formed 12% of total liabilities of Belgian non financial firms. Data from the Reserve Bank of India shows that accounts receivable accounted for 10.86% and accounts payable accounted for 11.59% of total assets/liabilities respectively in 2008 for a sample of large public limited companies. The comparable figure of short term bank credit was 10.75%. In most advanced countries accounts receivables can be easily collateralized. This makes it possible for firms to obtain additional bank credit against their accounts receivables. Consequently, a firm providing trade credit does not necessarily have to reduce its investment in other avenues. Unfortunately, inspite of the relevance of trade credit, no systematic empirical evidence on the determinants of trade credit in Nigeria is available. This paper makes a small beginning in that direction. We do not deal with the issue of terms and conditions of trade credit due to lack of information in this regard in the Nigeria context. We estimate a model similar to [7] to study the determinants of trade credit in Nigeria.

This objective is set out to investigate the rate at which Nigerian firms switch from other sources of finance to trade credit as an alternative form of finance. The model seeks to determine the link between credit constraints and trade credit demand. Since previous studies [5](Antov, 2005) in testing for the effects of credit constraints, firms were separated into groups on the basis of a single indicator that may not be a good proxy for credit quality and access to institutional finance. The problem with the use of a single indicator is that it prevents researcher from controlling for the many factors that influence firm's borrowing ability.

 Another weakness of these studies is that the regime to which a firm belongs is determined exogenously.   Because of the restrictive nature of this approach, this study follow the studies (Petersen and Rajan, 1995[6]; Deloof and Jegers, 1999[4]) on the credit market disequilibria that measure the impact of credit constraints directly, hence an endogenous Switching Regression Model that allows the data analysis to derive the probability that a firm faces credit constraints directly from the distribution of the firm's financial strength is applied.

2 Methodology

The study employed secondary data from annual financial statements of the sample listed companies in the Nigerian Stock Exchange, Central Bank of Nigeria, Nigerian Deposit and Insurance Corporation and Security and Exchange Commission. A total number of eighty three (83) non financial firms were purposively sampled for the study. However, sample firms without complete or reasonable amount of information to enhance the robustness of the analysis and findings were dropped. Data collected were analyzed using switching regression model.

2.1 The Switching Function Model of Trade Credit

Since it is difficult to determine *a priori* when a firm will require supplier financing, therefore, the probability of a firm operating in a particular financial regime (constrained or unconstrained) can be determined by a switching regression function which is defined as a function of variables that the theory suggests influence the imperfect substitutability between internal and external sources of finance. It is a function of a firm's financial variables and other characteristics that proxy for the severity of information and agency problems, and the overall macro environment. In the model, the probability of whether a firm is facing a high constraint on external finance is endogenously determined. Hence, the model captures the dynamic effects of a firm's financing decisions. By estimating the switching regression it will be possible to test directly the effect of different factors on the firm likelihood of facing a high constraint. Following the model conceptualized by [7]Atanasova (2007 the Switching Model of Trade Credit was adopted.

The Switching Model of Trade Credit (SMTC) represents a credit constrained firm *i*'s notional demand and supply curves for institutional loans at time *t* by:

$$L^D (r_t, Z_{it}, U_{1,it}) \text{ and } L^S (r_t, Z_{it}, U_{1,it}) \text{ respectively.}$$

Thus;

Notional Demand for Institutional loan by firm *i* at time *t* is given by

$$L^D (r_t, Z_{it}, U_{1,it}) \tag{1}$$

While;
Notional Supply for Institutional loan by firm *i* at time *t* is given by equation

$$L^S (r_t, Z_{it}, U_{2,it}) \tag{2}$$

Where;
L^D =Quantity of loan demanded
L^S =Quantity of loan supplied
r_t=denote the market rate of interest
Z_i,=is a vector of observable firm characteristics that determine the demand and supply of loans for firm *i* at time *t*,

$U_{1,it}$ and $U_{2,it}$ =are variables that represent the unobservable characteristics for the same firm in the same time period.

In the event of a firm having excess demand for loans at time *t*, this will be represented by the equation:

$$L^*_{it} = L^D (r_t, Z_{it}, U_{1,it}) - L^S (r_t, Z_{it}, U_{2,it}) \tag{3}$$

The excess demand quantity L^*_{it} is not observable, hence as indicator variable L_{it} is defined as:

$$L_{it} \quad = \quad \begin{cases} 1 & \text{if } L^*_{it} > 0 \\ \\ 0 & \text{if otherwise} \end{cases} \tag{4}$$

Where there is probability of excess demand for loans, then what are the determinants i.e. $P_r(L^*_{it} > 0)$

Then it is assumed that credit availability will be a function of the firm's characteristics, and that for firm i at time t, excess demand quantity can be expressed as:

$$L^*_{it} = \grave{Z}_{it}\gamma + U_{3,it} \tag{5}$$

Where γ = a parameter vector to be estimated
$U_{3,it}$ = the innovation term that captures unobservable qualities of firm borrowers.
Then:

$$P_r(L^*_{it} > 0) = P_r(\grave{Z}_{it}\gamma + U_{3,it} > 0) \tag{6}$$

If $U_{3,it}$ is Gaussian with mean zero and variance one, this formulation leads to a standard probit model.
For the unconstrained firms, the quantity of bank credit received is $L_{it} = 0$, but for the constrained firms, the maximum credit granted is L^S_{it} since $L^D_{it} > L^S_{it}$.
Further, the quantity of trade credits obtained by the constrained and unconstrained firms is denoted by TC^c_{it} and TC^u_{it} respectively.

Where; TC^c_{it} = Trade credit obtained by constrained firm i at time t.
          TC^u_{it} = Trade credit obtained by unconstrained firm i at time t.

In general, for firm i at time t, the expected level of trade credit was represented by the equation:

$$E(TC^u_{it}|L^D_{it} = 0) = X'_{it}\beta^u + \delta^u L^s_{it} + E(\varepsilon_{1,it}|L^D_{it} = 0) \tag{7}$$
$$\text{or}$$
$$E(TC^c_{it}|L^D_{it} = 1) = X'_{it}\beta^c + \delta^c L^s_{it} + E(\varepsilon_{2,it}|L^D_{it} = 1) \tag{8}$$

Where:
E = Expected level of trade credit;
X_{it} = is a vector that includes the two types of firms observable heterogeneity of variables that determine the level of trade credit.(One is a group of firm-specific characteristics; the other is a group of variables specific to particular credit supplier practices common to firms in the same industry).

$\varepsilon_{1,it}$ and $\varepsilon_{2,it}$ = Firm's unobservable characteristics that affect the level of trade credit used. When credit constraints are binding, trade credit is a substitute to conventional institutional loans. It is expected that the amount of trade credit used by the constrained firms will decrease with the amount of short-term institutional loans received; i. e.

δ^c = Amount of credit used by the constrained firm;

$\delta^c < 0$ = the amount of trade credit used by the constrained firms will decrease with the amount of short-term institutional loans received; and

$\delta^u \geq 0$ = there should be no substitution effect for the unconstrained firms; and where trade credit complements conventional loans, then it is expected that $\delta^c > 0$ and $\delta^u > 0$.

In the switching function, the vector Z_{it} includes a sort of variables that are indicators of other sources of finance available to a firm. These include Institutional loan (INST. LOAN), Equity (EQT.), Operating Income (OPRT INCM), Retained Earnings (RET. EARN), Differed Tax Liability (DEF. TAX)

3 Results and Discussion

3.1 Descriptive Analysis of Determinants of Trade Credit Usage

The result from Table 4.1 indicates that the mean of trade credit measured by accounts payable is sufficiently large at an average of 30.84. This indicates high rate/level of trade credit usage by the sample firms under study. The maximum value of trade credit experienced by the firms is 64.00 while the minimum value of trade credit experienced by the firms is zero (0). The mean of operating expenses (0.15) is relatively low when compared to that of trade credit (30.84). This implies that retained earnings are expected to be higher with a maximum value of operating expenses incurred by the firm amount to a high value/percentage of 1.93.

With respect to sales value (turnover), this financial parameter appears to be a significant determinant of access to trade credit. The size of the co-efficient suggests that the volume of sales is very important in the firm's ability to pay on account and able to enjoy continual access to supplier credit. A mean value of 1.27 is obtained. The high mean of the sales value indicates high retained earnings for the firms. The maximum for the firms under study is 10.99. Similarly from the table, the results show a strong correlation between turnover and volume of trade creditors. The higher the value of sales (Turnover), the more profit and the more the demand for goods supplied on credit. This is a positive relation.

Furthermore, firms borrow more from their suppliers when raw materials are frequently replaced. Thus, firms with higher turnover of inventory of raw materials, enjoy more supplier credit. In order words, when there is rising sales, it is expected that trade credit will rise. This obviously explains a major part of the level of accounts payable, and importantly whenever sales fall, it predicts that accounts payable falls. Since firms that frequently replace their inventories face higher transaction costs of paying bills, as firm purchases more supplies, more trade credit allows higher cost savings. This is the basis for a direct relation between trade credit and the amount of firm's transactions. This finding suggests that buyers centralize payments and use the extended commercial debt to bridge the era between purchase and payment.

The mean value of inventory which represents reasonably liquid assets of the firms is 0.3468. This is relatively low and indicate that trade credit is less secured since a low value of firm's inventory when turned to cash may not be adequate to meet repayment terms. Inventory of the firms under study has a maximum value of 3.93.

Retained Earnings has a mean value of 1.03 implying low demand for credit because the firms presumably would have enough internal funds as working capital. A maximum value of 29.29 is obtained for the firms under study.   If a firm holds large amount of internal generated revenue, then trade credit becomes unattractive. This will be consistent with the pecking order theory, which expects a firm to first use internal equity to finance before moving to debt and external financing.   Thus the level of cash generation significantly and negatively affects trade credit demand. Firms that experienced low internal funds, increase their reliance on commercial debt like trade credit.   Firms with high level of internal generated funds rely more on this and less on external financing like trade credit.

The mean value of current assets is relatively high at 0.84. This finding indicates that firms would be able to meet payment periods of trade credit and take advantage of cheaper cost of fund due to cash discount benefits. The disparity in current asset ranged from 9.63 (maximum value) for some firms to a minimum of 0.90 for some others. The higher the value of current assets, the more will the suppliers be willing to grant trade credit since the current assets can be easily converted to cash for prompt settlement of suppliers bills. Also, since trade credit financing simplifies payment for their firms, they can combine deliveries into a single period invoice as well as assist their suppliers to offload their excess inventories. This finding supports and confirms the transaction motive theory and working capital management tool of trade credit. The transaction cost motive theory postulates that trade credit can be used to reduce transactions costs of paying bills as firms may accumulate payment for supplies to the end of month or quarter and hence use trade credit to bridge the period between purchase and payment. This motive is particularly important for firms with high raw materials turnover rates. Also with seasonality in purchase and sales, firms may use trade credit to facilitate their cash management as stocks held and debtors are important items of working capital of a firm.

High current assets value is also a signal to the firm's creditworthiness. Higher value has a positive relation with trade credit enjoyed as suppliers will be willing to finance by constantly extending trade supplies to them

Tangible assets have a mean value 6.37, implying that credit suppliers will be willing to extend credit to the firms. The disparity in tangible asset ranged from 124.42 maximum value for some firms to as low as 4.678 (minimum value) for others. Expectedly, tangible fixed assets may reduce the reliance on trade credit. A negative relation is expected since firms with assets that can be easily pledged as collateral and will likely find it easier to raise reasonably priced bank finance. This is consistent with other empirical findings on the importance of collateral to the availability of debt finance as in [8] Huyghebaert (2006) who found an insignificant relationship between the possession of tangible fixed assets by firms and the use of trade credit. Thus, firms whose assets are highly tangible find it easier to access bank credit, which could reduce their demand for trade credit financing. However, firms where investments in intangible assets are important, they use trade credit more extensively.

The firm size (total assets) also experienced huge growth of up to 21.06 and low growth of 11.58. Firm size growth rate is expected to be positively related to accounts payable. Therefore, the larger mean value of firm size could serve as an incentive to demand for trade credit by firms since the current component of it could easily be converted to cash.

The amount of institutional loan enjoyed by sample firms during the study period (2000-2009) is abysmally low. The mean value of which is 0.27. This finding supports the earlier hypothesis that most corporate firms in Nigeria are credit constrained by

conventional credit market hence their resort to external trade credit (inter-firm) financing. This is also confirmed by the high mean value of 30.84 for all firm's usage of trade credit financing in the table above.

The standard deviation which measures the level of variation or degree of dispersion of the variables from their mean indicates that the most volatile (least stable) of the explanatory variables is tangible asset with a standard deviation of 12.41, followed by institutional loan (58.89), retained earnings (3.54), firm size (20.05), current asset (1.10), sales value (1.08) and operating expense (2.22).

Table 4.1: Descriptive Statistics for Variables of Trade Credit (2000-2009)

Variables	Obs	Mean	Std. Deviation	Minimum	Maximum
Acct. Payable	590	30.84238	288.4961	0	6400.44
Operating Exp.	590	0.1530526	0.221505	0.000496	1.929429
Sales Value	590	1.266313	1.0818884	0.0037121	10.99907
Retained Earn.	590	1.029072	3.535103	0.0001725	29.28908
Institut. Loan	590	0.27145	5.888131	4.67e-06	95.48665
Current Asset	590	0.8382671	1.101706	0.898517	9.634341
Inventory	590	0.3468268	0.4435783	0.0016407	3.926455
Tangible Asset	590	6.371828	12.41498	4.67e-06	124.4217
Size	590	15.39443	2.04732	11.58601	21.06977

Source: Data Analysis, 2011

3.2 The Switching Estimation of Trade Credit and Other Sources of Finance

Table 4.2 shows the switching regression results with firm's specific sources of finance. The table presents the estimated parameters (sources) for the switching model. Most notably, the effect of institutional loans on the demand for trade credit is much stronger (1.36) indicating that firms are credit constrained by the conventional financial institutions hence switch to trade credit financing. The implication of this finding is also true of the retained earnings (-0.69) suggesting that firms with very low or weak internal funds may resort to trade credit financing.

The coefficient of equity (EQT) is negative and statistically insignificant at 5% level (-0.13) which may be interpreted to mean that firms mobilize adequate capital through equity, hence unconstrained as far as equity capital is concerned. This implication is justified by the negative coefficient of the parameter (-0.23) under the unconstrained regime.

Operating income (OPRT INC) variable exhibits a positive but weak coefficient (0.04). This suggests that firms generate large amount of profits hence unconstrained by this variable and may not need to seek external trade credit financing. This result is supported by the positive and significantly strong coefficient of 1.099 also confirming the weak coefficient (0.04) in the constrained regime.

Retained earnings (RET. EARN) is the most readily source of finance in the pecking order theory as the fund generated from within the organization is devoid of all financing costs characterized of other sources of external financing. From the switching regression, this parameter demonstrates that most sample firms under study are in the unconstrained regime as depicted by the negative and statistically significant coefficient of -2.36. In line with the earlier theoretical discussion, the estimated coefficient of retained earnings is

significant but negative, (-0.69) implying that the sample firms are not constrained hence they do not require trade credit financing.

In contrast, deferred tax liability has a very low and negative coefficient of -0.098 reflecting that firms are constrained as to this variable. It also exhibits low and positive coefficient under the unconstrained regime. This mixed result confirms that practically, deferred tax liability cannot be tampered with by business organizations as the relevant tax authority could demand for its remittance anytime of the year.

Overall, the results of analysis confirms that high levels of operating income/profitability, retained earnings, depreciation provision gives the firms a strong leverage hence unconstrained and may not need to demand trade credit. On the contrary, when the coefficients of institutional loan and equity are high, they suggest that the firms are constrained as to these variables hence resorts to trade credit financing as substitute to mitigate these constraints.

Table 4.2: Estimation of Switching Regression Model with Firms Sources of Finance

Variables	C Regime	UC Regime
Institution Loan	1.360025*	0.15725
	(0.4000)	(0.755)
Equity	- 0.127251*	-0.2311985*
	(0.0054695)	(0.0457)
Operating Income	- 0.044025	1.09987*
	(0.00546)	(0.55597)
Retained Earnings	-0.6900	-2.3569*
	(0.5335)	(0.7673)
Deferred Tax Liability	-0.097903	0.015228
	(0.3107436)	(0.14017)

Log Likelihood =   -247.8105
Wald Chi 2 (5) =   2.98
C   =   Constrained
UC   =   Unconstrained
Standard Errors in Brackets
*Significant at 5% level

4 Conclusion

On the determinants of trade credit usage among firms, it is found that deferred tax liability, operating expenses, retained earnings, and firm size were all negatively related to trade credit demand, while current assets, tangible assets were positively and significantly related to trade credit financing. However, turnover and institutional loan showed mixed results. High turnover indicates high retained earnings for the firms showing a strong correlation with the volume of trade creditors since the higher the value of sales, the more the profit and the more the demand for goods supplied on credit; hence suppliers value high profitability, as it reduces risk of default. Consequently, a positive relationship between profitability and trade credit ratio is observed. It is also considered as a positive signal for banks, to relax rationing in banks credit. The switching regression

estimation showed that the affect of institutional loans on demand for trade credit is much stronger (1.36) indicating that firms are credit constrained and hence switch to trade credit financing. The econometric analysis showed that high level of operating income, retained earnings, depreciation provision gives the firms a strong leverage hence would not switch on to trade credit financing. On the contrary, the coefficients of institutions loan and equity are high (1.360 and -0.127) suggesting that the firms are constrained as per these sources of financing hence demand for trade credit to mitigate the constraints.

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