“Trade credit in corporate financing in South Africa: evidence from a dynamic panel data analysis”

AUTHORS	Farai Kwenda https://orcid.org/0000-0002-8241-4148 Merle Holden

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Farai Kwenda (South Africa), Merle Holden (South Africa)

Trade credit in corporate financing in South Africa: evidence from a dynamic panel data analysis

Abstract

This paper explores the factors influencing the use of trade credit as a source of finance for companies listed on the JSE Securities Exchange (JSE). The study uses a balanced panel data collected for 92 companies for the period of 2001-2010 and employs the generalized method of moments (GMM) estimation technique in order to control for unobservable heterogeneity and potential endogeneity problems. The evidence obtained from the study suggests that firms have a target level of account payable and that firm internally-generated resources, investment opportunities and short-term financial debt play an important role in the use of trade credit as a short-term source of financing among the listed companies. Finally, the study recommends that firms pay attention to relationships with their suppliers as their supply of goods on credit is an important source of funding.

Keywords: accounts payable, dynamic panel, trade credit, target.
JEL Classification: G30, G32.

Introduction

Trade credit is supposed to be a non-issue in corporate financing, at least under perfect capital conditions (Hill and Satoris, 1992). However, for most non-financial firms, accounts payable (created by trade credit) represent an important source of financing (Deloof and Jegers, 1999; Petersen and Rajan, 1997). This importance differs among countries and is likely to be more pronounced in manufacturing-oriented countries (Khan et al., 2012). According to Van der Wijst and Hol (2002) at the end of 1998, the accounts payable balances of United States (US) firms were about $2.5 trillion and this figure was approximately 25% of the total debt of these firms and was almost equal to 25% of the market capitalization of the New York Stock Exchange (NYSE) in December 1998. Trade credit makes up about 41% and 35% of total debt among medium sized United Kingdom (UK) and US firms respectively and represents more than 50% of short-term debt in both countries (Cunat, 2007).

Two major concerns of finance managers in corporate financing are the accessibility and the cost of finance. The volatile nature of financial markets compounds these challenges for finance managers. Recent developments in financial markets have heightened the importance of access to finance as a very significant area of financial management. Chiou et al. (2006) assert that stringent credit policies, followed by lending institutions since the slowdown of the global economy during the late 1990s, have made it more difficult for companies to access cheap credit. In South Africa, the implementation of the National Credit Act (NCA) in 2007 has tightened access to and extension of credit. The raising of funds in capital markets is increasingly proving to be difficult and costly. These challenges amplify the role of supplier financing as an instrument of short-term external funds because, among other benefits, it is "cost and formalities free" and easily accessible.

South Africa boasts of one of the most developed and extensively-regulated financial services sector in the world. The South African financial system is dominated by commercial banks and their total assets are 120% of the country's gross domestic Product (GDP) (International Monetary Fund, 2008). The combined assets of the big four banks (ABSA, First Rand, Nedbank and Standard), account for 85% of the total bank assets (International Monetary Fund, 2008). Since 1996, bank credit to the private sector as a percentage of GDP has consistently exceeded 100%. Despite the huge amount of bank credit to the private sector, there seems to be heavy dependence on trade credit by big companies in South Africa. Table 1 shows that during the period under review, among the sample firms, trade credit formed 68% and 56% of total current liabilities and total debt respectively and financed half of the current assets and 32% of the total assets held by these firms. Extensive dependence on trade credit is usually associated with firms seeking to overcome financial constraints or the unavailability of credit from financial institutions or challenges presented by a poorly developed financial sector (Fisman and Love, 2003; Petersen and Rajan, 1997; Schwartz, 1974).

There is a dearth in literature on working capital financing in emerging markets (Zapalska et al., 2004). Research into the area of trade credit as a short-term source of finance among listed firms in South Africa is very sparse. A search of the literature on trade credit in South Africa found two studies; (Kohler and Saville, 2011; Olawale and Akinwumi, 2010). Both studies do not deal with determinants of trade credit among South African listed firms. To the best of our knowledge, research

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of this nature has not been carried out in South Africa. In an attempt to add to the growing literature on access to finance in emerging economies, this paper examines the determinants of trade credit as a short-term debt financing instrument in an economy that has both well-developed capital market and financial services sectors. The extensive use of trade credit by listed companies (which are supposedly big firms likely facing few financial constraints) while there is an abundant supply of bank credit in South Africa make this matter worthy investigating.

The main objectives of the paper are two-fold: to establish the importance of trade credit as a source of financing using the determinants of accounts payable and to establish whether firms have a target level of accounts payable.

The rest of the paper is organized as follows. Section 1 briefly reviews the literature on trade credit. Data sources and the sample are described in Section 2. Section 3 reveals the methodology. Section 4 presents and analyzes the principal findings of the study. The conclusion of the study is presented in the final section.

1. Literature review

1.1. Trade credit theories. Lewellen et al. (1980) state that in perfect financial and product markets, trade credit should not exist. Firms would want to sell their goods and services for cash rather than on credit. A number of theories have been propounded as explanations why buyers accept and sellers offer trade credit despite its high costs after factoring implicit costs. These theories fall into five major categories and include: the financing theory (Emery, 1984); the signaling theory (Alphonse et al., 2006), the macroeconomic conditions theory (Schwartz, 1974); the price discrimination theory (Nadiri, 1969); the quality guarantee theory (Smith, 1987; Long et al., 1993) and the transaction costs theory (Ferris, 1981). The validity of these theories is increasingly coming under scrutiny by modern financial management theory because some of these theories seem to have largely been overtaken by technological advancement while others seem to have lost their relevance.

The financing theory is premised on the reasoning that suppliers have advantages over traditional lenders in extending credit. Petersen and Rajan (1997) identified three cost advantages[1] that make suppliers superior to lenders in granting credit to their clients. The financing theory has been criticized on the grounds that, if suppliers have better expertise in assessing the creditworthiness of buyers, why they do not extend credit beyond the value of the goods.

[1] For a full discussion of these advantages see Petersen, M.A. & Rajan, R.G. (1997). Trade credit: theories and evidence, *Review of Financial Studies*, 10, pp. 661-691.

The macroeconomic conditions theory states that trade credit stimulates sales during periods of low demand (Blinder and Maccini, 1991). The validity of this argument is extremely questionable because periods of low demand tend to affect both suppliers and their customers. Economic slowdowns tend to be systemic, affecting both the supplier and customer, making it unreasonable for the customer to increase demand for goods when such customers are struggling to increase their own rate of stock turnover.

The price discrimination theory was put forward by Nadiri (1969) who stated that in highly competitive markets, suppliers compete for customers using fronts other than price. The supplier can charge different customers with different prices. Such tactics are used by firms with significant market power in an industry. Empirical evidence suggests that trade credit practices tend to be similar within an industry; any firm that deviates from industry trade credit norms potentially faces resistance from the market.

1.2. Variables description and hypothesis development. Several internal and external factors influence the use of trade credit as a financing instrument and these factors are discussed below.

1.2.1. Investment in current assets. The matching principle states that firms try to match the maturity of assets with the maturity of liabilities. By matching asset and liability maturities, firms reduce the agency problems between shareholders and bondholders (Myers, 1977). As a result, short-term assets are usually financed with short-term debt like accounts payable, while long-term assets are financed with long-term debt or equity. The more current assets a firm holds, the more the short-term financing required to finance such assets. We created the variable CATA, defined as the ratio of current assets (trade debtors, inventory and cash holdings) to total assets and hypothesize that it is positively related to accounts payable.

1.2.2. Financing costs. Firms substitute trade credit with bank credit and vice-versa. As the cost of borrowing increase it is expected that firms switch to trade credit. We therefore hypothesize that financing costs are positively related to trade credit. Financing cost was calculated as:

$$Financing\ costs = \frac{Financing\ expenses}{Total\ debt - Accounts\ payable}.$$

1.2.3. External sources of finance. Short-term debt and long-term debt, the two main sources of external debt, can be regarded as substitutes to trade credit (Deloof and Jegers, 1999). It is therefore hypothesized that these are inversely related to the trade credit.

1.2.4. Growth opportunities. Firms with more growth opportunities will generally have inadequate internal resources to finance those growth opportunities and would depend a lot more on trade credit (Niskanen and Niskanen, 2006). Sales growth can either be positive or negative, therefore we created variables p_{growth} and n_{growth} to represent positive and negative sales growth respectively. We hypothesize that positive (negative) sales growth results in increase (decrease) demand for trade credit.

1.2.5. Internal resources. Firms with more internally-generated resources are less likely to depend on external finance since external funds are more costly than internal resources. It is hypothesized that operating cashflows (as a proxy for internal resources) is inversely related to trade credit because firms with more internally generated resources may have less reliance on trade credit. Operating cash flows was calculated as profit before interest and tax plus depreciation.

1.2.6. Supply of trade credit. The supply of trade credit influences the amount of trade credit that the firm uses. Large firms normally do not pay their purchases in cash, the annual purchases were used a as a proxy for the supply of trade credit, following previous studies (Niskanen and Niskanen, 2000; Khan et al., 2012; García-Teruel and Martínez-Solano, 2010b). This study used a sample of large JSE-listed firms; therefore the assumption that all purchases are on credit is not very restrictive as large firms generally purchase goods on credit (Khan et al., 2012).

1.2.7. Creditworthiness and access to capital markets. Firm size and age are generally used as proxies for the firm's creditworthiness and access to capital markets (Hill et al., 2010; García-Teruel and Martínez-Solano, 2010a; Akinlo, 2012). Large firms are more creditworthy and therefore can access more trade credit than small firms. However, large firms can attract funds from wider sources; therefore they can depend less on trade credit. Therefore, the direction of influence of this variable is not clear. In this study we used the natural log of market capitalization was used as proxy for size.

1.2.8. Macroeconomic factors. The state of the economy may affect trade credit levels (Smith, 1987). Good economic performance offers a conducive environment for the extension and use of trade credit. During expansion, suppliers may be liberal with credit and firms might also demand more trade credit in order to build up inventory. In an economic slowdown, suppliers may tighten credit extension and firms may demand less trade credit due to low stock turn over. Therefore the direction of influence of macroeconomic conditions on trade credit is not clear.

1.2.9. Market power. Larger firms have significant bargaining power in their relationships with suppliers and can stretch their credit terms with few or no repercussions (Hill et al., 2010). Therefore, a positive relationship between market power and trade credit is hypothesized. Market power was calculated as given below:

$$Market\ power = \frac{Firm's\ annual\ sales}{Total\ industry\ annual\ sales}.$$

2. Sample and data sources

The empirical study is based on a sample of 92 JSE-listed firms. Sample firms' data were collected from the financial statements for the accounting period 2001 to 2010 available on the McGregor BFA Library. In order to produce a balanced panel, firms with missing financial statements were eliminated. Consistent with previous studies, firms in the financial services sector were excluded because the nature of their trade credit is different from the context of this study (Akinlo, 2012).

2.1. Trade credit as a source financing and its contribution to total financing. Table 1 shows the extent to which trade credit is used to finance current assets and total assets. It is evident that trade credit financed at least 49% of the current assets and 32% of total assets held by these firms. Initially trade credit is used to finance current assets trends upward, peaking at 52% in 2003, the follows a downward trend until 2010 with the exception of 2006. The lowest and highest ratios of trade credit to current assets were recorded in 2009 and 2003 respectively. The overall contribution of trade credit to current liabilities and total debt was at least 67% and 53% respectively. The contribution of accounts payable to total short-term financing does not seem to follow a specific pattern over the ten-year period, though it fluctuates between 67% and 72%. The proportion of trade credit to total debt trends downward between 2002 and 2004, stabilizes for three years and resumes the downward trend for most of the remainder of the study period, aside from 2010. These data illustrate the heavy use of accounts payable as a source of finance.

Table 1. Trade credit as a source financing and its contribution to total debt financing

Year	Trade credit/current assets	Trade credit/total assets	Trade credit/current liabilities	Trade credit/total debt
2001	0.5092	0.3183	0.6820	0.5611
2002	0.5180	0.3308	0.6921	0.5746
2003	0.5187	0.3346	0.6778	0.5709

Table 1 (cont.). Trade credit as a source financing and its contribution to total debt financing

Year	Trade credit/current assets	Trade credit/total assets	Trade credit/current liabilities	Trade credit/total debt
2004	0.5160	0.3307	0.6823	0.5666
2005	0.5061	0.3340	0.6857	0.5486
2006	0.5144	0.3274	0.6728	0.5487
2007	0.5024	0.3168	0.6718	0.5487
2008	0.4929	0.3155	0.6699	0.5302
2009	0.4755	0.3009	0.6967	0.5292
2010	0.4852	0.3026	0.7217	0.5540
Overall	0.5038	0.3212	0.6856	0.5554

Source: Own calculations using a balanced panel over the period of 2001 to 2010. Data obtained from the McGregor BFA Library.

2.2. Descriptive statistics. Trade credit to total assets is approximately four times the ratio of short-term debt to total assets and is more than double the ratio of long-term debt to total assets. These figures show that these firms' use of supplier financing is far higher than the other forms of financing; both short-term debt and long-term debt, reflecting the importance of trade credit. The respective averages of long-term and short-term financial debt financing total assets are 13% and 9%. The average market capitalisation and purchases of firms in the sample are R15 billion and R6 billion respectively, which shows that larger firmsmake up the sample. Trade debtors are 29% of total assets and this figure is less than the ratio of trade credit to total assets of 32%, raising the high possibility that these firms are net receivers of trade credit. Current assets are 64% of total assets with a median value of 66%. The average age of the firms used in this study is 45 years (with a median value 40) which means the sample comprises well-established firms that have been in business for a long time.

Table 2. Descriptive statistics

Variable	Description	Mean	Standard deviation	10 percentile	Median	90 percentile
tcta	Trade credit/total assets	0.3212	0.1823	0.1264	0.2862	0.6074
stdta	Short-term debt/total assets	0.0904	0.1104	0.0003	0.0596	.2190
ltdta	Long-term debt/total assets	0.1348	0.2065	0.0074	0.0809	0.3036
cata	Current assets/total assets	0.6431	0.2230	0.3312	0.6570	0.9127
skta	Stock/total assets	0.2248	0.1434	0.0511	0.2030	0.4319
cmsta	Cash holdings/total assets	0.1326	0.1175	0.0117	0.1090	0.2864
tdta	Trade debtors/total assets	02480	0.1368	0.0943	0.2293	0.4357
age	Age of the firm	45	30	10	40	87
fincost	Finance cost/total assets	-1.3407	62.1982	0.0168	0.0809	0.2423
purta	Purchases/total assets	1.2339	0.8257	0.3385	1.1134	2.7735
ocfta	Operating cash flows/total assets	0.1983	0.1658	0.0792	0.1700	0.3535
p_{growth}	Positive sales growth	0.2576	0.6071	0	0.1300	0.5000
n_{growth}	Negative sales growth	-0.0354	0.1454	-0.1100	0.0000	0
mktpower	Market power/sector sales	0.0934	0.1434		0.027	
size	Market capitalization (000 000s)	16 000	49 600	113	2 150	28 800

Source: Own calculations using a balanced panel over the period 2001 to 2010. Data obtained from the McGregor BFA library.

2.3. Panel unit root tests. Using non-stationary data produces spurious regression results, therefore tests for stationarity were conducted using the Harris-Tzavalis panel unit root test. The results presented in Table 3 show that all variables in the model are integrated of order 0, which suggests the absence of unit roots in the data. Therefore, regressing the data in levels will not lead to spurious regressions and wrong inferences.

Table 3. Harris-Tzavalis panel unit root test results

Variable	Statistic	Z	Order of integration
tcta	0.5028	-7.8110***	0
stdta	0.3353	-13.6379***	0
ltdta	0.4867	-8.3697***	0
cata	0.6367	-3.51518***	0
skta	0.3725	-12.3441***	0
tdta	0.4674	-9.0440***	0
cmsta	0.3560	-12.9182***	0
p_{growth}	-0.0790	-28.0574***	0
n_{growth}	-0.1034	-28.9034***	0
ocfta	0.1951	-18.5162***	0
mktpower	0.7417	0.5020****	0
lnmcap	0.6381	-3.1036***	0
fincost	0.0002	-25.3128***	0
purta	0.3366	-13.5952***	0

Source: Own calculations using a balanced panel over the period 2001 to 2010. Data obtained from the McGregor BFA Library.
Notes: *, ** and *** denote significance at 10%, 5% and 1%, respectively.

2.4. The correlation matrix. The results of the pairwise correlation matrix are presented in Table 1A in the Appendix. Most of the correlations in the correlation matrix follow the expected signs. There is a positive correlation between current assets and accounts payable, meaning that as the level of current assets increase, the level of accounts payable increase. Disaggregated current assets investments into inventory, trade debtors and cash and marketable securities show statistically significant positive correlations with accounts payable. Long-term debt shows a statistically significant negative correlation (-0.06) with accounts payable. Positive sales growth is positively correlated (0.06) with accounts payable, suggesting that as firms experience positive sales growth, they demand more trade credit. The study did not find any statistically significant correlation between accounts payable and the following variables: short-term financial debt, financing costs and the performance of the economy.

3. Methodology

The study uses a dynamic approach in analyzing trade credit in corporate financing, following the footsteps of (García-Teruel and Martínez-Solano, 2010b). Using static models to understand the determinants of trade credit implies an assumption that firms instantaneously adjust towards their desired level of accounts payable. Static models fail to recognize the dynamic behaviour of accounts payable, since there is an adjustment process from real to desired levels of accounts payables. The adjustment process involves time and costs. Nadiri (1969) developed a model which demonstrated that the real accounts payable levels may not always equal the desired levels, and firms take time to adjust from actual to target levels. Such variances between real and desired levels exist because of difficulties in estimating with certainty the level of sales, purchases and current assets of the firm like inventories (García-Teruel and Martínez-Solano, 2010b). Secondly, trade credit is an important part of external source of funds; therefore it should be part of the financial policy of a firm known as the firm's capital structure (Deloof and Jegers, 1999). Firms have a target capital structure (target debt to equity ratio) and adjust from real to target level (Ozkan, 2001). Accounts payable is part of the debt finance of the firm, and by implication, firms must have a target level of account payable, which is part of debt finance.

The target trade credit ($tcta_{it}^{*}$) is estimated as follows:

$$tcta_{it}^{*} = \alpha + \sum_{k} \delta_k X_{kit} + v_{it}, \quad (1)$$

where *tcta* is trade credit to total assets (accounts payable level); firms are represented by subscript i = 1, …, N; time t = 1, … T; X_{it} is a $k \times 1$ vector of explanatory variables; δ_k is a vector of the unknown parameters to estimated; and v_{it} the random disturbance.

We then assume that firms adjust their *tcta* level according to the degrees of adjustment λ in order to reach their target level:

$$tcta_{it} - tcta_{i,t-1} = \lambda(tcta_{i,t}^{*} - tcta_{i,t-1}),\ 0 \le \lambda \le 1. \quad (2)$$

The expression $tcta_{i,t}^{*} - tcta_{i,t-1}$ is the adjustment required to reach the firm's target account payable level. The coefficient λ measures the speed of adjustment and has an inverse relationship with adjustment costs and takes values between 0 and 1. If λ is 0, then $tcta_{i,t} = tcta_{i,t-1}$ indicating that firms face high adjustments costs such that the current level of accounts payable remains as in the previous period. On the contrary, if λ is 1, then $tcta_{i,t} = tcta_{i,t-1}$, indicating that firms quickly adjust their accounts payable level to their target level.

Substituting equation (1) into (2) yields an equation that expresses the trade credit model as determined by the following expression:

$$tcta_{it} = \rho + \beta_0 tcta_{it-1} + \sum_{k=1} \beta_k X_{kit} + \varepsilon_{it}, \quad (3)$$

where $\rho = \alpha\lambda$; $\beta_0 = (1 - \lambda)$; $\beta_k = \lambda\delta_k$ and $\varepsilon_{it} = \lambda v_{kit}$ (where λv_{kit} has the same properties as ε_{it}).

We introduce the variable η_i to measure company-fixed effects which acknowledges the intrinsic differences between companies that result in unobserved heterogeneity. These unobservable individual effects vary across firms but are assumed constant. We also include the time dummy variable η_t in order to control for both observable and unobservable time effects that may impact on accounts payables' decisions, which the firm cannot control, such as business cycle effects and other time-specific events. The time dummy variable is assumed to change over time, but is equal for all firms in each time period under consideration.

The estimation model for the determinants of accounts payable ($tcta_{it}$) would be as follows:

$$tcta_{it} = \rho + \beta_0 tcta_{it-1} + \beta_1 ocfta_{it} + \beta_2 \ln mcap_{it} + \beta_3 p_{growth_{it}} + \beta_4 n_{growth_{it}} + \beta_5 stdta_{it} + \beta_6 ltdta_{it} + \\ + \beta_7 \ln age_{it} + \beta_8 fin\cos t_{it} + \beta_9 rgdp_{it} + \beta_{10} purta_{it} + \eta_t + \varepsilon_{it}, \quad (4)$$

These variables are as previously defined in Table 2 above.

4. Estimation results and analysis

We estimate equation 4 and its modifications using first-difference two stage GMM approach advanced by Arellano & Bond (1991) for a number of reasons. First, ordinary least squares regressions of dynamic panel data lead to biased and inconsistent estimates because the explanatory variables are not independent of the error term. Second, the fixed effect estimator produces biased but consistent estimates when T tends to infinity and not when N tends to infinity. This is known as the dynamic panel bias or the Nickell bias (Nickell, 1981). The Instrumental variable (IV) estimator as suggested by Anderson and Hsiao (1981), produces consistent and efficient estimates in a dynamic panels if the error term in levels is not serially correlated. However, its weakness is that it fails to use all the available moments, which means that it does not necessarily result in more efficient estimates. GMM in first differences produces more efficient and consistent estimates, hence its preference over the Anderson and Hsiao estimator GMM in first differences deploys additional instruments obtained by applying the moment conditions that exist between the lagged dependent variable and the disturbances.

We tested the legitimacy of the instruments using the Sargan test, which is also known as the J test, a test for overidentifying restrictions. The presence of the n^{th}-order serial correlation in the instruments was tested using the $m(n)$ test, which is asymptotically distributed as a standard normal under the null of no second-order serial correlation of the differenced residuals. The coefficient estimates are presented in Table 4. In models 3 and 4, time dummies are included and the explanatory variable *rgdp* is dropped because it is correlated with the time dummies.

4.1. Regression results. *4.1.1. The lagged dependent variable,* $tcta_{t-1}$. The coefficient of $tcta_{it-1}$ is precisely defined in model 1, which supports the principal argument of this study. $tcta_{it-1}$ is positive and statistically significant at 1% in model 1; therefore the dynamic approach used in this study is not rejected. South African firms have target levels of accounts payable and the accounts payable levels are persistent over time. South African firms partially adjust towards their target levels in an attempt to reach their targets. The adjustment coefficient, which is calculated as 1 minus the coefficient of $tcta_{it-1}$ (1 – 0.39) is 0.61 in model 1, providing some evidence that the speed of adjustment by South African firms towards their target trade credit usage level is relatively fast. In model 2, the current assets investments were disaggregated into cash holdings, inventory and trade debtors. The coefficient of the lagged dependent $tcta_{it-1}$ is also statistically significant at 5%, further supporting the principal argument of this study. The adjustment coefficient is 0.72, which is higher than that reported in model 1 and could be an indication that the speed of adjustment is influenced by these firms' current assets structure. The costs of deviating from the target trade credit usage level are significant. The coefficient of $tcta_{it-1}$ is less than 0.5, which means that the adjustment process of these firms is not very costly. Firms trade-off the cost of being off target (being in disequilibrium) and the adjustment costs of reaching their target (Ozkan, 2001). If the costs of being in disequilibrium are higher than the cost of adjusting towards the target, the adjustment coefficient would be close to 1.

4.1.2. Operating cash flows. The study found some evidence that the availability of internal influences the use of trade credit. In all the models, except models 4 and 5, the study found that operating cash flows (a proxy for the availability of internal resources) had a statistically significant negative relationship with *tcta*, consistent with findings from studies which used profit instead of operating cash flows (Delannay and Weill, 2004; Akinlo, 2012). This suggests that as South African listed firms generate more internal resources, they reduce their dependence on supplier financing.

4.1.3. Short-term and long-term debt. Of the two external sources of debt finance, short-term and long-term debt, the study found that only the former is statistically significant at 1% in all six models. When internal funds are exhausted, the most likely first choice of finance for firms is trade credit because it is cheaper than short-term financial debt. The employment of more trade credit in short-term financing results in less use of short-term debt, which means that trade credit, is a substitute for short-term debt. The substitution relationship is expected because both are forms of short-term financing. Alternatively, these results mean that in cases where South African firms have access to more short-term borrowings they depend less on trade credit. Contrary to the findings of García-Teruel and Martínez-Solano (2010b) and Deloof and Jegers (1999), the study did not find any evidence to suggest that there is a relationship between trade credit and long-term debt.

Table 4. Determinants of trade credit/accounts payable

	(1)	(2)	(3)	(4)	(5)	(6)
	tcta	*tcta*	*tcta*	*tcta*	*tcta*	*tcta*
l.tcta	0.310***	0.255*	0.355***	0.339***	0.312***	0.257**
	(2.78)	(1.75)	(2.62)	(2.57)	(2.84)	(2.00)
ocfta	-0.069**	-0.0699**	-0.0724**	-0.0714	-0.078***	-0.0827***
	(-2.34)	(-2.20)	(-2.13)	(-1.56)	(-2.58)	(-2.58)
lnmcap	-0.0043	0.00227	-0.00574	0.00107	-0.00386	0.00308
	(-0.84)	(0.42)	(-0.88)	(0.18)	(-0.70)	(0.56)
p_{growth}	0.0002	0.00111	0.000271	0.00216	0.00027	0.00137
	(0.13)	(0.73)	(0.14)	(1.20)	(0.18)	(0.90)
n_{growth}	-0.0044	-0.00121	-0.00732	-0.00377	-0.00608	-0.00192
	(-0.58)	(-0.11)	(-1.32)	(-0.70)	(-0.93)	(-0.20)
stdta	-0.129***	-0.110***	-0.131***	-0.113***	-0.133***	-0.122***
	(-4.13)	(-3.77)	(-3.73)	(-3.67)	(-4.04)	(-3.72)
ltdta	0.0079	-0.0109	0.00116	-0.0199	0.00903	-0.00476
	(0.13)	(-0.18)	(0.02)	(-0.32)	(0.15)	(-0.07)
lnage	-0.0045	-0.0133	-0.00759	-0.0162	-0.00899	-0.0219
	(-0.21)	(-0.70)	(-0.39)	(-0.76)	(-0.41)	(-0.89)
fincost	0.0029**	0.0035***	0.00216	0.00321**	0.00295**	0.00334**
	(2.30)	(2.81)	(1.62)	(2.33)	(2.31)	(2.48)
rgdp	0.2476***	0.152*	-	-	0.316**	0.252**
	(2.78)	(1.67)	-	-	(2.54)	(2.07)
purta	0.0407***	0.0172	0.0338***	0.00839	0.0376***	0.0148
	(2.72)	(0.77)	(2.57)	(0.49)	(3.66)	(0.71)
mktpower	-0.0289	-	-	-	-	-
	(-0.47)	-	-	-	-	-
cata	0.250***	-	0.249***	-	0.245***	-
	(6.74)	-	(5.73)	-	(6.14)	-
skta	-	0.0652	-	0.0663**	-	0.0619
	-	(1.53)	-	(1.98)	-	(1.60)
tdta	-	0.374***	-	0.357***	-	0.374***
	-	(4.80)	-	(3.96)	-	(4.72)
cmsta	-	0.0105	-	-0.0106	-	0.00986
	-	(0.20)	-	(-0.22)	-	(0.20)
crisis	-	-	-	-	0.00360	0.00601
	-	-	-	-	(1.16)	(1.23)
cons	0.1297	0.123	0.180	0.160	0.140	0.140
	(1.10)	(1.00)	(1.16)	(1.07)	(1.48)	(1.07)
Time dummies	-	-	Yes	Yes	-	-
m^2	0.2973	0.3245	0.3102	0.2895	0.2936	0.3022
Sargan test	11.32	18.83	12.20	15.01	10.69	16.86
p-values	0.9374	0.5330	0.9091	0.7760	0.9538	0.6619

Source: Own calculations using a balanced panel over the period of 2001 to 2010. Data obtained from the McGregor BFA Library.
Notes: *t* statistics in parenthesis. *, ** and ***denote significance at 10%, 5% and 1%, respectively. Time dummies' coefficients are not reported for brevity.

4.1.4. Asset maturity. The study found a very strong positive relationship between current assets investments and trade credit, consistent with previous studies (Niskanen and Niskanen, 2006; Petersen and Rajan, 1997). The more current assets a firm holds, the more it uses trade credit from suppliers. The amount of current assets held by firms mirrors the amount of trade credit used. The high statistical significance of the coefficient of current assets can also be an indication of the extent to which South African firms match the short-term maturities of assets and liabilities (Myers, 1977; Van Horne, 2002).

In columns 2, 4 and 6 of Table 4, the relationship between accounts payable and investment in current assets was further analyzed using the disaggregated components of currents assets (inventory, trade receivables, and cash holdings). Of the three, only inventory and trade receivables debtors had a statistically significant relationship with trade credit, which suggests that, trade credit is affected by

inventory holdings and the level of trade receivables. Trade credit primarily supports the acquisition of inventory and trade receivables; therefore, the statistically significant relationship is neither surprising nor unique. While the findings on accounts payable and inventory association are consistent with to those of Petersen and Rajan (1997), the statistically insignificant relationship between cash and marketable securities contradicts the findings of Deloof and Jegers (1999). Since the study found substitution effect between accounts payable and short-term debt from banks, this means that these investments can also be explained by both the use of and access to other forms of short-term financing.

4.1.5. Supply of trade credit. The use of supplier financing by the firms in this study was found to be significantly influenced by the supply of trade credit as proxied by purchases, shown by a 5% level of significance in models 1 and 3. This finding suggests that South African firms take advantage of credit supply when it is available, consistent with previous studies (Niskanen and Niskanen, 2000; García-Teruel and Martínez-Solano, 2010b).

4.1.6. Macroeconomic conditions. The positive statistically significant relationship between trade credit and the real GDP growth rate in both models 1 and 2 suggests that the firms' level of accounts payable increases as growth in real GDP increases. This provides some evidence that South African firms use more suppliers financing under favorable economic conditions.

4.1.7. Economic crisis. In model 5 the dummy variable which took the form 1 (and 0 otherwise) to represent the period of the financial crisis; the years 2008 and 2009 were introduced to analyze the impact of the recent global financial crisis on the use of trade credit by listed firms in South Africa. The coefficient of the dummy variable; crisis is positive but statistically insignificant, suggesting that the global financial crisis had an impact on the use of trade credit although the effect may not have been large enough to produce a statistically significant impact. The positive impact of the crisis might suggest that South African firms temporarily delayed or stopped settling their debts, resulting in further credit accumulation, a plausible explanation offered by Love (2011) in a commentary on the global financial crisis. The extent to which these firms temporarily delayed paying their debt could have been small; hence the statistically insignificant positive relationship. Another possible explanation is the short period of time the South African economy was in recession during the period of the financial crisis.

4.1.8. Sales growth. Growth in sales and current assets must be financed and trade credit is a key source of short-term finance. The coefficients of both p_{growth} and n_{growth} were statistically insignificant, suggesting that growth opportunities (a proxy for the need for funding) do not affect the supplier financing received, consistent with Niskanen and Niskanen (2006) but contradict with the findings of Delanny and Weill (2004) and Petersen and Rajan (1997). The non-influence of growth and investment opportunities may not be surprising because the sample comprised large listed firms; growth opportunities diminish with firm size (Petersen, 1997). High growth and investment opportunities are usually associated with small and young firms and such firms are expected to partially finance their investments with trade credit.

4.1.9. Creditworthiness and access to external funds. The hypothesis that larger firms face fewer constraints when accessing financial markets; hence they depend on less trade credit is not confirmed. Firm size was found to be insignificantly related to trade credit raising the possibility that large South African firms also depend on supplier financing as a source of funds. Consistent with previous studies (Deloof and Jegers, 1999; Niskanen and Niskanen, 2000), the study did not find that creditworthiness (proxied by age of the firm) influences the use of trade credit.

4.1.10. Financing cost. The financing cost has a positive association with trade credit (not statistically significant in model 3). The study found a positive association between accounts payable and the cost of alternative capital[1]. The coefficients of the cost of alternative capital were not reported for brevity. Consistent with previous studies, the study found a positive association between accounts payable and the cost of alternative capital, which suggests that an increase in short-term interest rates causes firms to demand more trade credit (Niskanen and Niskanen, 2000; Khan et al., 2012). Since the study found the substitution effect of short-term debt on trade credit, this means that when the cost of short-term funds increase, firms switch to supplier financing as an alternative. Switching to trade credit suggests that they consider trade credit cheaper than bank finance.

4.1.11. Market power. The relationship between market power and trade credit is negative and statistically insignificant. Hill et al. (2010) and Kieschnick et al. (2013) also found that market power did not have any statistically significant relationship with net operating working capital. The expectation was that firms with more market power hold huge accounts payable balances because such

[1] We used the Government 91 days treasury bills rate (as a proxy for short-term minimum lending rate). Using financing costs (the interest expenses reported in the income statement) may not fully capture the impact of interest expenses on the use of trade credit since no distinction is made between interest on short-term debt and that on long-term debt.

firms have more bargaining power over their suppliers and customers. The descriptive statistics reveal that the mean and median market power values of the sample firms are 9% and 3% respectively, which shows that most firms in this sample do not have significant market power, which means they have limited bargaining power over their suppliers.

Conclusions

The major aims of the study were to examine the importance of trade credit and to determine the factors that influence its use as a financing instrument in South Africa. Employing the GMM estimation technique in order to control for unobservable heterogeneity and potential endogeneity problems, the study found that listed firms have a target level of accounts payable and they partially adjust towards their accounts payables level. The speed of adjustment towards the target level is relatively fast as shown by coefficients that ranged between 0.64 and 0.7. The study, like other previous studies, found that the use of trade credit by South African listed firms is influenced by both the availability of internal resources, economic performance, supply of trade credit and investments in current assets and only bank credit was found to be a substitute for trade credit. No evidence was found to support the argument that size, growth opportunities, its creditworthiness and long-term debt explain firms' use of supplier financing as a source of funds.

We conclude that trade credit is an important source of funds even in well-developed financial markets. Therefore it is important that managers to ensure they maintain healthy and good relationships with suppliers as this benefits the firm with continued supply of goods and access to "free" source of funds. The use annual financial statements as the main source of data is this study's main limitation. Financial statements can be manipulated by managers through window dressing of accounts and creative accounting. The heavy dependence on trade credit despite its high implicit costs makes managers' views and attitude on it a very crucial area of further research.

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Appendix

Table 1A. Pairwise correlation matrix

	tcta	*ocfta*	*lnmcap*	p_{growth}	n_{growth}	*stdta*	*ltdta*	*lnage*	*fincost*	*purta*	*rgdp*	*cata*	*skta*	*tdta*	*cmsta*	*mktpower*
tcta	1.00															
ocfta	-0.19***	1.00														
lnmcap	-0.16***	0.27***	1.00													
p_{growth}	0.07**	0.00	0.02	1.00												
n_{growth}	0.04	0.05	0.05	0.10***	1.00											
stdta	0.01	0.10***	0.04	0.07**	-0.01	1.00										
ltdta	-0.06*	0.02	0.09**	0.07**	-0.08**	0.12***	1.00									
lnage	-0.25***	0.01	0.34***	-0.05	-0.01	0.06	0.04	1.00								
fincost	0.03	0.01	-0.01	0.01	-0.01	0.03	0.02	-0.03	1.00							
purta	0.69***	-0.09***	-0.16***	0.04	0.04	-0.02	-0.19***	-0.15***	0.04	1.00						
rgdp	0.04	0.12***	0.02	0.01	0.11***	-0.01	-0.02	-0.03	0.01	0.01	1.00					
cata	0.55***	0.06*	-0.20***	0.02	-0.01	0.10***	-0.22***	-0.16***	0.02	0.49***	0.02	1.00				
skta	0.38***	-0.03	-0.10***	-0.01	0.00	0.05	-0.13***	-0.05	0.03	0.49***	0.00	0.55***	1.00			
tdta	0.37***	0.00	-0.21***	0.01	0.03	0.12***	-0.06*	-0.21***	0.02	0.22***	0.06**	0.57***	0.20***	1.00		
cmsta	0.21***	0.12***	-0.06*	0.03	-0.06*	-0.02	-0.14***	-0.11***	-0.03	0.12***	0.03	0.43***	-0.06*	0.07**	1.00	
mktpower	0.16***	-0.03	0.41***	0.05	0.08***	0.05	0.05	0.10***	0.02	0.12***	-0.02	-0.01	0.00	0.07***	-0.04	1.00

Source: Own calculations using a balanced panel over the period 2001 to 2010. Data obtained from the McGregor BFA Library.
Notes: *, ** and *** denote significance at 10%, 5% and 1%, respectively.