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NET TRADE CREDIT: WHAT ARE THE DETERMINANTS?

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Abstract

The main objective of this paper is to extend the literature on trade receivables and trade payables by examining the determinants of net trade credit. To do that, a sample of 67,047 firms in the UK with 443,190 firm year observations is used. Results are robust to unobserved heterogeneity and industry effects. The evidence suggests that firms with more inventories, market share and are financially distressed invest less in trade credit. Moreover, higher operating cash flow, annual sales growth, export propensity, access to bank credit and larger firms lead to higher investment in trade credit. Additionally, the paper broadens the scope of the literature by analysing the determinants of net trade credit around the financial crisis and industry competitiveness.

JEL classification: G30, G31, G32

Keywords: net trade credit, trade receivables, trade payables, financial crisis, industry competitiveness

1 Introduction

Trade receivables and trade payables are notions that traditionally appear in all standard corporate finance textbooks highlighting their importance for corporations. For example, at the end of 2013, the leading 2,000 US and Europe companies' total investment in trade credit (i.e., trade receivables) amounted to approximately $1.7 trillion, which is equivalent to 9% of their combined sales. Approximately $1.6 trillion of this aggregate trade receivables was financed by trade payables (i.e., supplier credit), leading to an aggregate excess net trade credit of over $1 billion[1].

Existing literature (Ng et al. 1999; Niskanen and Niskanen 2000; García-Teruel and Martínez-Solano 2010; García-Teruel and Martínez-Solano 2010; Vaidya 2011) separately examined the determinants of trade receivables and trade payables without considering net trade credit. However, firms manage trade receivables and trade payables concurrently in order to optimize performance (Ferrando and Mulier 2013) because these two components of trade credit influence each other(Niskanen and Niskanen, 2000; Caglayan et al. 2012). That is, firms are both trade creditors and trade debtors at the same time (Burkart and Ellingsen 2004) and thus simultaneously manage **operating** assets (receivables) and liabilities (payables) (Hill et al. 2010). Accordingly, Fabbri and Klapper (2008) note that firms match the maturities of their trade receivables (assets) and trade payables (liabilities) for risk management purposes (Fabbri and Klapper 2008). This study focuses on identifying the determinats of net trade credits.

The preceding facts may suggest that more efficient firms should have nil or at worst minimal net trade credit. However, some firms may possess certain characteristics which permit them to demand or allow more trade credit (Hill et al. 2010). For example, Hill et al (2010) argue

[1] Source: Ernest & Young working capital report entitled "All tied up". This report is the seventh annual publication reviewing the working capital performance of the world's largest companies. The survey focuses on the top 2,000 companies in the US and Europe. In this research, they used the three components of working capital including: trade receivables, trade payables and inventories.

that firms with capital market access are happy to finance customers. Also, Petersen and Rajan (1997) postulate that trade receivables are positively related to firm size. That is, not all firms will match the maturity of trade receivables and trade payables, which could lead to net investment or financing in trade credit. Hence, net trade credit in firms may not necessarily indicate inefficiency as firms may have good reasons to indulge in such practices. The net investment or financing of trade credit is the difference between trade credit received and granted (Hill et al. 2010; Aktas et al. 2015)

The receiving and granting of trade credit is an essential element of a business life (Lewellen et al. 1980; Petersen and Rajan 1997) because they constitute a major component of firms working capital[2] (Long et al. 1993). In the United Kingdom (UK) corporate sector, more than 80% of daily business-to-business transactions are on credit terms (Peel et al. 2000) and about 90% of global merchandise worth around $25 trillion is funded by trade credit (Klapper et al. 2012).

Investment in trade credit or conservative trade credit policy may help stimulate the sales of a firm (García-Teruel and Martínez-Solano 2010a; Tauringana and Afrifa 2013; Afrifa and Padachi 2016). Companies may also use trade credit to entice customers to purchase more than is required (Deloof 2003; Afrifa et al. 2016). Trade credit may also serve as a quality guarantee to customers (Ng et al. 1999; Wilner 2000), may help sustain a long-term relationship with customers (Ng et al. 1999; Wilner 2000). Investment in trade credit may also lead to a reduction in inventories related costs (Bougheas et al. 2009; Afrifa 2016). García-Teruel and Martinez-Solano (2010b) state that by relaxing trade receivables, firms can reduce the storage costs of the excess inventories accumulated. However, investment in trade credit will require additional capital (Hill et al. 2010) and therefore may harm firm performance.

[2] Rajan and Zingales (1995) find that trade payables represent 15% of total assets.

On the other hand, financing of trade credit or aggressive trade credit policy help firms to overcome financial constraint (Schwartz 1974; Pike and Cheng 2001), as it serves as a financial facility to firms (García-Teruel and Martínez-Solano 2010b). Berger and Udell (1998) and Deloof and Jegers (1999) insist that trade payables are an important source of short-term funds for most firms. However, trade payables may result in the loss of discount for early payment (Ng et al. 1999). The adopted framework simultaneously controls for industry-, firm- and year effects, and, unlike previous studies, which use concomitant variables, all determinants are lagged by one year in order to alleviate the concern that net trade credit and the determinants may be simultaneously determined in equilibrium.

To assess the determinants of net trade credit, a sample of 67,047 UK firms with available observations between 2004 and 2013 is used. This study contributes to the literature in several ways. First, it provides evidence of strong relationship between net trade credit and operating conditions (inventories, operating cash flow, annual sales growth, export propensity, financial distress, firm size, market share and bank financing). Second, by adjusting the dependent variable by the annual mean industry-level net trade credit, this paper confirms that the results are robust to industry effects. Third, the scope of literature on net trade credit is broadened by analysing the determinants of net trade credit around the financial crisis and industry competitiveness.

The rest of the paper is structured as follows. The next section hypothesises the relationship between the net trade credit and various operating conditions. Section three describes the sample and descriptive statistics and specifies the model. The last but one section discusses the empirical results, and the final section gives the summary and conclusion.

2 Literature review of hypothesis development

2.1. Determinants of net trade credit and expected relationships

In a perfect capital market, trade credit investment and financing decisions are independent because companies have unlimited access to sources of finance (Modigliani and Merton 1958). In that situation, a net trade credit would have no opportunity cost because companies could obtain external finance without problems and at a reasonable price. However, because of imperfections in the capital market, there may be a cost to net trade credit. Based on the above argument and previous literature on trade credit, this paper explains operating conditions that might determine net trade credit of firms. Previous studies have employed variables including: sales growth, financial distress, operating cash flow, inventories (Molina and Preve 2012), age (Niskanen and Niskanen 2006), firm size (García-Teruel and Martínez-Solano 2010) and assets tangibility (Huyghebaert et al. 2007). Also, the richness of the data has allowed for the inclusion of export propensity as a possible determinant of net trade credit.

The age of a firm has been found by previous studies to affect both trade receivables and trade payables (Petersen and Rajan 1997; Cuñat 2007). Older firms may have established relationship with suppliers and customers (**Baños-Caballero et al. 2010**). Older firms are also expected to have good reputation with suppliers of debt and equity (Niskanen and Niskanen 2006). As a result, older firms may access external finance more easily and at affordable rates (Berger and Udell 1998). However, older firms may be granted more trade credit by suppliers due to their reputation and long standing relationship (Petersen and Rajan 1997). Banos-Caballero et al (2010) postulated a positive association between age and investment in working capital and argue that firms with better access to capital markets maintain a more conservative working capital policy. Older firms may benefit from higher investment in trade credit because they can act as financial intermediaries to firms with greater financial constraints (Schwartz 1974). It is therefore argued here that the easy access of older companies into the financial markets will enable them to increase investment in trade credit, leading to a positive net trade credit. Therefore, a positive relationship between firm age and net trade credit is expected.

Size is a common factor in the consideration of firms' access to both trade credit (Petersen and Rajan 1997) and financial institution credit (Schwartz 1974). Larger firms are considered to be more creditworthy and therefore have easy access to funds in the capital markets than smaller firms (Banos-Caballero et al. 2010). According to Vaidya (2011), size is typically interpreted as reflecting the credit worthiness of the firm. Atanasova (2012) argues that small firms are limited in terms of their access to bank loan as a result of their high failure rate and therefore need to rely on suppliers' credit as a source of finance. A research by Nilsen (2002) found that small firms react to tightening of external finance by borrowing more from their suppliers. Although the creditworthiness of larger firms may also command more trade credit from suppliers, the expensive nature of trade credit in comparison with institutional finance (Bougheas et al. 2009) means that larger firms may prefer the latter. Therefore, larger firms are expected to have higher levels of trade receivables than trade payables which will lead to higher investment in trade credit. Accordingly, a positive association between firm size and net trade credit is anticipated.

Trade credit is granted and received for commercial motive purposes (Brennan et al. 1988; Martinez-Sola et al. 2014). The commercial motive of trade credit argues that firms can use trade credit extended to improve the marketability of their products by increasing sales (Nadiri 1969). Based on this strand of argument, Hill et al (2012) contend that firms with smaller lower market share may grant more trade credit to their customers than those with higher market share since they have greater incentive to increase sales. However, a research by Martinez-Sola et al (2014) found that it is less profitable for firms with lower market share to grant higher level of trade credit to their customers. Similarly, Wilson and Summers (2002) argue that growing firms with lower market share grant trade credit to their customers as a necessity rather than an option. That is, firms with lower market share are forced to grant higher trade credit by customers. The lower bargaining power of firms with lower market share will force them to grant more trade credit to their customers than they receive from suppliers. As a result, firms with lower market

share are expected to have higher levels of trade receivables than trade payables, leading to higher investment in trade credit.

Inventories are hardly used in the existing literature as an explanatory variable in examining the presence of trade credit in firms (Vaidya 2011). However, the level of inventories is as a direct consequence of the trade credit policy of a firm (Bougheas et al. 2009). Bougheas et al (2009) posit that trade credit is very important to the management of firms' inventories. Given the various costs associated with the holding of inventories (Tauringana and Afrifa, 2013; Afrifa 2015) such as warehouse costs, lighting, security, theft, wastage, etc., one way to minimise those costs is to offer generous credit to customers, which will lead to lower levels of inventories (Ferrando and Mulier 2013). García-Teruel and Martínez-Solano (2010) state that by relaxing credit period, firms can reduce the storage costs of inventories accumulated. Cunat (2007) found a positive relationship between inventories and trade payables, arguing that trade payables are higher in firms with higher inventories because inventories act as collateral. On the contrary, a research by Bougheas et al (2009) found a negative association between inventories and trade receivables and argue that firms offer generous credit terms in order to reduce inventories. A negative association between trade credit investment and inventories was postulated by Caglayan et al (2012) and Daripa and Nilsen (2011). In this paper, an inverse relationship between net trade credit and inventories is expected.

Positive cash flows allow companies to increase investment in trade credit which may lead to excess net trade credit. Such a firm will practice a conservative trade credit strategy by financing part of customers purchase in order to facilitate future sales growth (Hill et al. 2010). Love et al (2007) found a direct correlation between net trade credit and operating cash flow for a sample of firms in emerging countries. A study by Hill et al (2010) in the US also postulated a positive association between net trade credit and operating cash flow, suggesting that companies with greater operating cash flows manage working capital more conservatively. This line of argument is supported by Niskanen and Niskanen (2006) who reported that firms with strong

cash flow from operations use less trade payables in their financing. That is, positive operating cash flows will result in higher trade receivables than trade payables (Vaidya 2011). Consequently, positive relationship is expected between net trade credit and operating cash flow.

Sales growth affects both trade receivables and trade payables (Petersen and Rajan 1997; Ferrando and Mullier 2013). Ferrando and Mullier (2013) argue that firms use trade credit to manage growth, and that firms do rely on financial intermediaries to finance a large portion of their trade receivables. Sales growth naturally comes with accompanying increase in trade receivables, which is partly financed with various lines of credit (Mian and Smith 1992; Mester et al. 2001; Burkart and Ellingsen 2004). However, Petersen and Rajan (1997), Deloof and Jegers (1999) and Hill et al. (2010) believe that trade receivables and trade payables are inversely and directly related to sales growth respectively because firms with greater prior growth tighten credit policy as they achieve planned levels of sales growth. Nevertheless, high growth firms are expected on average to have more trade receivables than trade payables, which may result in higher investment in trade credit. Therefore, a direct relationship is expected between sales growth and net trade credit. Similar to Hill et al (2010) and Molina and Preve (2009) potential endogeneity problem is mitigated between trade credit and sales growth by lagging sales growth.

Net trade credit directly linked to the export propensity activity of a firm as importers takes on average longer time period to settle their accounts (Fabbri and Klapper 2008; Paravisini et al. 2011). This means that the trade receivables of an exporting firm are expected to be higher than non-export firm. One possible solution to the high trade receivables of exporting firms is to equally demand higher trade payables from their suppliers; however, research shows that such firms rather rely on financial institutions and factors such as credit insurance, etc. (Fabbri and Klapper 2013). Paravisini et al (2011) indicate that export propensity is characterized by longer freight times and, thus, longer cash cycles than domestic sales. Two dimensions of firm level export propensity performance have been used in the previous studies: export propensity and export propensity intensity. Export propensity is defined as whether or not a company is an

exporter (Bellouma 2011). The intensity of export propensity is defined as the ratio of export propensity sales over total turnover (Lu and Beamish 2006). In this study, the export propensity is employed, given that only about 9.7% of the firms in the sample indulge in export propensity activities[3]. Fabbri and Klapper (2013) included export propensity in their study to measure the level of trade receivables use among nationals and foreign customers and found that the latter uses more trade receivables than the former. Therefore, a positive relationship is expected between net trade credit and export propensity.

Financial conditions have been used extensively in the literature as an indicator of the credit policy of firms, suggesting that financially distressed firms have lower trade receivables (Molina and Preve 2009) and higher trade payables (Atanasova 2007). Financially distressed firms may be forced to collect trade receivables, tighten credit terms and stretch credit terms granted by suppliers (Hill et al. 2010). Molina and Preve (2009) show that financially distressed firms significantly reduce levels of trade receivables compared with non-distressed firms. On the other hand, Atanasova (2007) shows that financially distressed firms demand more trade payables from their suppliers, arguing that trade payables serve as a substitute for institutional finance to firms that are credit constrained. Molina and Preve (2012) found that firms in financial distress use a significantly higher amount of trade credit to substitute for alternative sources of financing. Therefore, a negative relationship is expected between financial distress and net trade credit.

Many past studies show that trade payable and bank finance are substitutes (García-Teruel and Martinez-Solano 2010; McGuinness and Hogan 2014). That is, firms that are able to access bank finance are less likely to use suppliers' credit as a source of finance. This is because bank finance is generally cheaper than suppliers' credit (Huyghebaert et al. 2007). Ng et al (1999) empirically show that typical credit terms of 2/10 net 30 to customers implies an effective annual interest income of 44%. However, a research by Berger and Udell (1998) in the US shows that

[3] Fabbro and Klapper also used export propensity because they identified only 9% of the firms in their sample as exporters.

trade credit financing (31.3%) and bank financing (37.2%) are almost the same. Despite the cheaper nature of bank financing, Danielson and Scott (2004), Huyghebaert et al (2007) and García-Teruel and Martinez-Solano (2010) argue that suppliers credit offer higher degree of financial flexibility. A research by McGuinness and Hogan (2014) shows that firms with lack of access to bank finance depend more on suppliers' credit. This suggests that, *ceteris paribus*, firms will always use bank finance as first option. In line with the financial motive of granting trade credit developed by Schwartz (1974), firms with access to bank finance will grant more credit to their customers. Therefore, access to bank finance is expected to positively relate to net trade credit. In other words, such firms will have higher trade receivables than trade payables.

2.2 Financial crisis on net trade credit determinants

Trade credit investment and financing are both affected by economic conditions (Lamberson 1995; Martínez-Sola et al. 2014). For example, a research by Love et al (2007) found that firms that are financially more vulnerable to crises extend less trade credit to customers. The existing literature based on the redistribution view of Meltzer (1960) suggests that when bank credit is limited, trade credit becomes more important as a source of finance and therefore the use of trade credit should increase (Petersen and Rajan 1997; Wilner 2000; Nilsen 2002). For example, a study by Carbó-Valverde et al. (2014) show that trade credit increases when bank credit tightens. However, Love et al (2007) examined the behaviour of trade credit during the financial crises of the 1990's and found that all other alternative sources of funds dry up and as such nothing is left to redistribute through trade credit. Therefore, one expects the general trend of trade credit use to fall during financial deepening (Kestens et al. 2012), such as the financial crisis that started as a sub-prime crisis in 2007 but unfolded into the recession in 2009 (Campello et al. 2010; Duchin et al. 2010). For example, a research by Aktas et al (2014) found a 9% decrease in trade credit investment over the financial crisis period from 2007-2009. It is difficult to predict whether firms will receive (grant) more trade credit. While firms may demand more of suppliers' credit,

suppliers may not be willing to offer such request due to contraction of access to external finance. These contrasting arguments mean we cannot make a clear prediction for the result expected.

2.3 Industry competitiveness on net trade credit determinants

The prevailing market competition within an industry may influence the trade credit policy of firms within that industry (Hill et al. 2010; Hill et al. 2012). Concentrated industries are characterised by few firms which makes it possible for those firms to dictate the credit polity available to customers and suppliers alike. Contrarily, firms in competitive industries have little or no influence on the trade credit policies of customers and suppliers. Therefore, firms in competitive industries are expected to have more trade receivables than trade payables; while those in concentrated industries are expected to have more trade payables than trade receivables. As a result, the relationship between the dependent and independent variables in Equation (1) may be influenced by the degree of competition within an industry. For example, Molina and Preve (2009) show that financial distress effect on credit policy is more severe for firms in concentrated industries. This is because those firms can easily respond to difficulties by adjusting their trade credit policy, something with firms in competitive industries cannot afford to do. Following Hill et al (2010) and Molina and Preve (2009), competitive industry is defined as one whose Herfindahl Index is below the median industry Herfindahl Index for the year; otherwise, the industry in deemed to be concentrated[4].

3 Data and Methods

3.1 Data Source and Description

The data used in this study was obtained from the AMADEUS database, a commercial database provided by Bureau Van Dijk Electronic Publishing. This is a comprehensive database

[4] The Herfindahl Index is the sum of the squares of the market share of the firms in an industry, HFI = $\sum(Mkt\_share^2)$

containing financial information on over 10 million public and private firms. The initial sample includes all 88,482 listed and unlisted firms in the UK covered by the AMADEUS database for the period from 2004 to 2013, as at 8th of March 2014. Unlike many developed economics such as France, Germany and Japan where the banking system still dominates credit allocation, the equity market dominates in the UK. However, many nonfinancial firms still rely on trade credit for much of their borrowing (Dudley and Hubbard 2004). According to Giannetti (2003), the ratio of trade receivables to total assets of UK firms is (20.47%). Financial firms such as banks and insurance were excluded because they have different accounting requirements (Deloof 2003; Hill et al. 2010). Moreover, firm-years with anomalies in their accounts such as negative values in assets, sales, trade receivable, trade payable and fixed assets were removed (Hill et al. 2010). Also, firms missing more than five years' amount of information and duplicate values were excluded. Finally, to mitigate the influence of outliers, all variables were winsorized at 1% (García-Teruel and Martinez-Solano 2007; Hill et al. 2010). The final sample consists of an unbalanced panel of 67,047 firms for which the information is available. It represents 443,190 firm-year observations. By allowing for both entry and exit, the use of an unbalanced panel partially mitigates potential selection and survivor bias. Summary of variables calculations and definitions are contained in Table 1.

[Table 1 about here]

3.2 The determinants of net trade credit

To examine the determinants of net trade credit, the following empirical model is estimated:

$$NTC_{it} = \beta_0 + \beta_1 AGE_{it} + \beta_2 SIZE_{it-1} + \beta_3 MKTSHARE_{it-1} + \beta_4 INVT_{it-1} + \beta_5 OCF_{it} + \beta_6 GROWTH_{it-1} + \beta_7 EXPORT_{it-1} + \beta_8 DISTRESS_{it-1} + \beta_9 BANK_{it-1} + \mu_i + \varepsilon_{it} \quad (1)$$

In this model, the dependent variable, NTC, is measured as trade receivables minus trade payables scaled by total assets (Ferrando and Mullier 2013). AGE is the number of year since incorporation (García-Teruel and Martínez-Solano 2010). SIZE is the natural logarithm of total

assets minus trade receivables. MKTSHARE is the ratio of annual firm sales to annual industry sales (Martinez-Sola et al. 2014). INVT is the ratio of inventories to net assets (Bougheas et al. 2009). OCF is the ratio of operating income before depreciation minus income taxes to total assets (Hill et al. 2010). GROWTH is the annual percentage change in sales over the previous period (Aktas et al. 2015). EXPORT is a dummy variable equal to one if the firm sells some of its products abroad and zero otherwise (Fabbri and Klapper 2008; Bellouma 2011). DISTRESS is a dummy variable equal to one if the firm is in financial distress and zero otherwise (Molina and Preve 2009; Hill et al. 2010). BANK is the sum of short-term and long-term bank loans scaled by total assets. In Equation (1), all right-hand side variables except age and export are lagged by one period to reduce the endogeneity problem of simultaneity.

This paper utilised four measures of the net trade credit. 1-year net trade credit is defined as the ratio of trade receivables minus trade payables to total assets at the end of each year. 3-year net trade credit is defined as the ratio of trade receivables minus trade payables to total assets over a 3-year period. 1-year industry adjusted net trade credit is defined as the ratio of the difference between the firm's net trade credit and the firm's industry average annual net trade credit for the respective year. 3-year industry adjusted net trade credit is defined as the ratio of the difference between the firm's net trade credit and the firm's industry average net trade credit over a 3-year period.

The descriptive statistics for the variables used to estimate the determinants of net trade credit are displayed in Table 2. The mean of the 1-year net trade credit is **5.8763%**. Thus, approximately £0.06 of each pound sterling in sales is tied up in trade credit equating to approximately **£9.55** million[5]. The mean of the 3-year net trade credit is **5.7948**%; the mean 1-year and 3-year industry adjusted net trade credit are 0% apiece[6]. The summary statistics for the remaining variables are similar to prior studies. The average firm age is 20.0037 years with a

[5] The mean sales level for sampled firms is **£162,588,522.70**

[6] The 1-year and 3-year industry adjusted net trade credit approximately zero by construction.

median of **12.9178** years. Mean and median firm sizes in the sample are £**191.5510** million and **36.2813** million respectively. Mean market share is **0.0065**% with a median of **0.0006**%. Mean inventories is **9.2410**%, and the average operating cash flow is 5.6105%. The average sales growth rate is 7.9906% with a median of **5.1293**%. The mean export propensity is **9.6970**%, and the average percentage of firms in distress is **5.125**%. Finally, the average bank finance of firms in the sample is approximately **19.2843**%.

[Table 2 about here]

Table 3 provides the distribution of the sample across time. The maximum and minimum net trade credit for a given year is 6.7578% and 5.2209% occurring in 2012 and 2007, respectively. Table 3 illustrates a general decrease in trade credit during the recession periods from 2007 to 2009, which echoes the findings of Aktas et al (2015).

[Table 3 about here]

Table 4 provides the distribution of net trade credit by industry affiliation according to the NACE Rev. 2 Code[7] (see, Tykvova and Borell 2012; Andrew et al. 2013; Hyytinen et al. 2015). The maximum industry-level net trade credit is manufacturing with a mean of 8.3362%, whiles public administration and defence, compulsory social security has the smallest mean net trade credit of 3.4370%. The substantial variation of net trade credit behaviour across industries echoes the findings of Greg and Thomas (2005) and García-Teruel and Martínez-Solano (2007).

[Table 4 about here]

Table 5 displays the matrix of Pearson correlation coefficients for the variables in this study. The net trade credit is positively correlated with lagged age, lagged operating cash flow, annual sales growth, export propensity, firm size and bank finance. The net trade credit is negatively related with lagged inventories, lagged financial distress and lagged market share. All correlation coefficients are significant at the 1% level with the exception of lagged age. Finally,

[7] The industrial codes are based on NACE rev. 2 which is a statistical classification system of economic activities the European Community.

none of the correlation coefficients are of sufficient magnitude to suggest a multicollinearity problem. However, Myers (1990), suggests that a certain degree of multicollinearity may still exist even when none of the correlation coefficients are very large. Therefore, the variance inflation factors (VIFs) are examined in our models to further test for multicollinearity. The highest VIFs were well below the threshold value of 10 suggested by Field (2005) indicating that multicollinearity does not pose a problem to the regressions.

[Table 5 about here]

4 EMPIRICAL RESULTS

4.1 Determinants of net trade credit

In Table 6, columns 1 and 3 relate to the 1-year net trade credit specification and column 2 and 4 relate to the 3-year net trade credit specification. The fixed effects result in column 1 show a positive but insignificant association between net trade credit and firm age. Older firms are expected to have alternative and cheaper source of finance and therefore extend more credit to customers than they receive from suppliers. Therefore, the lack of an association between net trade credit and firm age is unexpected; however, it is possible that the explanatory power of firm age is captured by the fixed effect. Niskanen and Niskanen (2006) found a significantly positive association between firm age and receivables but a significantly negative association between payables and firm age.

The association between net trade credit and lagged firm size is positive and significant at the 1% level. Taking firm size as the degree of creditworthiness, hence a proxy for access to the capital market, the estimated direct relationship between the net trade credit and firm size supports the view that firms with access to institutional finance seek to increase investment in trade credit. Alternatively, larger firms benefit more from extending generous credit to customers (Danielson and Scott 2004). Since investment in trade credit needs to be financed, smaller firms will avoid this by demanding more credit from their suppliers (Nilsen 2002; Atanasova 2012). A

direct correlation between investment in trade credit and firm size supports prior trade credit results such as Deloof and Jegers (1999), Niskanen and Niskanen (2006), García-Teruel and Martínez-Solano (2010) and Vaidya (2011).

The association between the net trade credit and lagged market share is negative and significant at the 1% level. This shows that firms with lower market share invest more in trade credit in order to promote sales (Nadiri 1969). This support the findings by Hill et al. (2010) that firms with lower market share extend more trade credit because of their greater incentive to increase sales. Another explanation is that such firms may need to guarantee the quality of their products through the granting of trade credit (Long et al. 1993). Specifically, firms with lower market share have approximately 2.3% more investment in net trade credit than firms with higher market share.

The estimated correlation between net trade credit and lagged inventories is negative and significant at the 1% level, suggesting that firms offer generous credit terms in order to reduce inventories (Bougheas et al. 2009). An alternative explanation is that suppliers are happy to increase credit offered when higher purchases are made, consistent with the positive association between trade payables and inventories by Cunat (2007) and a negative relationship between receivables and inventories by Vaidya (2011). This means that higher investment in trade credit leads to lower inventories level. Caglayan et al (2012) found a positive association between trade payables and inventories, suggesting that firms increase their inventories and trade payables when they buy on credit from their suppliers. Although the result seems to differ from the positive association between trade receivables and inventories for firms in distressed postulated by Molina and Preve (2009), further analysis in section (4.4) shows that in times of financial hardship (recession) inventories and receivables are positively related.

The results from column 1 of Table 6 indicate that the association between net trade credit and lagged operating cash flow is positive and significant at the 1% level. The significantly positive association between net trade credit and operating cash flow indicates that with higher

operating cash flow, firms increase their investment in trade credit. This finding is consistent with Petersen and Rajan (1997), Niskanen and Niskanen (2006) and Ferrando and Mulier (2013) view that firms with high operating cash flow have higher accounts receivable. This also supports the intuition that firms with higher operating cash flow practice a conservative trade credit policy (Hill et al. 2010) by extending more credit to customers but demanding lesser amount of credit from suppliers.

The results contained in column 1 of Table 6 indicate that the association between net trade credit and lagged annual sales growth is positive and significant at the 1% level. This result indicates that sales growth of firms lead to higher investment in trade credit, supporting the assertion that sales growth naturally comes with accompanying increase in trade receivables (Petersen and Rajan 1997). Niskanen and Niskanen (2006) found a positive relationship between trade receivables and sales growth. Although Molina and Preve (2009) and Hill et al (2012) are right when they argue that firms tighten their credit policy as they achieve planned levels of sales growth, this results indicate that comparatively those firms will have higher trade receivables than trade payables. This is because suppliers' credit is believed to be more expensive than bank credit (Yang 2011; Ng et al. 1999) and also firms will not tighten their credit policy drastically, knowing that it can have adverse effect on sales and profitability (Love et al. 2007).

Net trade credit varies directly with export propensity and the association is significant at the 1% level. This association was expected because on average importers take longer time period to settle their accounts because of delays in issuing invoices and receipt of the amounts involved. The result indicates that the exportation of goods and services increase the investment in trade credit. Paravisini et al (2011) found a direct association between trade receivables and export, indicating that export is characterised by longer freight times. The result supports prior research by Fabbri and Klapper (2013), Lu and Beamish (2006) and Bellouma (2011). The finding has additional economic meaning. The average net trade credit of exporting firms is

1.8203% greater than that of non-exporting firms. This implies that exporting firms have approximately £2,960,000[8] additional investment in trade credit.

Net trade credit has an inverse association with lagged financial distress, which is significant at the 10% level. This finding indicates that financially distressed firms try to reduce investment in trade credit by practicing an aggressive trade credit policy (Atanasova 2007). This result supports that intuition that a more restrictive trade credit policy is a rational response to financial distress due to the limited financial slack and cash generating ability of distressed firms (Hill et al. 2010). A firm in financial distress may want to collect receivables quicker, tighten credit terms and also delay payment to suppliers. The additional economic meaning of this finding is that non-distressed firms have a approximately £9,460,000[9] additional investment in trade credit relative to their distressed counterparts, on average; because the mean net trade credit of distressed firms is 5.8174% lower than that of non-distressed firms.

Net trade credit is positively associated with lagged bank finance at the 1% significance level. This result shows that firms with access to bank finance invest more in trade credit, on average. This supports prior studies that show that trade credit and bank finance are substitutes (McGuinness and Hogan 2014). The significantly positive coefficient of ***Bank*** demonstrates that financially unconstrained firms finance their customers, which supports the financial motive of granting trade credit (Schwartz 1974). Similar to the findings by Berger and Udell (1998), firms with access to bank finance have approximately only 1% more investment in trade credit. Alternatively, this shows that even firms with access to finance also depend on trade credit (Fabbri and Klapper 2008).

The above analyses indicate that net trade credit is positive and significantly related to operating cash flow, annual sales growth, export propensity, firm size and bank finance. On the other hand, net trade credit is inversely associated with inventories, financial distress and market

[8] See note 5
[9] See note 5

share, but not significantly related to firm age. Next, the average 3-years net trade credit is used as the dependant variable and also examines the industry effects of the relationship between net trade credit and the various determinants. So far, the fixed effects have been allowed to absorb the industry effect on net trade credit.

[Table 6 about here]

To assess whether the determinants of net trade credit persists through time, the net trade credit over a 3-year horizon is considered, which reduces the observation by 84,699. The results using the 3-year horizon as the dependent variable appear in column 2 of Table 6. Overall, the results are consistent with the earlier results in that net trade credit is positively related to firm age, lagged operating cash flow, lagged annual sales growth, export propensity, lagged firm size and lagged bank finance and inversely correlated with inventories, financial distress and market share. As before, the firm age relationship is insignificant. However, the significance of the relationships of net trade credit with operating cash flow and market share reduce over the 3-year horizon from 1% to 10% and 1% to 5% respectively, suggesting the lessening of these two variables as determinants of net trade credit over a longer period. On the other hand, the significance of the relationship between net trade credit and distress increases over the 3-year horizon from 10% to 1%. Overall, the results suggest that the significant relationship between net trade credit and the various determinants persist over time, with the exception of firm age.

Research has shown that trade credit behaviour is industry specific (Greg and Thomas 2005; Garia-Teruel and Martinez-Solano 2007; Hill et al. 2010), because it is customary in some industries to give or receive extended trade credit. Authors such as Smith (1987), Ng et al (1999) and Fisman and Love (2003) found credit terms to be uniform within industries but different across industries. The use of fixed effects estimation prevents the inclusion of the industry effects, since they are time-invariant in nature. Therefore, columns 1 and 2 of Table 6 assume the

industry loads on the fixed effect. To explicitly control for industry effects, the 1-year and 3-year industry net trade credit averages are netted from 1-year net trade credit and 3-year net trade credit where industries are defined according to the NACE Rev. 2 Code. Columns 3 and 4 of Table 6 report the results using the deviations from industry averages as dependent variables. Column 3 demonstrates the estimates of Equation (1) using the annual net trade credit minus the industry average net trade credit as the dependent variable. Column 4 illustrates the estimates of Equation (1) using the 3-year average net trade credit minus the 3-year industry average net trade credit as the dependent variable.

The results in column 3 confirm the findings in column 1. As in column 1, the relationships between the determinants and net trade credit still hold. Similar to column 1, firm age is still not significant. However, the significance level of lagged financial distress and lagged market share increases and decreases from 10% and 1% in column 1 to 1% and 5% in column 3, respectively. Lagged inventories, lagged operating cash flow, lagged sales growth, export propensity, lagged firm size and lagged bank finance all maintain the same significance level as in Column 1.

Results in column 4 also confirms the findings displayed in column 2. As in column 2, the coefficient of lagged firm age is positive but not significantly related to net trade credit. In terms of the significance, lagged operating cash flow increases from 10% in column 2 to 1% in column 4; lagged market share increases from 5% to 1%. The results contained in columns 3 and 4 indicate that the trade credit behaviour is strongly influenced by certain firm level characteristics even after controlling for industry-level net trade credit.

4.2 Financial crisis effect on net trade credit

As found in Table 7, each determinant in Equation (1) is interacted with an indicator variable crisis, which is equals to one for years 2007-2009 and otherwise zero. Specifically, the sample

period is partitioned into two: from 2007-2009[10] (3 years) representing the recession years; while all other periods (7 years) represent the booming years (Aktas et al. 2015). The results in Table 7 are estimated using the four dependent variables mentioned earlier plus a crisis dummy variable. The coefficient of the crisis indicator variable is negative and significant at the 1% level, indicating that investment in trade credit reduces in times of recession (Aktas et al. 2015).

The findings illustrated by Table 7 indicate that the relationship between net trade credit and the interaction between lagged inventories and crisis is positive and significant in each model. This suggests that higher inventories cause a greater increase in trade credit investment during recession periods. The significantly positive interaction between lagged inventories and crisis is consistent with findings by prior studies that firms struggle to sell inventories for cash during recession periods (Wasiuzzaman and Arumugam 2013). Another result worth noting is that the coefficient of the interaction between lagged operating cash flow and crisis is negative and significant in all models, suggesting that firms with available cash flow invest less in their customers during recession periods because of the contraction of other sources of fund (Kestens et al. 2012).

The negative and significant association between net trade credit and the interaction of lagged sales growth and crisis shows that firms' sales growth rate decreases in recessionary periods (Biais and Gollier 1997). The results of the relationship between net trade credit and the interaction of export propensity and crisis indicate a reduction in export during recessionary periods (Rao et al. 1990). The coefficient of the interaction between lagged financial distress and crisis is negative and significant, which suggest that firms in financial distress further reduce investment in trade credit during recessionary periods. The relationship between the interaction of lagged firm size and crisis is positive and significant, indicating that larger firms increase investment in trade credit during recession periods (Atanasova and Wilson 2003), because larger

[10] Similar results are quantitatively obtained when 2007-2010 is considered to be the crisis period

firms act as financial intermediaries to less credit worthy firms (Schwartz 1974; Emery 1984; García-Teruel and Martínez-Solano 2010a). The interaction of the lagged market share and crisis shows a negative relationship with net trade credit, which indicates that lower market share leads to trade credit investment during recessionary periods because of the increase need to sell the produces. Finally, the interaction of the lagged bank finance and crisis shows a positive relationship with net trade credit, which justifies the financial motive of trade credit.

[Table 7 about here]

4.3 Industry competitiveness on net trade credit

To determine whether the relationship between the determinants and net trade credit differ depending on the degree of industry competitiveness, each of the determinants in Equation (1) is interacted with an indicator variable for competition, where the indicator variable equals one if the firm is in a competitive industry and zero otherwise. As before, the models account for fixed and time effects.

According to the results in Table 8, firms in competitive industries invest more in trade credit than firms in concentrated industries, as indicated by the positive association between the dummy variable (competition) and net trade credit. The higher investment in trade credit by firms in competitive industries is because firms in such industries need to offer more generous trade credit in order to attract customers. The relationship between the net trade credit and the interaction between lagged inventories and competition is negative and significant for each model, suggesting that firms in competitive industries offer more generous trade credit to customers to help facilitate sales (Ferrando and Mulier 2013). The coefficient of the interaction between lagged sales growth and competition is positive and significant in all models, suggesting that the sales growth of firms in competitive industries lead to greater investment in trade credit. This is because the sales growth of firms in competitive industries is influenced by trade receivables.

The coefficient of the interaction between financial distress and competition indicates that the trade credit investment of financially distressed firms is higher in competitive industries than concentrated ones; and the plausible explanation is that such firms use trade receivables as a competitive tool (Niskanen and Niskanen 2006; Petersen and Rajan 1997; Ferrando and Mulier 2013). Another explanation is that firms in concentrated industries are able to reduce investment in trade credit without severe detriment to market share (Molina and Preve 2009).

[Table 8 about here]

5 Conclusions

This paper provides comprehensive evidence of the determinants of net trade credit of firms in the UK. To complete the study, a sample of 67,047 UK firms during the period 2004-2013 was used. Using fixed effect estimation, the paper controls for unobserved heterogeneity and industry effects.

The results support the idea that trade credit policy is influenced by firms' individual characteristics and operating conditions. In particular, the results indicate that firms offer generous credit terms to customers in order to reduce inventories. The availability of operating cash flow leads to higher investment in trade credit. The growth of firms' annual sales and access to bank finance lead to higher investment in trade credit. Larger and exporting firms invest more in trade credit. Financially distressed and firms with higher market share invest less in trade credit. These results are consistent after using a 3-year averaged net trade credit.

The results are also robust after employing 1-year and 3-year industry-adjusted net trade credits. Additionally, the paper examines the determinants of net trade credit around the just ended financial crisis (2007-2009) and finds that investment in trade credit reduces in times of recession. Finally, the paper examines the influence of industry-level competitiveness on the determinants of net trade credit and finds that firms in competitive industries invest more in trade credit.

The results have important corporate policy implications. Given the magnitude of net trade credit as a proportion of firm total assets, corporate managers should put particular emphasis on the simultaneous management of both trade receivables and trade payables in order to improve performance. In particular, corporate managers should consider their firm's individual characteristics, economic conditions and industry affiliations in order to optimise the benefits of trade credit.

Reference

Afrifa, G.A. (2016). "Net working capital, cash flow and performance of UK SMEs". Review of Accounting and Finance, 15(1), 21-44. doi: 10.1108/raf-02-2015-0031.

Afrifa, G.A. and Padachi, K. (2016). "Working capital level influence on SME profitability. Journal of Small Business and Enterprise Development". 23(1), 44-63. doi: 10.1108/jsbed-01-2014-0014

Afrifa, G.A. (2015). "Working Capital Management Practices and Profitability of AIM ListedSMEs". Journal of Enterprising Culture, Vol. 21(4), 1-23.

Aktas, N., Croci, E. and Petmezas, D. (2014). "Is working capital management value-enhancing? Evidence from firm performance and investments." Journal of Corporate Finance (30): 98-113.

Atanasova, C. (2007). "Access to Institutional Finance and the Use of Trade Credit." Financial Management 36(1): 49-67.

Atanasova, C. (2012). "How Do Firms Choose Between Intermediary and Supplier Finance?" Financial Management 41(1): 207-228.

Atanasova, C.V. and Wilson, N. (2003). "Bank borrowing constraints and the demand for trade credit: evidence from panel data." Managerial and Decision Economics 24(6-7): 503-514.

Baños-Caballero, S., García-Teruel, P.J. and Martinez-Solano, P. (2010). "Working capital management in SMEs." Accounting & Finance 50(3): 511-527.

Bellouma, M. (2011). "The Impact of Working Capital Management on Profitability: The Case of Small and Medium-Sized Export Companies in Tunisia." Management International 15(3).

Berger, N.A. and Udell, F.G. (1998). "The economics of small business finance: The roles of private equity and debt markets in the financial growth cycle." Journal of Banking & Finance 22(6–8): 613-673.

Biais, B., and Gollier, C. (1997). "Trade Credit and Credit Rationing." Review of Financial Studies 10(4): 903-937.

Bougheas, S., Mateut, S. and Mizen, P. (2009). Corporate trade credit and inventories: New evidence of a trade-off from accounts payable and receivable. Journal of Banking & Finance, 33(2), 300-307. doi:http://dx.doi.org/10.1016/j.jbankfin.2008.07.019

Brennan, M.J., Maksimovics, V. and Zechner, J. (1988). Vendor Financing. The Journal of Finance, 43(5), 1127-1141. doi:10.1111/j.1540-6261.1988.tb03960.x.

Burkart, M. and Ellingsen, T. (2004). In-Kind Finance: A Theory of Trade Credit. [10.1257/0002828041464579]. American Economic Review, 94(3), 569-590.

Burkart, M. and Ellingsen, T. (2004). "In-Kind Finance: A Theory of Trade Credit." American Economic Review 94(3): 569-590.

Caglayan, M., Maioli, S. and Mateut, S. (2012). Inventories, sales uncertainty, and financial strength. Journal of Banking & Finance, 36(9), 2512-2521. doi:http://dx.doi.org/10.1016/j.jbankfin.2012.05.006

Campello, M., Graham, J.R. and Harvey, C.R. (2010). The real effects of financial constraints: Evidence from a financial crisis. Journal of Financial Economics, 97(3), 470-487. doi:http://dx.doi.org/10.1016/j.jfineco.2010.02.009

Carbó-Valverde, S., Rodríguez-Fernández, F. and Udell, G.F. (2016). "Trade Credit, the Financial Crisis, and SME Access to Finance." Journal of Money, Credit and Banking, 48: 113-143.

Cuñat, V. (2007). "Trade Credit: Suppliers as Debt Collectors and Insurance Providers." Review of Financial Studies 20(2): 491-527.

Danielson, M.G. and Scott, J.A. (2004). "Bank Loan Availability and Trade Credit Demand." Financial Review 39(4): 579-600.

Daripa, A. and Nilsen, J. (2011). "Ensuring sales: A theory of inter-firm credit." American Economic Journal: Microeconomics 3: 245-279.

Deloof, M. (2003). "Does Working Capital Management Affect Profitability of Belgian Firms?" Journal of Business Finance & Accounting 30(3-4): 573-588.

Deloof, M. and Jegers, M. (1999). "Trade Credit, Corporate Groups, and the Financing of Belgian Firms." Journal of Business Finance & Accounting 26(7-8): 945-966.

Duchin, R., Ozbas, O. and Sensoy, B.A. (2010). Costly external finance, corporate investment, and the subprime mortgage credit crisis. Journal of Financial Economics, 97(3), 418-435. doi:http://dx.doi.org/10.1016/j.jfineco.2009.12.008

Dudley, W.C. and Hubbard, R.G. (2004). "How capital markets enhance economic performance and facilitate job creation", New York: Goldman Sachs Global Markets Institute.

Emery, G.W. (1984). "A Pure Financial Explanation for Trade Credit." The Journal of Financial and Quantitative Analysis 19(3): 271-285.

Fabbri, D. and Klapper, L.F. (2008). "Trade Credit Supply Market Power and the Matching of Trade Credit Terms, Working Paper.

Fazzari, S. and Petersen, B. (1993). "Working Capital and Fixed Investment: New Evidence on Financing Constrains." RAND Journal of Economics 24: 328-342.

Fearne, A., María García Álvarez-Coque, J., López-García Usach Mercedes, T., & García, S. (2013). Innovative firms and the urban/rural divide: the case of agro-food system. Management Decision, 51(6), 1293-1310. doi:10.1108/MD-12-2011-0482

Ferrando, A. and Mulier, K. (2013). "Do firms use the trade credit channel to manage growth?" Journal of Banking & Finance 37(8): 3035-3046.

Field, A. (2005). Discovering statistics using SPSS. London, Sage Publications Ltd.

Fisman, R. and Love, I. (2003). "Trade Credit, Financial Intermediary Development, and Industry Growth." The Journal of Finance 58(1): 353-374.

García-Teruel, P. J. and Martínez-Solano, P. (2010). "A dynamic perspective on the determinants of accounts payable." Review of Quantitative Finance and Accounting 34(4): 439-457.

García-Teruel, P.J. and Martínez-Solano, P. (2010). "Determinants of trade credit: A comparative study of European SMEs." International Small Business Journal 28(3): 215-233.

García-Teruel, P.J. and Martínez-Solano, P. (2007). "Effects of working capital management on SME profitability." International Journal of Managerial Finance 3(2): 164-177.

Giannetti, M. (2003). "Do better institutions mitigate agency problems? Evidence from corporate finance choices." Journal of Financial and Quantitative Analysis, 38, 185–212.

Greg, F. and Thomas, M.K. (2005). "An Analysis of Working Capital Management Results Across Industries." American Journal of Business 20(2): 11-20.

Hill, M. D., Kelly, G. W. and Highfield, M. J. (2010). Net Operating Working Capital Behavior: A First Look. Financial Management, 39(2), 783-805. doi:10.1111/j.1755-053X.2010.01092.x

Hill, M. D., Kelly, G. W. and Lockhart, G. B. (2012). Shareholder Returns from Supplying Trade Credit. Financial Management, 41(1), 255-280. doi:10.1111/j.1755-053X.2012.01198.x

Huyghebaert, N., Van de Gucht, L. and Van Hulle, C. (2007). "The Choice between Bank Debt and Trade Credit in Business Start-ups." Small Business Economics, 29(4), 435-452.

Hyytinen, A., Pajarinen, M. and Rouvinen, P. (2015). Does innovativeness reduce startup survival rates? Journal of Business Venturing, 30(4), 564-581. doi:http://dx.doi.org/10.1016/j.jbusvent.2014.10.001

Kestens, K., Van Cauwenberge, P. and Bauwhede, H.V. (2012). "Trade credit and company performance during the 2008 financial crisis." Accounting & Finance, 52: 1125-1151.

Kieschnich, R., LaPlante, M. and Moussawi, R. (2006). Corporate working capital management: determinants and consequences. Working Paper (University of Texas, Dallas).

Klapper, L., Laeven, L. and Rajan, R. (2012). Trade Credit Contracts. Review of Financial Studies, 25(3), 838-867.

Lamberson, M. (1995). "Changes in Working Capital of Small Firms in Relation to Changes in Economic Activity." American Journal of Business 10(2): 45-50.

Lewellen, W. G., McConnell, J. J. and Scott, J. A. (1980). Capital Market Influences on Trade Credit Policies. Journal of Financial Research, 3(2), 105-113. doi:10.1111/j.1475-6803.1980.tb00043.x

Long, M. S., Malitz, I. B. and Ravid, S. A. (1993). Trade Credit, Quality Guarantees, and Product Marketability. Financial Management, 22(4), 117-127. doi:10.2307/3665582

Love, I., Preve, L. A. and Sarria-Allende, V. (2007). Trade credit and bank credit: Evidence from recent financial crises. Journal of Financial Economics, 83(2), 453-469. doi:http://dx.doi.org/10.1016/j.jfineco.2005.11.002

Lu, J. and Beamish, P. (2006). "SME internationalization and performance: Growth vs. profitability." Journal of International Entrepreneurship 4(1): 27-48.

Martínez-Sola, C., García-Teruel, P. and Martínez-Solano, P. (2014). Trade credit and SME profitability. Small Business Economics, 42(3), 561-577. doi: 10.1007/s11187-013-9491-y.

McGuinness, G. and Hogan, T. (2016). Bank credit and trade credit: Evidence from SMEs over the financial crisis. International Small Business Journal, 34(4), 412-445.

Meltzer, A.H. (1960). "Mercantile credit, monetary policy, and size of firms." The Review of Economics and Statistics 42: 429-437.

Mester, L., Nakamura, L. and Renault, M. (2001). "Checking accounts and bank monitoring. Federal Reserve Bank of Philadelphia." Working Paper(No. 01-3).

Mian, S.L. and Smith, Jr. C.W. (1992). "Accounts Receivable Management Policy: Theory and Evidence." The Journal of Finance 47(1): 169-200.

Modigliani, F. and Merton, H.M. (1958). "The Cost of Capital, Corporation Finance and the Theory of Investment." The American Economic Review 48(3): 261-297.

Molina, C.A. and Preve, L.A. (2009). "Trade Receivables Policy of Distressed Firms and Its Effect on the Costs of Financial Distress." Financial Management 38(3): 663-686.

Molina, C.A. and Preve, L.A. (2012). "An Empirical Analysis of the Effect of Financial Distress on Trade Credit." Financial Management 41(1).

Myers, R.H. (1990). "Classical and Modern Regression with Applications." PWS - KENT Publishing Co., Boston.

Nadiri, M.I. (1969). The Determinants of Trade Credit in the U.S. Total Manufacturing Sector. Econometrica, 37(3), 408-423.

Ng, C.K., Smith, J.K. and Smith, R.L. (1999). Evidence on the Determinants of Credit Terms Used in Interfirm Trade. The Journal of Finance, 54(3), 1109-1129. doi:10.1111/0022-1082.00138

Nilsen, J.H. (2002). "Trade Credit and the Bank Lending Channel." Journal of Money, Credit and Banking 34(1): 226-253.

Niskanen, J. and Niskanen, M. (2000). "Accounts Receivable and Accounts Payable in Large Finnish Firms Balance Sheets: What Determines Their Levels"?" The Finnish Journal of Business Economics 4: 489-503.

Niskanen, J. and Niskanen, M. (2006). "The Determinants of Corporate Trade Credit Policies in a Bank-dominated Financial Environment: the Case of Finnish Small Firms." European Financial Management 12(1): 81-102.

Paravisini, D., Rappoport, V., Schnabl, P. and Wolfenzon, D. (2011). "Dissecting the Effect of Credit Supply on Trade: Evidence from Matched Credit-Export Data." No. 16975.

Peel, M. J., Wilson, N., & Howorth, C. (2000). Late Payment and Credit Management in the Small Firm Sector: Some Empirical Evidence. International Small Business Journal, 18(2), 17-37.

Petersen, M.A. and Rajan, R.G. (1997). "Trade credit: theories and evidence." Review of Financial Studies 10(3): 661-691.

Pike, R. and Cheng, N.S. (2001). "Credit Management: An Examination of Policy Choices, Practices and Late Payment in UK Companies." Journal of Business Finance & Accounting 28(7-8): 1013-1042.

Rao, C. P., Erramilli, M. K., & Ganesh, K. G. (1990). Impact of Domestic Recession on Export Marketing Behaviour. International Marketing Review, 7(2). doi:10.1108/02651339010005168

Schwartz, R.A. (1974). "An Economic Model of Trade Credit." The Journal of Financial and Quantitative Analysis 9(4): 643-657.

Smith, J.K. (1987). "Trade Credit and Informational Asymmetry." The Journal of Finance 42(4): 863-872.

Tauringana, V. and Afrifa, G.A. (2013). "The relative importance of working capital management and its components to SMEs' profitability." Journal of Small Business and Enterprise Development 20(3): 453-469.

Tykvová, T. and Borell, M. (2012). "Do private equity owners increase risk of financial distress and bankruptcy?" Journal of Corporate Finance 18(1): 138-150.

Vaidya, R.R. (2011). "The Determinants of Trade Credit: Evidence from Indian Manufacturing Firms." Modern Economy 2(5): 707-716.

Wasiuzzaman, S. and Arumugam, V. C. (2013). "Determinants of Working Capital Investment: A Study of Malaysian PublicListed Firms." Australasian Accounting, Business and Finance Journal 7(2): 63-83.

Wilner, B. S. (2000). "The Exploitation of Relationships in Financial Distress: The Case of Trade Credit." The Journal of Finance 55(1): 153-178.

Wilson, N. and Summers, B. (2002). Trade credit terms offered by small firms: survey evidence and empirical analysis. Journal of Business, Finance & Accounting, Vol. 29, pp.317–51.

Yang, X. (2011). "The role of trade credit in the recent subprime financial crisis." Journal of Economics and Business 63(5): 517-529.

Table 1: Summary of Variables Calculations and Definitions

Variable	Acronym	Description
1–year net trade credit	1–year NTC	$\text{NTC} = \left(\frac{\text{Trade receivables}}{\text{Total assets}}\right) - \left(\frac{\text{Trade payables}}{\text{Total assets}}\right)$
3–year average net trade credit	3–year NTC	The 3–year average NTC at time *t* is the average NTC between year *t* and *t* + *2*.
1–year industry average adjusted net trade credit	1–year IndAdjNTC	The difference between the annual NTC and industry average annual NTC for the respective year.
3–year industry average adjusted net trade credit	3–year IndAdjNTC	The 3–year industry average NTC at time *t* is the 3–year industry average NTC between year *t* and *t* + *2*.
Firm Age	AGE	Number of years between incorporation and the calendar year end of each firm.
Firm Size	SIZE	Value of firms' total assets minus trade receivables in British pounds sterling
Market share	MKTSHARE	The ratio of annual firm sales to annual industry sales.
Inventory holding	INV	Total inventory as a percentage of total assets minus inventory.
Operating cash flow	OCF	Operating income before depreciation minus income taxes scaled by total assets.
Annual Sales Growth	GROWTH	Percentage change in sales revenue over the previous year.
Export propensity	EXPORT	A dummy variable equals to one if the firm sells some of its products abroad and zero otherwise.
Dummy for financial distress	DISTRESS	Following Molina and Preve (2009) and Hill et al. (2010), two criteria are used to categorise firms as financially distressed or otherwise. First, if a firm has difficulty covering its interest expenses and second, if a firm is overleveraged. A firm is considered to be facing difficulties in covering interest expenses if its interest coverage (defined as operating income before depreciation divided by interest expense) is below one for two conservative years or less than 0.80 in any given year. For leverage, a firm is considered overleveraged if it is in the top two deciles of industry leverage in a given year.
Bank finance	BANK	The sum of short-term and long-term bank loans scaled by total assets.
Financial crisis	CRISIS	Crisis period is defined as the years 2007 to 2009, otherwise zero.
Industry competitiveness	COMPETITION	Herfindahl index is the Herfindahl-Hirschman index of an industry, calculated by adding the squares of the sales market shares of all the firms in an industry.

Table 2 Descriptive Statistics

The table provides the sample characteristics of 443,190 firm–years across 67,047 unique UK firms over the period 2004–2013. All variable are defined in Table 1

Variables	Observation	Mean	Stan Dev	Median	Minimum	Maximum
1–year NTC (%)	443,190	5.8763	16.9196	3.9465	–45.4967	68.3372
3–years NTC (%)	358,491	5.7948	10.7793	3.7303	–59.0660	80.1756
1–year IndAdj NTC (%)	443,190	0.0000	16.9011	0.0023	–45.8217	61.6829
3–years IndAdj NTC (%)	358,491	0.0000	10.7619	0.0023	–59.4035	81.6829
AGE_{t-1} (years)	422,315	20.0037	21.1315	12.9178	6.2493	105.1233
$SIZE_{t-1}$ (£M)	443,190	191.5510	217.5046	36.2813	0.0897	4,594.4502
$MKTSHARE_{t-1}$ (%)	443,190	0.0065	0.0757	0. 0006	0.0000	10.9411
INVT (%)	435,535	9.2410	16.7510	2.2958	0.0000	33.1735
OCF (%)	437,593	5.6105	15.4988	3.5940	–50.2145	66.3389
GROWTH (%)	416,558	7.9906	43.9867	5.1293	–70.9867	219.7225
EXPORT (binary) (%)	443,190	9.6970	—	0.0000	0.0000	1.0000
DISTRESS (binary) (%)	443,190	5.125	—	0.0000	0.0000	1.0000
BANK (%)	443,090	19.2843	23.4323	15.0345	0.9254	78.2756
CRISIS (binary)	443,090	0.3000	0.3899	0.0000	0.0000	1.0000
COMPETITIVENESS	443,090	0.3222	0.3939	0.3046	0.0232	1.0000

Table 3. Time Distribution of Sample

The table provides the distribution of net trade credit accross time for 443,190 firm–years across 67,047 UK firms over the period 2004–2013. The mean values of 1–year IndAdj NTC and 3–year IndAdj NTC are not reported since they approximate zero by construction. All variable are defined in Table 1.

Sample year	Mean Values		Median Values			
	1–YEAR NTC	3–YEAR NTC	1–YEAR NTC	3–YEAR NTC	1–YEAR NTC IndAdj	3–YEAR NTC IndAdj
2004	6.1573		4.9216		0.0023	
2005	6.3902		6.1765		0.0034	
2006	5.3268	5.9581	2.5654	4.5545	0.0024	0.0027
2007	5.2209	5.6460	2.5764	3.7728	0.0022	0.0027
2008	5.4529	5.3335	2.7263	2.6227	0.0021	0.0022
2009	5.5127	5.3955	2.2854	2.5294	0.0021	0.0021
2010	5.5692	5.5116	4.4354	3.1490	0.0012	0.0018
2011	6.4996	5.8605	4.8756	3.8655	0.0023	0.0019
2012	6.7578	6.2755	4.9563	4.7558	0.0031	0.0022
2013	5.8760	6.3778	3.9465	4.5928	0.0023	0.0026

Table 4. Industry Distribution of Sample

The table provides the distribution of net trade credit accross industries for 443,190 firm–years across 67,047 UK firms over the period 2004–2013. The mean values of 1–year IndAdj NTC and 3–year IndAdj NTC are not reported since they approximate zero by construction. All variable are defined in Table 1.

		Mean Values		Median Values			
Industry Focus	NACE 2	1–YEAR NTC	3–YEAR NTC	1–YEAR NTC	3–YEAR NTC	1–YEAR NTC IndAdj	3–YEAR NTC IndAdj
Agriculture, forestry and fishing	A	7.1761	7.2306	1.7479	1.3501	0.1289	0.1511
Mining and quarrying	B	6.6753	6.2175	3.2848	3.2692	0.1474	0.0880
Manufacturing	C	8.3362	8.2529	4.6657	3.2903	0.2118	0.0400
Electricity, gas, steam and air conditioning supply	D	7.3959	6.1540	6.3456	4.5094	–0.1265	–0.0524
Water supply; sewerage, waste management and remediation activities	E	7.0958	7.0815	2.2788	3.7725	0.0959	–0.0944
Construction	F	7.3214	7.1311	7.7045	6.7307	0.1371	0.5496
Wholesale and retail trade; repair of motor vehicles and motorcycles	G	7.0166	7.1856	3.4560	2.7626	0.1848	0.4066
Transportation and storage	H	6.2975	6.1146	3.8965	3.4118	–0.1102	–0.0605
Accommodation and food service activities	I	5.0129	6.2931	3.4576	4.6390	0.2739	0.0816
Information and communication	J	6.1094	6.3016	5.4093	4.7529	–0.1326	–0.0374
Real estate activities	L	5.6383	5.0236	4.3558	3.2611	–0.0043	0.0976
Professional, scientific and technical activities	M	4.2997	4.2416	4.4962	4.6692	–0.1368	–0.0494
Administrative and support service activities	N	4.4184	4.1402	3.5850	5.6344	0.0608	0.0833
Public administration and defence; compulsory social security	O	3.4370	3.1721	3.2784	2.8783	–0.0840	–0.0803
Education	P	3.5461	3.7894	4.4262	3.1426	–0.1424	–0.5372
Human health and social work activities	Q	5.9190	5.3271	4.1794	3.5335	–0.0699	–0.1530
Arts, entertainment and recreation	R	7.7485	7.8203	2.6631	3.3128	–0.1183	–0.1122
Other service activities	S	4.5000	4.8185	3.1858	4.9717	–0.0515	–0.1153
Activities of households as employers; undifferentiated goods–	T	4.6468	4.7225	3.2462	2.6280	–0.1176	–0.1111
Activities of extraterritorial organisations and bodies	U	4.6174	4.3812	4.7575	3.5289	–0.1374	–0.1031
Others		6.1943	6.2916	2.4557	2.2881	0.0397	0.0567

Table 5. Pearson Correlation Coefficients

The table presents Pearson Correlatin Coefficient for the 443,190 firm–years across 67,047 unique UK firms over the period 2004–2013. All variable are defined in Table 1.

	NTC	AGE	SIZE	MKTSHARE	INVT	OCF	GROWTH	EXPORT	DISTRESS
AGE	0.0013								
SIZE	0.0264***	0.0209***							
MKTSHARE	–0.0745***	0.0061***	0.3315***						
INVT	–0.0014***	–0.0037***	0.1179***	–0.2668***					
OCF	0.0025***	–0.0043**	–0.0088***	–0.1637***	–0.0088***				
GROWTH	0.26354***	0.0051***	0.0106***	0.0964***	0.0106***	0.0964***			
EXPORT	0.1032***	–0.0007	0.1443***	0.0416***	0.0037**	0.0416***	0.0037**		
DISTRESS	–0.3732***	0.0028**	–0.0702***	0.0935***	0.002***	–0.0167***	0.0020***	–0.0167***	
BANK	0.0354***	0.0006	0.0279***	0.0679***	0.0111***	0.0824***	0.0537***	0.0644***	0.0888***

***Significant at the 0.01 level; **Significant at the 0.05 level.

Table 6. Fixed Effects Results

This table presents firm fixed effects regression with 1–year NTC, 3–year NTC, 1–year IndAdj NTC, and 3–year IndAdj NTC as the dependent variables. The sample consists of 443,190 firm–years across 67,047 UK firms over the period 2004–2013. *t*–values are in parentheses below coefficients. All variable are defined in Table 1.

Variables	1–year NTC(%) (1)	3–year NTC(%) (2)	IndAdj NTC(%) (3)	3–year IndAdj NTC(%) (4)
AGE (log)	0.0024	0.0025	0.0026	0.00193
	(1.25)	(1.59)	(1.55)	(1.57)
$SIZE_{t-1}$ (log)	–0.0057***	–0.0050***	–0.0053***	–0.0058***
	(–4.57)	(–3.16)	(–3.25)	(–4.63)
$MKTSHARE_{t-1}$ (%)	–0.0221***	–0.0195**	–0.0191**	–0.0292***
	(–6.75)	(–2.13)	(–2.04)	(–9.19)
$INVT_{t-1}$ (%)	–0.0290***	–0.0861***	–0.0336***	–0.0784***
	(–3.74)	(–10.72)	(–3.36)	(–11.71)
OCF_{t-1} (%)	0.0142***	0.0229*	0.0157***	0.0167***
	(3.54)	(1.82)	(3.57)	(3.66)
$GROWTH_{t-1}$ (%)	0.0026***	0.0037***	0.0040***	0.0027***
	(3.37)	(3.49)	(3.29)	(4.48)
EXPORT (dummy)	0.0113***	0.0077***	0.0092***	0.0094***
	(5.80)	(2.91)	(3.70)	(4.50)
$DISTRESS_{t-1}$ (dummy)	–0.0034*	–0.0070***	–0.0050***	–0.0073***
	(–1.78)	(–3.74)	(–2.93)	(–4.29)
$BANK_{t-1}$ (dummy)	0.0109***	0.0210***	0.0119***	0.0510***
	(3.26)	(3.87)	(3.32)	(4.75)
C	0.110***	0.0835***	0.0880***	0.109***
	(9.27)	(2.66)	(2.68)	(9.02)
Observation	403,962	358,491	403,962	358,491
Adjusted R^2	0.3931	0.4482	0.3872	0.5255

***Significant at the 0.01 level; **Significant at the 0.05 level; *Significant at the 0.10 level.

Table 7. Fixed Effects Results: Marginal Effects of Economic Condition

This table presents firm fixed effects regressions using interaction terms to test for differences between recession and booming periods. The indicator variable is CRISIS, which is equals to one for years 2007–2009 and otherwise zero. The sample consists of 443,190 firm–years across 67,047 UK firms over the period 2004–2013. *t*–values are in parentheses below coefficients. All variable are defined in Table 1.

Variables	1–year NTC (1)	3–year NTC (2)	1–year IndAdj NTC (3)	3–year IndAdj NTC (4)
$CRISIS_{t-1}$ (dummy)	–0.0208***	–0.0258***	–0.0384***	–0.0214***
	(–5.24)	(–4.37)	(–4.35)	(–4.57)
AGE (log)	–0.0209	–0.0710	–0.0309	–0.0711
	(–1.11)	(–1.04)	(–1.06)	(–1.03)
AGE (log) x Crisis	–0.0109	–0.0961	–0.0110	–0.0251
	(–0.95)	(–0.00)	(–1.28)	(–0.27)
$SIZE_{t-1}$ (log)	0.0714***	0.0588***	0.0856***	0.0378***
	(4.59)	(3.11)	(5.52)	(2.63)
$SIZE_{t-1}$(log) x Crisis	0.0085***	0.0059***	0.0099***	0.0042***
	(7.14)	(5.04)	(7.21)	(5.16)
$MKTSHARE_{t-1}$ (%)	–0.0144***	–0.0141***	–0.0011**	–0.0247***
	(–4.20)	(–4.55)	(–2.11)	(–7.79)
$MKTSHARE_{t-1}$ (%) x Crisis	–0.0125***	–0.0097***	–0.0144***	–0.0079***
	(–7.03)	(–6.56)	(–7.01)	(–6.17)
$INVT_{t-1}$ (%)	–0.0171**	–0.0777***	–0.0179*	–0.0726***
	(–2.13)	(–9.44)	(–1.71)	(–10.84)
$INVT_{t-1}$ (%) x Crisis	–0.0602***	–0.0574***	–0.0517***	–0.0576***
	(–4.82)	(–3.55)	(–3.30)	(–4.58)
OCF_{t-1} (%)	0.0130***	0.0230*	0.0327*	0.0154***
	(6.08)	(1.77)	(1.62)	(4.92)
OCF_{t-1} (%) x Crisis	–0.0177***	–0.0154***	–0.0227***	–0.0106***
	(–5.66)	(–5.28)	(–5.98)	(–4.83)
$GROWTH_{t-1}$ (%)	0.0514***	0.0401**	0.0212***	0.0219***
	(3.04)	(2.30)	(3.09)	(2.93)
$GROWTH_{t-1}$ (%) x Crisis	0.0448***	0.0111**	0.0314**	0.0474***
	(2.80)	(2.22)	(2.59)	(3.39)
EXPORT (dummy)	0.0483***	0.0383**	0.0443**	0.0303**
	(2.90)	(2.43)	(2.47)	(2.40)
EXPORT (dummy) x Crisis	–0.0241**	–0.0266***	–0.0309**	–0.0215**
	(–2.10)	(–2.95)	(–2.44)	(–2.58)
$DISTRESS_{t-1}$ (dummy)	–0.0310**	–0.0614***	–0.0136*	–0.0673***
	(–2.29)	(–4.29)	(–1.78)	(–4.90)
$DISTRESS_{t-1}$(dummy)x Crisis	–0.0345***	–0.0243***	–0.0389***	–0.0399***
	(–4.14)	(–3.75)	(–4.32)	(–4.55)
$BANK_{t-1}$ (dummy)	0.0726***	0.0391**	0.0381**	0.0642***
	(3.55)	(2.47)	(2.36)	(3.11)
$BANK_{t-1}$ (dummy) x Crisis	0.0107***	0.0074***	0.0141***	0.0043***
	(4.54)	(2.96)	(4.37)	(2.65)
C	0.1150***	0.0882***	0.0536	0.112***
	(9.59)	(2.88)	(1.43)	(9.31)
Observation	403,962	358,491	403,962	358,491
Adjusted R^2	0.3933	0.4484	0.3874	0.5256

***Significant at the 0.01 level; **Significant at the 0.05 level; *Significant at the 0.10 level.

Table 8. Fixed Effects Results: Marginal Effects of Industry Competition

This table presents firm fixed effects regressions using interaction terms to test for differences between concentrated and competitive industries. A competitive (concentrated) industry is the half sample of firms in industries whose Herfindahl Index is below (above) the year median. The sample consists of 443,190 firm-years across 67,047 UK firms over the period 2004-2013. t-values are in parentheses below coefficients. All variable are defined in Table 1

Variable	1-year NTC (1)	3-year NTC (2)	1-year IndAdj NTC (3)	3-year IndAdj NTC (4)
Competition (binary)	0.0229***	0.0197*	0.0220***	0.0207***
	(3.38)	(2.12)	(28.21)	(27.52)
AGE (log)	–0.0341	–0.0157	–0.0162	–0.0145
	(–0.01)	(–0.21)	(–0.81)	(–0.02)
AGE(log) × Competition	0.0490	0.0804	–0.0789	–0.0738
	(1.11)	(1.66)	(–0.72)	(–0.01)
SIZE $_{t-1}$ (log)	0.0902***	0.0118**	0.0810***	0.0788***
	(5.17)	(2.67)	(3.85)	(3.70)
SIZE $_{t-1}$ (log) × Competition	0.0274***	0.0286***	0.0291***	0.0302***
	(11.16)	(5.97)	(5.48)	(6.12)
MKTSHARE $_{t-1}$ (%)	–0.0195	–0.0509***	–0.0674*	–0.0625**
	(–0.87)	(–4.67)	(–2.09)	(–3.41)
MKTSHARE $_{t-1}$ (%) × Competition	–0.0157***	–0.0236***	–0.0254***	–0.0228***
	(–6.04)	(–8.13)	(–4.35)	(–4.90)
INVT $_{t-1}$ (%)	–0.0191***	–0.0152***	–0.0138*	–0.0148**
	(–4.39)	(–3.82)	(–2.25)	(–3.30)
INVT $_{t-1}$ (%)× Competition	–0.0223***	–0.0193***	–0.0190**	–0.0208***
	(–7.74)	(–4.74)	(–3.24)	(–5.11)
OCF $_{t-1}$ (%)	0.0824***	0.0883***	0.0223	0.0803***
	(4.10)	(4.79)	(1.28)	(3.80)
OCF $_{t-1}$ (%)× Competition	0.0621***	0.0115***	0.0107***	0.0482***
	(7.59)	(3.67)	(3.80)	(6.27)
GROWTH $_{t-1}$ (%)	0.0370***	0.0155**	0.0233***	0.0244***
	(4.26)	(2.42)	(3.98)	(4.06)
GROWTH $_{t-1}$ (%)× Competition	0.0158**	0.0372***	0.0395***	0.0553***
	(2.72)	(3.45)	(3.66)	(4.88)
EXPORT(dummy)	0.0614***	0.0638***	0.0275***	0.0272***
	(49.26)	(65.23)	(16.88)	(27.92)
EXPORT(dummy) × Competition	0.0128***	0.0110***	0.111***	0.118***
	(7.97)	(4.83)	(14.57)	(40.91)
DISTRESS $_{t-1}$ (dummy)	–0.0509**	–0.0709***	–0.0510	–0.0514
	(–3.21)	(–3.52)	(–0.84)	(–0.89)
DISTRESS$_{t-1}$(dummy)×Competition	0.0801***	0.0831***	0.0406***	0.0461***
	(6.65)	(7.42)	(3.69)	(3.89)
BANK $_{t-1}$ (dummy)	0.0142***	0.0180***	0.0010	0.0021
	(4.58)	(4.70)	(0.05)	(1.80)
BANK $_{t-1}$ (dummy) × Competition	0.0610**	0.0909**	0.0810**	0.0409**
	(2.90)	(3.01)	(3.00)	(2.78)
C	0.126***	0.125***	0.0720***	0.0766***
	(58.79)	(30.83)	(15.82)	(17.63)
Observation	403,962	358,491	403,962	358,491
Adjusted R^2	0.3535	0.3350	0.2138	0.3797

***Significant at the 0.01 level; **Significant at the 0.05 level; *Significant at the 0.10 level.