THE EFFECT OF FINANCIAL CRISIS ON BEHAVIOUR OF TRADE CREDIT: A STUDY OF THE UK PRIVATE FIRMS

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ABSTRACT

The purpose of this paper is to investigate the impact of the recent credit supply shocks on the behaviour of trade credit (accounts payable) and trade debtor (accounts receivable) of UK private firms.

Design/methodology/approach – The fixed effect model is used in this study to investigate these issues.

The results indicate that private firm's short term bank leverage is adversely affected by the recent credit supply shock. In addition we have found that during the crises period UK private firms do not increase trade credit. The results further highlight that these firms also reduced the extension of trade credit to their customer. In addition, the trade credit behaviour of both manufacturing and service sector firms is adversely affected by exogenous credit contraction.

It is the first study that investigates the behaviour of trade credit, trade debtor of the UK private firms during the recent crisis period.

Key Words: Trade Credit, Private Firms, Financial Crisis

INTRODUCTION

Trade credit is one of the important sources of short term finance for the small firms (Berger & Udell, 1998). Its importance can be seen from the fact that it is not only the significant sources of short term finance for small firms but also for large firms (Beck, Demirgu¨c--Kunt, & Maksimovic, 2008; Stephen D. Oliner & Rudebusch, 1995). According to Federal Reserve Board study by Elliehausen and Wolken (1993), in the US trade credit represent 20 percent of all nonfarm nonfinancial liability of small business and 15 percent of all nonfarm nonfinancial liability of large firms in 1987. Berger and Udell (1998, 202) also reports that trade credit is a significant source of the US small business finance. They report that 15.78% of assets of small firms are financed by trade credit. Similarly, Bevan and Danbolt (2002) highlight that trade credit account for 62% of total liabilities of the UK firms. Kohler, Britton and Yates (2000, p. 13) also observed in their dataset that '.....70% of the total short-term (ie due in less than one year) credit extended and 55% of the credit received took the form of trade credit'.

It is reported in the existing literature that trade credit may provide cushion during credit crunches or tight monetary conditions, that leave financial institutions less willing or able to provide finances to small firms (Nilsen, 2002; Petersen & Rajan, 1997). Other studies such as Atanasova and Wilson (2003, 2004), and Mateut, Bougheas and Mizen (2006) have confirmed that when monetary conditions are tight small, bank dependent firms substitute bank credit with trade credit. However, the findings of some other

studies do not support the notion that small firms increase the use of trade credit as a substitute for bank credit during tight monetary conditions (Bernanke & Gertler, 1995; Gertler & Gilchrist, 1993).

However, the above mentioned studies have examined the behaviour of trade credit during tight monetary policy regime. There is however, handful of studies that have focused on the behaviour of trade credit during the crisis period obtaining contrasting results. Love, Preve and Sarria-Allende (2007) for example, report short term surge in trade credit following the Asian financial crisis. The studies by Taketa and Udell (2007) and Love and Zaidi (2010) report that trade credit and financial institutions lendings complement each other rather than act as substitutes. Arslan and Goknur (2009) examine the behaviour of trade credit and reported contrasting results.

To summarize the above discussion, it seems that behaviour of trade credit is mostly investigated during tight monetary policy regime while few studies have examined the behaviour of trade credit during the crisis period. It is clear from the findings of the existing studies that empirical evidences on the role of trade credit during the crisis period are mixed and inconclusive. This highlights a clear gap in the existing literature. It is also not very much clear from the existing literature whether trade credit serves as a complement or substitute for bank credit during the crisis period. As a result, it is still an unresolved dilemma. In this regard, some authors (see for example, Inessa Love & Zaidi, 2010) have called for more research on this issue in order to understand better the behaviour of trade credit during the crisis period. In addition, none of the above-mentioned studies have examined the behaviour of private firms during the recent financial crisis period. Similar, the trade credit behaviour of manufacturing and service sectors firms during the crisis period has never been investigate till date on the UK market.

This study therefore, investigates the trade credit behaviour of private firms during the recent financial crisis in the UK. More specifically, this study first investigates whether the shock to supply of credit affects the short term bank debt of private firms and then examine the behaviour of trade credit and trade debtor during the crisis period. The results of the study show that financial crisis has adversely affected the short term bank debt and trade credit. In other words, it suggests that trade credit do not serve as substitute of bank credit during the recent financing crisis period.

PREVIOUS LITERATURE

As mentioned earlier that trade credit is an important source of short term finance. Theoretical exposure on the role of trade credit as a potential substitute of bank credit was pioneered by Meltzer (1960). Meltzer (1960, p. 429) argue that '...when money was tightened, firms with relatively large cash balances increased the average length of time for which credit was extended. And this extension of trade credit appears to have favored these firms against whom credit rationing is said to discriminate'. Subsequent studies have confirmed the predictions of Meltzer (1960). For example, it has shown

that firm increase the use of trade credit when rationed by banks (Nilsen, 2002; Petersen & Rajan, 1997). This suggests that trade credit play an important hedging role during the crisis period.

It has been argued that trade credit can alleviate the information problem. The terms of credit potentially act as a screening device that extracts the information about the default risks of the buyers (Smith, 1987). Information imbalance between firms and banks can result in credit rationing possible due to adverse selection problem. As a result, firms may not be able to pursue the positive NPV projects. Trade credit can mitigate this information inequality because sellers have private information about their buyers. The provision of trade credit to buyer reveals that information to the market. In other words, the provision of trade credit from the sellers conveys signal of buyer credit worthiness to the banks and hence mitigate the credit rationing (Biais & Gollier, 1997).

The information advantage of suppliers has also been emphasized by Petersen and Rajan (1997). They argue that supplier has relatively advantage in providing trade credit to small, growing firms. This is because the supplier can obtain private information about a firm at relatively low cost and routinely. Suppliers do not use the information of other financial intermediaries; rather they collect and use different set of information. By monitoring repayment and observing the trade discount, the supplier can quickly and better judge the credit quality of a firm.

In addition, suppliers are also efficient to liquidate firm assets, if firm fail to meet their commitments (ibid). That is why firms that receive trade credit might have higher probability to obtain access to bank credit. It may be because bank use the presence of trade credit as a signal of firm quality (Cook, 1999). In a similar vein, Elliehausen and Wolken (1993) find evidence consistent with the financing theory of trade credit. They find that firms with high amount of short term finance use more trade credit. In other words, they find that trade credit is a complement rather than substitute for short term financial institutional loan.

Nilsen (2002), argues that small firms increase the use of trade credit during tight monetary conditions. Tight monetary conditions reduces bank loan as a result, the small firms, which face greater information problem and have restricted access to capital market, increase the use of trade credit as a undesirable substitute of bank loan. Interestingly, his findings show that large firms also increase the use of trade credit. In his further analysis, he used bond rating as a measure of access to market and show that large firms without bond rating, having high cash holdings and low collateral are also credit constraint. These firms do not have alternatives options and therefore, use costly trade credit. Overall, his results support the role of trade credit as a potential substitute of bank loan especially for the small firm's case.

It has also been reported that firms, which have access to capital market, use less trade credit (Nilsen, 2002; Petersen & Rajan, 1994). Moreover, accessibility to financial intermediaries credit increase the probability that firms will offers more trade credit (Petersen & Rajan, 1997). In addition, non-financial firms/suppliers provide more trade

credit to firms, should they generate greater cash flow (Biais & Gollier, 1997). Jain (2001) shows that when bank cannot costless observe firm revenue then it may find desirable to lend indirectly i-e to lend to an agent with superior information about buyers so that to enhance the profit. In other words, suppliers act as intermediaries between banks and final customers.

Atanasova and Wilson (2003, 2004) provide evidence that firm substitute bank credit with trade credit during stringent monetary conditions. They argue that during tight monetary conditions banks reduce the supply of credit. Specifically, the supply of bank credit reduces for the informationally opaque small and medium-sized firms. The demand for bank credit however, remains strong. To lessen the effect of bank credit rationing, the borrowing constrained small firms increase the use of trade credit. In other words, their reliance on less desirable alternative source of finance (i-e trade credit) increases. To conclude, their results suggest that when monetary conditions are tight small, bank dependent firms substitute bank credit with trade credit.

Kohler, Britton and Yates (2000) demonstrate that quoted firms help out the non-quoted firms by extending more trade credit to them during recession and tight monetary period. Using data on firms quoted in the UK stock exchange, they show that during recession trade credit extended rise while in the booms it falls. Similarly, the trade credit received fall during recession and rise during boom period. As a result, the net trade received fall during recession. This indicates that quoted firms, which have better access to capital market, extend more trade credit during recession period.

Further, they report that both the trade credit extended and trade credit received fall, when monetary conditions are tight. However, the reduction in trade credit received is more than trade credit extended. Hence, confirmed that quoted firms extend credit to non-quoted firms during recession and tight monetary conditions. In a similar vein, Calomiris, Himmelberg and Wachtel (1995) show that financially sound high quality firms issue commercial paper during economic duress. These firms issue more commercial paper during downturn to finance the account receivable. In other words, financially sound high quality firms extend more trade credit during economic downturns to support the short term financing needs of those firms which do not have access to public capital market. Thus, these firms serve as intermediaries during downturn.

Wilson, Le and Wether hill (2004) examine the Meltzer's hypothesis by using the UK data. They used data from the Credit Reference Agency data-base, ICC Juniper over the period 1983-1999. By disaggregated data on firm sizes, they find differences in the behaviour of various sized firms. For instance, their findings reveal that large firm extend more trade credit during monetary contractions period, but at the same time they also receive more trade credit. This indicates that large firms may not be able to obtain the required amount of credit from the external market and therefore, need more trade credit. However, they find that trade credit extended is more than trade credit received, as a consequence, net trade credit extension increased during stringent monetary period.

They also report that medium-sized firms extend less trade credit and receive more during tight monetary period. Similarly, small firms receive more trade credit when interest rate increases. Interestingly, they report that small firms also extend more trade credit during tight monetary conditions. Their further investigation reveals that this behaviour is found in financially distress firms. This may explain why small firms run out of cash and eventually fail. Overall, their results support the Meltzer's hypothesis.

Mateut, Bougheas and Mizen (2006) similarly provide evidence that trade credit serve as a substitute of bank loan during tight monetary period. By using data on 16000 UK manufacturing firms over the period 1990-1999, they show that during stringent monetary conditions bank loan reduce relative to trade credit. In conclusion, their findings confirm that UK small manufacturing firms resort to trade credit when monetary conditions are tight. In other words, small firms substitute bank loan with trade credit.

The above mentioned studies have examined the behaviour of trade credit during tight monetary policy. Love, Preve and Sarria-Allende (2007) however, explicitly examine the effect of the financial crisis on trade credit and bank credit for a sample of 890 publically traded firms in six emerging economies namely Indonesia, Korea, Malaysia, Philippines, Mexico and Thailand. Using data from the World scope database, they find short term surge in trade credit right after the crisis. However, it falls back in the post-crisis period. To indentify whether the result is driven by demand or supply factors, they used reliance on short term debt in the pre-crisis as indicator of firm vulnerability to crisis. Their analyses confirm that firms with high short term debt prior to the crisis reduced the provision of trade credit to their customer during and after the crisis period. Though, these firms reduced the provision of trade credit to their customer but increased their reliance on trade credit from their supplier. Gao and Yun (2009) also report similar result.

In addition, Love, Preve and Sarria-Allende (2007) also used cash stock and cash flow as indicator of firm's vulnerability to the crisis. Their estimation results confirm that high cash stock and high cash flow firms extend more trade credit to their customer both during and after the crisis and receive less credit from their supplier. They interpret this result as consistent with the redistribution view, in which financially sound firms redistribute the bank credit via trade credit to financially weak firm during the crisis period.

Love and Zaidi (2010) also examine the behaviour of trade credit and bank credit during the 1998 financial crisis. More specifically, they investigate the behaviour of trade credit and bank credit in a sample of SMEs in four East Asian countries namely Thailand, Korea, Philippines and Indonesia. They argue that, on average, the use of trade credit declined following financial shocks. However, this effect is more pronounced in a sample of firms which are financially constraint. The financial disturbance not only reduced the availability of trade credit but also reduced the maturity of trade credit and increased the cost of trade credit for the financially

constraint firms. As a result, financially constraint firms reduced the extension of trade credit to their customer, reduced the maturity and increased the cost of trade credit. Overall, their results suggest that trade credit and bank credit move in the same direction. In other words, the financial crisis reduced the availability of both bank credit and trade credit. This is consistent with the view that bank credit and trade credit are complements rather than substitutes of each other (Taketa & Udell, 2007).

Arslan and Goknur (2009) examine the behaviour of trade credit and reported contrasting results. They find that at low level of trade credit, there is positive relationship between bank loan and trade credit. In other words, at low level of trade credit, the supply of bank loan increases with the rise in trade credit. This implies that bank credit and trade credit serve as a complement at low level of trade credit. At high level of trade credit, they find negative relationship between bank credit and trade credit. At high level of trade credit, banks become unwilling to extend the loan to firms. Hence, it indicates that at high level of trade credit, bank loan and trade credit work as a substitute to each other.

To summarize the above discussion, it seems that behaviour of trade credit is mostly investigated during tight monetary policy regime while few studies have examined the behaviour of trade credit during the crisis period. In addition, it is clear from the findings of the existing studies that empirical evidences on the role of trade credit during the crisis period are mixed and inconclusive. This highlights a clear gap in the existing literature. It is also not very much clear from the existing literature whether trade credit serves as a complement or substitute for bank credit during the crisis period. As a result, it is still an unresolved dilemma. In this regard, some authors (see for example, Inessa Love & Zaidi, 2010) have called for more research on this issue in order to better understand the behaviour of trade credit during the crisis period. We therefore present the research methodology and data of this study in section 3 below.

RESEARCH METHODOLOGY AND DATA

The purpose of this study is to investigate the effect of the credit crisis on trade credit, trade debtors' behaviour of 4973 private firms in the UK during 2004-2009. To investigate these issues, the study adopts the fixed effect model as our research methodology. Financial Analysis Made Easy (FAME) database is used to extract Data. In addition, following (Love et al., 2007) the top and bottom 1% of all variables are winsorized for addressing the outlier's problem. The fixed effect regression model is given below.

$Y_{it} = \beta_{1i} + \beta_1 * Crisis_{it} + \beta_2 * X_{it} + \beta_3 * Crisis * X_{it} + \mu_{it}$ (1)

Where, Y_{it} is a measure of firm short term bank leverage ratio, β_1 is the differential slope coefficient and indicates how much is the slope coefficient of the second period (2007-2009) differ from that of the pre-crisis period (2004-2006); crisis is a dummy variable equal to one for the period 2007-2009 and 0 otherwise (2004-2006). The interactive term β_3 represent the change in response relative to the pre-crisis period, and

Xitis a set of firm control variable(s) such as size, sales growth, ROA, cash flow.

First, we take model 1 as the bench mark model for firm short term bank leverage ratio which will be regressed on firm demand and supply side factors. In order to examine the trade credit behaviour during crisis period, we incorporate trade credit and trade debtor as the dependent variables in model 1, which will be regressed against demand and supply side factors. Thus model 2 and 3 are formed which are highlighted below.

Trade Credit (Accounts payable)= 0+ 1 *CF + 2* GT+ 3* CR + 4* GT *CR + 5* CF *CR+ µit(2)

Trade Debtor (Accounts Receivable)= 0+ 1 *CF + 2* GT+ 3* CR + 4* GT *CR + 5* CF *CR+ µit(3)

Results

The fixed effect regression is run on short term bank loan In order to examine the effect of the credit crisis on the trade credit behaviour of private firms. Table 1 shows results from the estimation of model 1. The coefficient on the crisis dummy variable in the short term bank debt regression is -0.025 and significant at the level of 1% or better. The R-square value is 75% which indicates the goodness of model fit. The negative coefficient and high significance suggests that the flow of short term credit to private firms is squeezed as a result of the credit crisis. In other words, the financial

Table 1: Financial Crisis and Trade Credit

Variables	Model 1 Short Term Bank Loan	Model 2 Trade Credit	Model 3 Trade Debtor
ROA	-0.174	-----	-----
	(-11.01)***		
GT	-0.003	0.009	0.010
	(-0.82)	(2.31)**	(2.23)**
		0.046	-0.057
		(4.08)***	(-4.78)***
		-0.027	
CF*CR	----	(-2.13)**	
			(-0.25)
CR*ROA	-0.051		
GT*CR	(-2.72)***	0.040	0.058
	(2.91)***	(6.51)***	(8.63)***
CR	-0.025	-0.043	-0.069
	(-3.47)***	(-6.59)***	(-9.41)***
C	0.172	0.172	0.227
	(36.09)***	(39.73)***	(43.76)***

R-squared	0.750	0.909	0.932
No of Obs	22039	10041	10053
F-statistics	12.695	32.071	43.417
Prob(F-statistics)	0.000	0.000	0.000

The dependent variable in model 1 is short term bank loan.. Dependent variable in model 2 is trade credit which is measured as trade credit divided by total assets. Likewise, dependent variable in model 3 is trade debtor which is measured as trade debtors divided by total assets. Growth is measured as turnover divided by lagged turnover, i.e., turnovert / turnovert-1, Cash Flow is measured as cash flow from operating activities plus net interest income minus income tax divided by total assets. ***, **, * represent 1%, 5% and 10% levels of significance respectively

crisis has impaired the short term financing channel for private firms. As private firms face high information problem and are generally considered risky for the reasons discussed in chapter 2. Therefore, lenders may have squeezed the availability of credit to these firms because it has been shown that banks only consider safer loan options during tight credit conditions (Lang & Nakamura, 1995).

The reduction in the short term borrowings during the crisis period seems to be in line with the predictions of the existing published studies. For instance, it has been argued that small firms experienced reduction in short term borrowing during a tight monetary condition. In other words, the flow of short term credit to small firms squeezed following a tight monetary policy (see for example, Black & Rosen, 2008; Bougheas et al., 2006; Gertler & Gilchrist, 1993, 1994; Stephen D. Oliner & Rudebusch, 1995; Stephen D. Oliner & Rudebusch, 1996, for details). The result seems to be in contrast with the findings in Lim (2003). His results reveal that credit has been reallocated from large firms to small and profitable firms following the financial shocks in the Korea.

In order to investigate whether the private firms increased the use of trade credit during the recent financial crisis period, the fixed effect regression model (2) is run on trade credit. The dependent variable in model (2) is trade credit which is measured as trade credit scaled by total assets. The control variables in this regression are the crisis dummy indicator, cash flow, sales growth variable and their interaction with the crisis dummy variable.

The estimation results of model (2) are reported in table (1). Results from the estimation of model (2) reveal that majority of the control variables are statistically significant at the level of 1% or better. The coefficient on cash flow interacted with crisis dummy variable is negative and statistically significant at the level of 5%. With the predictions of the pecking order theory, the negative coefficient on cash flow variable is consistent. This implies, the more firm generates internal fund, the less it needs external finance (trade credit). To put it another way, internal fund and trade credit are substitute of each other during the crisis period. The negative relationship between cash flow and trade

credit is in line with previous published studies (see for example, Akbar, Rehman, & Ormrod, 2013; Christina V. Atanasova & Wilson, 2003; Christina V. Atanasova & Wilson, 2004; Inessa Love et al., 2007; Wilson et al., 2004).

At the level of 1%, the coefficient on the growth variable interacted with the crisis dummy variable is positive and significant. This suggests that growing firm need more external finance (trade credit) during the crisis period. As explained before, growing firms usually do not have sufficient internal finances to finance their investment during the crisis period and therefore, need to borrow more trade credit during the crisis period.

The coefficient on the crisis dummy variable in trade credit (account payable) regression is -0.04 and significant at the level of 1% or better, which reveals that during the crisis period supply of trade credit to private firms decreased. The reduction in the flow of trade credit following the recent panic in the financial market implies that private firms experienced reduction in the flow of trade credit from their supplier. Which means that trade credit do not compensate for the lower access to credit during the crisis period.This finding is in line with the findings reported in Lemmon and Roberts (2010).

As shown above, that private firms experienced reduction in the flow of trade credit during the crisis period. However, trade credit is a two way process. The two way nature of trade credit makes it necessary that we should also examine the behaviour of account receivable. The examination of account receivable will reveal whether private firms increased (or decreased) the extension of trade credit to their customers during the financial crisis period. For this purpose, the fixed effect regression model (3) is run on account receivable. The dependent variable in model (3) is trade debtors (account receivable). The estimation results of model (3) are again presented in table (1). Results from the estimation of model (3) reveal that majority of the control variables are significant, which shows that model is best fit. Interestingly, the coefficient on the cash flow variable interacted with the crisis dummy variable is negative. However, it lacks significance which suggests that private firms may not consider cash flow when granting credit to their customer during the crisis period. The sign of the coefficient on growth variable interacted with the crisis dummy variable is positive and significant. This indicates that private firms extend more trade credit to their customer during the crisis period, when they have more growth opportunities.

The coefficient on the crisis dummy variable is negative and significant at the level of 1% or better. To state differently, with the reduction of the credit supply, private firms adjusted their trade credit policy and reduced the flow of trade credit to their customer. If we compare the results of model (3) with model (2) then it seems that account receivable of private firms decreased more than account payable during the crisis period. The result of account receivable is however, consistent with the Kohler, Britton and Yates (2000).

However, it is not clear from results reported in table (1) that which sector of the economy is more sensitive to the credit supply shocks. To investigate this further,

we reclassified our sample firms into manufacturing and service sector and run separate regression on each of these group of firms. The estimation results are given in table (2). The estimation results reveal that credit crisis has adversely affected the trade credit of both manufacturing and service sector firms. However, the effect is more pronounced on the manufacturing firms. The possible reason might be that manufacturing firms use more trade credit than firms in service sector.

Table 2: Effect of financial Crisis on Trade Credit

Variables	Manufacturing Trade Credit	Service Sector Trade Credit	Manufacturing Trade Debtor	Service Sector Trade Debtors
GT	0.029	0.014	0.034	0.007
	(2.99)***	(2.55)**	(2.75)***	(1.44)
CF	0.028	0.038	-0.070	-0.040
	(1.59)	(3.15)***	(-2.77)***	(-3.22)***
GT*CR	0.036	0.014	0.056	0.050
	(2.59)***	(2.55)***	(3.36)***	(6.75)***
CF*CR	-0.010	-0.020	-0.017	-0.030
	(-0.45)	(-1.39)	(-0.59)	(1.87)**
CR	-0.045	-0.030	-0.066	-0.060
	(-3.07)***	(-3.54)***	(-3.69)***	(-7.39)***
C	0.158	0.173	0.244	0.218
	(14.50)***	(29.13)***	(17.98)***	(38.31)***
R-squared	0.891	0.910	0.881	0.939
No of Obs	2208	6850	2212	6853
F-statistics	24.986	33.688	22.667	52.092
Prob(F-statistics)	0.000	0.000	0.000	0.000

CR represents crisis dummy for the crisis period. The impact on the dependent variable during the crisis period is given by the sum of the coefficient associated with the given variable and variable interacted with the crisis dummy. The crisis dummy is interacted with control variables to determine the change in response relative to the pre-crisis period and the net response during the crisis period is found by adding the coefficients. The coefficient referring to pre-crisis period is given by the non-interacted variables. CF is the measure of cash flow, GT is the measure of sales growth, and ROA is the measure of firm performance. ***, **, * representing 1%, 5% and 10% levels of significance respectively.

CONCLUSION

The purpose of this paper is to investigate the impact of the recent credit supply shocks

on the behaviour of trade credit (accounts payable) and trade debtor (accounts receivable) of UK private firms. Furthermore, the study also examines the behaviour of trade credit and trade debtor of the manufacturing and service sector firms during the recent credit supply shock. The fixed effect model is used in this study to investigate these issues. The results indicate that private firm's short term bank leverage is adversely affected by the recent credit supply shock. In addition we have found that during the crises period UK private firms do not increase trade credit. The results further highlight that these firms also reduced the extension of trade credit to their customer. In addition, the trade credit behaviour of both manufacturing and service sector firms is adversely affected by exogenous credit contraction The effect is however, more significant on the manufacturing sector than firms in the service sector.

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