한국경제학보 제14권 제2호
The Korean Journal of Economics Vol. 14, No. 2(Autumn 2007)

UK Manufacturing Firms' Access to Trade Credit

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Abstracts

We use data from a large panel of UK manufacturing firms for the period 1990-1999, which allows us to separate a tight money period (1990-1992) from a loose money period (1993-1999) and show that the uptake of trade credit varies with the monetary cycle, increasing when interest rates are high and falling when rates fall. This offers indirect evidence in support of the bank lending channel. We discover that creditworthiness of firms reduces the use of trade credit. Also, access to the stock exchange or even to one of the alternative markets isolates firms from the impact of a monetary tightening. We conclude that trade credit is taken up by firms as a substitute for bank finance at the margin when they are credit constrained.

KRF Classification : B030600
Keywords : Trade Credit, Monetary Policy Transmission, Credit Channel

I. Introduction

Trade credit is widespread. According to a Federal Reserve Board Study by Elliehausen and Wolken (1993) trade credit

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represented about 20% of nonbank non-farm businesses' liabilities, and up to 35% of their total assets in the US. Rajan and Zingales (1995) calculated that trade credit represented 17.8% of total assets for all American firms in 1991, and in European countries such as Germany, France and Italy, trade credit represents more than a quarter of total corporate assets. For the United Kingdom, Kohler et al. (2000) estimate that 70 per cent of total short term debits (credit extended) and 55 per cent of total credit received by firms is comprised of trade credit. Eighty per cent of all UK firms use trade credit according to a review by Atanasova and Wilson (2002), and the scale of trade credit usage is much increased during periods of monetary contractions. Nilsen (2002) reports different sources that suggest that greater priority should be placed on studies of trade credit. Yet only a small empirical literature attempts to address this question (cf. Nilsen (2002), Cunat (2003) and Kohler et al. (2000)) and these papers are concerned mainly with the direction of change in trade credit when business conditions become adverse.

In this paper we intend to compare the usage of trade credit under tight monetary conditions versus usage under more benign periods. There is evidence in Bougheas et al (2006) that bank lending contracts when monetary policy tightens and expands when it loosens. If trade credit is a substitute for or a complement to bank lending then there is likely to be a relationship between the take up of trade credit and the monetary policy cycle. We also to assess whether firms offering trade credit discriminate between borrowers on the basis of firm-specific characteristics as do banks. It is conceivable that trade creditors respond to the same information on borrower chacteristics but have better information than banks on some aspects of the creditworthiness of the firms to which they lend. However, sellers may have vested interests in

continuing to lend to downstream firms that buy from them even if the firms have adverse indicators of creditworthiness. Lastly, we are able to make an important distinction between firms that are quoted on the stock exchange and those that are not. The firms that are unquoted are often the smaller, riskier and younger firms that are more vulnerable to credit contractions when monetary policy tightens.

We make use of the interchange between Kashyap, Stein and Wilcox (1993) (hereafter KSW) and Oliner and Rudebusch (1996), since the improvements in our understanding of external finance (especially bank lending) over the monetary cycle that were derived from these papers can be carried over to trade credit. The KSW approach isolates the influence of monetary policy contractions on bank lending by measuring the relative changes to bank lending compared to non-bank sources of funds by constructing a "mix" variable defined as the ratio of bank lending to total external finance (bank lending plus commercial paper). The subsequent work by Oliner and Rudebusch (1996) widens the range of alternative sources of finance (although it does not include trade credit), and accounts for differential effects on small as opposed to large firms. It does this by offering several alternative "mix" variables to account for these issues.

We follow the KSW approach while also accounting for firm-specific characteristics highlighted by Oliner and Rudebusch (1996). Recent evidence suggests that financially weak firms have difficulties in accessing relatively low external premium funds during tight money periods and thus they tend to substitute more costly funds to finance their projects (Nilsen, 2002; Valderrama, 2003). Anecdotal evidence supports this view by implying that credit constrained firms rely proportionally more heavily on trade credit relative to other sources of external finance in periods of

monetary tightening. Although we expect to find that bank borrowing diminishes and that trade credit increases in absolute terms at these times, we anticipate that trade credit will increase in relative terms as a short term source of finance for firms that are unable to access alternative external funds.

The rest of the paper is organised as follows. The next section discusses the relationship between trade credit and bank lending, the following sections then report our data sources, methodology, and the results. The last section concludes.

Ⅱ. Theoretical background

Trade credit is short-term finance offered by the seller to the buyer in place of cash. It typically has a discount period for settlement of the credit and the common notation is 2/10 net 30 meaning the buyer can have a two percent discount for settlement within ten days but the full amount should be settled in thirty days. The implied interest on the credit if the buyer does not settle within the discount period is often greater than the rate on other forms of short term finance e.g. bank loans. There is considerable debate in the literature whether trade credit is a complement or a substitute for bank lending, and this is complicated by the fact that the terms and maturity of the credit depend on whether the buyer takes advantage of the discount or not.

Trade credit might be a complement because the seller's provision of trade credit provides a valuable signal to the banker that the buyer is worthy of credit (see Biais and Gollier, 1997). Thus firms that take up trade credit may find that the price and quantity effects of credit rationing are eroded as they build

reputation, or some bank lending is available to them. Evidence suggests that firms may use both trade credit and bank credit even when banks are assumed to be relatively more competitive lenders than suppliers (Cunat, 2003).

There is also evidence that suggests trade credit channel might be a substitute for bank lending. This is provided by indications that trade credit ameliorates the effects of a tighter monetary policy by providing substitute credit for bank lending, which contracts in these circumstances. Evidence in the UK implies that the broad credit channel can be offset by the trade credit channel (Kohler, et al. 2000), since firms with direct access to capital markets help out bank-dependent firms by extending more trade credit when times are hard, both in gross and net terms. When borrowing and lending rates on offer to firms differ by a margin, trade credit can serve to arbitrage the difference (Emery, 1984). Firms may take up trade credit in order to mitigate credit rationing. This is also the case in the US where firms believed to be credit constrained (small firms) receive greater amounts of trade credit during periods of monetary tightening, implying that their demand for trade credit remains steady (Nilsen, 2002).

These papers discuss some important issues but there are further unanswered questions to address. In this paper we return to the issue of whether the credit channel -operating through the broad credit channel and the bank lending channel -is offset by trade credit. The first aspect of this issue is whether the provision of trade credit does indeed increase when monetary policy tightens. If it does, this supports the view that trade credit is more readily available when conditions become adverse, but it also provides evidence that there is a bank lending channel. The willingness to offer trade credit is only one side of the story: its counterpart in the willingness to take it up demonstrates that firms do not have

other external funds higher up the pecking order to rely upon. If more trade credit was offered but bank lending was not constrained then firms would prefer to use bank lending (which is cheaper), but if firms make use of it, it is probably because bank lending is not available because they are credit constrained in some markets.

The second part of the issue is to determine who is offered trade credit. The previous literature has assumed that all bank constrained firms are eligible for trade credit. If there were one-for-one substitution of trade credit for bank lending, then the credit channel would be attenuated. In this paper we seek to determine whether firms that offer trade credit discriminate between their customers according to firm-specific characteristics in the same way that banks discriminate between safe and risky borrowers. If they do so then provision of trade credit may only o ffset the credit channel for specific classes of firms, i.e. those that are deemed eligible to receive trade credit. Some firms may have characteristics that leave them constrained in terms of all forms of external finance including trade credit. These firms are unlikely to find any viable alternatives when monetary conditions become tight, and they are likely to fail.

We answer these questions by examining trade credit during tight and benign periods of monetary policy in the UK. We will also assess how the ratio of trade credit to total debt (or total assets) varies with firm characteristics such as firm liquidity, collateral, cost of sales, inventories, use of bank loans, and access to credit markets. These variables are typically used to explain access to bank loans and other forms of short term credit (c.f. Bougheas et al. 2006).

Ⅲ. Data

We construct a sample from FAME database using the following criteria:[1] firms whose activity is classified as manufacturing industry according to 1992 UK SIC Code in England, Scotland, Wales and Northern Ireland; firms established prior to 1989 and still reporting for the years 1999 and 2000. Our data set includes information about a total of 16,354 firms over the years 1990 to 1999.[2] The data has an exemption structure that allows some missing observations in company's accounts, and these are prevalent in the first couple of years of the sample period. This means that the sample is not a balanced panel. Firms that did not have complete records on trade credit received, total assets, turnover, bank loans, total debt, liquidity, inventories, and cost of sales were excluded. We also remove observations beyond the 1st and 99th percentiles for each of the regression variables.

Sample separation criteria

The data set presents some characteristics that make it extremely useful for our purposes. Firstly, it allows us to separate a tight monetary period (1990 -1992) from a loose monetary period (1993 -1999). The monetary policy in the UK was dedicated towards maintaining the exchange rate within its target zone in the Exchange Rate Mechanism during 1990-1992. This required high rates of interest to match those in Germany following reunification and to offset the perceived weakness of sterling, which was at the bottom of its permitted range in the target zone for much of the

1) The FAME database is collected by Bureau van Dijk Electronic Publishing and it is available at http://fame.bvdep.com.

2) There are 940 firms whose secondary activity is classified in the manufacturing sector.

period. The second period, 1993-1999, following the recession witnessed a period of sustained economic growth, falling unemployment and inflation, and interest rates at low levels in real terms by historical standards. The corporate sector experienced an improvement in net worth and borrowing conditions and was less constrained than in the earlier period.

Secondly, it offers a large number of observations, which make it ideal for testing the implications of a monetary tightening on different categories of firms. To test whether a monetary policy tightening has an impact on the trade credit usage by different types of firms, we partition firms according to whether they are more or less likely to face financing constraints using total real assets as a measure of size. In particular, we generate a dummy variable, D_{it}^{a}, which is equal to 1 if firm i's total assets are in the lowest 67% of the distribution of the total assets of all firms belonging to the same industry as firm i in year t, and 0, otherwise.[3] We allow firms to transit between size classes and therefore, our empirical analysis focuses on small firm-years rather than small firms.

For robustness reasons, we also present results obtained using employees as a measure of size. Consequently, the dummy variable, D_{it}^{e}, will take the value 1 if firm i's number of employees is in the lowest 67% of the distribution of the number of employees of all firms belonging to the same industry as firm i in year t, and 0, otherwise.

Table 1 presents descriptive statistics relative to our full sample of firm-years and to various sub-samples.

3) Firms are allocated to one of the following industrial sectors: metals, metal goods; other minerals, and mineral products; chemicals and man made fibres; mechanical engineering; electrical and instrument engineering; motor vehicles and parts, other transport equipment; food, drink, and tobacco; textiles, clothing, leather, footwear; and others.

[Table 1] Descriptive statistics

	All firm-years (1)	1990 - 1992 (2)	1993 - 1999 (3)	Unquoted (4)	Quoted (5)	Firm-years such that $D_{it}=0$ (6)	Firm-years such that $D_{it}=1$ (7)	Firm-years such that $D_{it}=0$ (8)	Firm-years such that $D_{it}=1$ (9)
						Sample split by assets		Sample split by employees	
Emp_{it}	253.836 (650.9027)	157.7333 (620.5255)	274.1098 (691.187)	230.5512 (571.3804)	1288.006 (1910.315)	540.2249 (973.0062)	74.10639 (107.9312)	638.882 (1032.654)	65.70454 (42.84185)
A_{it}	13374.41 (37243.46)	6300.963 (16156.89)	15026.76 (41771.39)	12440.2 (35096.14)	62292.32 (84182.14)	35540.4 (58903.43)	2480.049 (1842.411)	38789.3 (63091.45)	4113.87 (6870.726)
$Liquid_{it}$	1.175738 (.8156702)	1.119731 (.7438109)	1.187445 (.8315224)	1.176371 (.8187551)	1.142565 (.6327983)	1.144146 (.7790332)	1.191265 (.832654)	1.078444 (.6794225)	1.180763 (.8252369)
$Tanga_{it}$	.3040366 (.1847336)	.3174225 (.1905524)	.3008097 (.1836423)	.3036536 (.1853936)	.3239926 (.1449373)	.3176929 (.178424)	2973187 (.1873964)	.3307203 (.1652815)	2901994 (.1887981)
$Stocks_{it}$	.1224736 (.0892985)	.1273541 (.0944102)	.1215571 (.0884092)	.1216717 (.0892133)	.1589336 (.0855104)	.1370954 (.0886092)	1137736 (.088569)	.1331298 (.0830675)	120735 (.0915459)
$Costs_{it}$	.6283436 (.2502359)	.3903723 (.3514759)	.6702794 (.200333)	.6276324 (.2513304)	.6606837 (.1913392)	.6687479 (.2368318)	6043031 (.2548619)	.6673374 (.2347954)	6078589 (.262759)
$TC_{it}/Debt_{it}$	.4505371 (.2937881)	.4508919 (.3084691)	.450359 (.2907909)	.4484709 (.2941453)	.5540948 (.2547307)	.4199654 (.2809921)	4665923 (.2990433)	.4371735 (.2708397)	4705677 (.2906044)
$Bank/Debt_{it}$	.365068 (.284042)	.3389037 (.2860639)	.3706808 (.2835954)	.3675985 (.2848132)	.2382381 (.2056971)	.3820864 (.2875324)	3561305 (.281783)	.3616213 (.2708907)	3690548 (.2803887)
Observations	81537	13810	67823	79942	1595	28076	53461	23559	48101

Note: The table reports sample means. Standard deviations are presented in parentheses. The subscript i indexes firms, and the subscript t, time. Emp represents the firm's total number of employees; A, its total real assets; Liquid, its liquidity ratio defined as (current assets - inventories)/current liabilities; Tanga, is the ratio of tangible assets in total assets; Stocks represents the inventories in total sales; Costs gives cost of sales in total sales; TC, is trade credit received (accounts payable); and Bank, short term bank loans; Debt, total debt, i.e. trade credit, short term bank loans and long term debt.

Ⅳ. Model and methodology

In this paper we seek to determine whether trade credit offsets to some degree the reduction in the availability of other forms of credit under tightening monetary policy. According to the bank lending channel of monetary policy transmission, as central banks engineer an increase in the level of the interest rates by reducing the available liquidity in the money market, bank loans supply falls as financial intermediaries find wholesale funds become more scarce. As a consequence, credit constrained firms are forced to reduce their activity, unless they can find alternatives such as trade credit.

We explain the use of trade credit over the cycle with a combination of environmental (monetary policy) conditions and firm specific characteristics including the level of bank loans, liquidity, collateral, inventories, and cost of sales relative to sales. Only after conditioning for these important variables can we determine the response of trade credit usage to changing monetary stance.

Our baseline specification is:

$$TC_{it} = \alpha_i + \beta_1 MS_t + \beta_2 Bank_{it} + \beta_3 Liquid_{it} + \beta_4 Stocks_{it} + \beta_5 Tanga_{it} + \beta_6 Costs_{it} + \epsilon_{it} \quad (1)$$

where the subscript i indexes firms; and t, time, is $t = 1990 - 1999$.

Our measure of trade credit received by firms (TC) is based on the ratio of trade credit received (account payables) relative to total debt (defined as trade credit received, short-term bank loans, and long-term debt)[4]. Similarly, short-term bank loans ($Bank$) are also scaled by total debt. MS stands for monetary stance and is

proxied by the base rate set by the central bank. The other firm specific variables are: the liquidity ratio (*Liquid*), defined as current assets less inventories divided by current liabilities; the collateral a firm can offer (*Tanga*) proxied by the ratio of tangibles in total assets; the stocks of inventories to turnover (*Stocks*) since trade credit is mainly related to the financing of inventories; and the cost of sales in total sales (*Costs*). By using ratios, we are able to eliminate cyclical influences for the same reasons explained in KSW, and therefore variation in these measures will be due to either the influence of monetary policy changes or firm-specific effects.

Methodology

Trade credit, the main variable in our study, is a source of external finance for short periods of time. It is typically extended and paid back several times during a single year. Thus, we expect to find little dependence year-on-year between trade credit received or granted. For this reason we might prefer static estimation to dynamic estimation but before we settle for a static model we check for the autocorrelation of trade credit across periods.

First, we estimate the relationship between the financial choices of firms and their specific characteristics using a standard static panel model written in the following form:

$$y_{it} = \alpha_i + X_{it}\beta + \epsilon_{it}$$

where $i = 1, 2, ., N$ refers to a cross sectional unit (firms in this

4) Alternatively, we scale variables by total assets. In this case the dependent variable is the ratio of trade credit received relative to total assets; bank loans, stocksof inventories, collateral are also scaled by total assets. We report these results in Appendix B.

study), $i = 1, 2, ., T$ refers to time period. y_{it} and X_{it} are the dependent variable and the vector of non-stochastic explanatory variables for firm i and year t, respectively. ϵ_{it} is the error term, α_i captures firm-specific effects.[5] We reject the hypothesis of no systematic difference between coefficients obtained from the random effects and fixed effects models by using both the Hausman test and the Breusch-Pagan Lagrange Multiplier test. Therefore, in what follows we report estimation results from the within-groups estimator, given by

$$y_{it} - \bar{y} = (X_{it} - \overline{X_i})\beta + (\epsilon_{it} - \bar{\epsilon_i})$$

Estimations are obtained only for variables that vary through time.

Before proceeding further we check also for the autocorrelation of trade credit across periods following Cunat (2003). To this end, we estimate equation (1) augmented with the lagged value of the trade credit variable.

$$TC_{it} = \alpha_i + \beta_0 TC_{it-1} + \beta_1 MS_t + \beta_2 Bank_{it} + \beta_3 Liquid_{it} + \beta_4 Stocks_{it} + \beta_5 Tanga_{it} + \beta_6 Costs_{it} + \epsilon_{it} \quad (2)$$

The presence of the lagged dependent variable among the explanatory variables will bias our within-groups results. The

5) The characteristics of the individual effect αi will dictate the particular type of panel data estimator used. If we assume that the individual effects are fixed but not common across firms $i = 1, 2, ., N$ we use the within-groups or fixed-effects estimator. If on the other hand, firm specific constant terms are distributed randomly across cross-sectional units, that is, there is no correlation between firm specific constant terms and explanatory variables, we should use the random effects model. In order to decide which of the two approaches is more appropriate we implement the Hausman test and the Breusch-Pagan Lagrange Multiplier test.

within-groups estimator eliminates the firm-specific bias present in OLS estimations but introduces a simultaneity bias in autoregressive models estimated from short panels. Hsiao (1986) and Nickell (1981) show that in an AR(1) specification the coefficient associated with the lagged dependent variable is biased upwards in an OLS specification, while the within-groups estimate is downwards biased. There is no indication of the size of the bias, but we can perform first-difference GMM equations, which eliminate the firms specific time effects by differencing the equations. We expect a consistent GMM estimate to lie in between the downward biased within-groups estimate and the upward biased OLS estimate. By gauging the proximity of the within-groups estimates to the GMM results we can get an indication of the size of the biases for fixed-effects estimators.

The GMM first-differenced estimation uses lagged values of the endogenous variables as instruments. If the model is correctly specified, the variables in the instrument set should be uncorrelated with the idiosyncratic component of the error term. We test the validity of the instruments used by reporting both the Sargan test of the overidentifying restrictions and direct tests of second order serial correlation in residuals (m2). The m2 test provides a further check on the specification of the model and on the legitimacy of instruments dated t-2. However, neither the Sargan nor the m2test allows us to discriminate between bad instruments and model specification.

Finally, as financially constrained firm-years are more likely to be affected by a change in monetary policy conditions than unconstrained firm-years, we differentiate between firm-years more and less likely to face financing constraints. More specifically, we estimate equations of the following type:

$$y_{it} = \alpha_i + \beta_1 X_{it} * D_{it} + \beta_2 X_{it} * (1 - D_{it}) + \xi_{it}$$

Estimation results are interpreted as follows: the coefficients referring to constrained firm-years are given by the variables interacted with D_{it}, while the coefficients referring to unconstrained firm-years are given by the variables interacted with $(1 - D_{it})$.

V. Results

The first step in our empirical analysis is to determine the serial correlation in the trade credit/ total debt ratio and the extent of the biases in within-groups versus GMM estimators. Table 2 reports alternative estimates for our model. Results are qualitatively the same, coefficients maintain sign and significance across estimation methods. This gives us several reasons for preferring the fixed-effects estimates to the GMM. First, the GMM coefficient is very close to the within-groups coefficient associated with the lagged dependent variable, therefore, the downward bias present in our within-groups estimation is negligible. Second, while the test for second order serial correlation of the residuals (m2) suggests the model is correctly specified, the Sargan test fails. This could be symptomatic of weak instruments since trade credit is poorly correlated with lagged values. Third, comparing across columns we see that the standard errors of the GMM estimates seem to be larger than the standard errors for fixed-effects, with resulting low significance of variables, and weaker tests for signifi cant differences between samples that are split using interaction dummies. Fourth, the use of first-difference GMM estimator implies the loss of two years of observations due to taking lags

【Table 2】 Alternative estimations

	GMM	Within-groups	OLS	GMM	Within-groups	OLS
$TC_{it}*D_{it}$				0.005	-0.038***	-0.119
				(0.016)	(0.006)	(0.007)
TC_{it-1}	0.168***	0.160***	0.544***	0.162***	0.185***	0.616***
	(0.009)	(0.003)	(0.004)	(0.014)	(0.005)	(0.006)
MS_t*D_{it}				0.000	0.004***	0.011***
				(0.001)	(0.001)	(0.001)
MS_t	-0.002*	-0.002***	-0.004***	-0.002	-0.005***	-0.012***
	(0.001)	(0.000)	(0.001)	(0.002)	(0.001)	(0.001)
$Bank_{it}*D_{it}$				-0.044**	-0.103***	-0.132***
				(0.019)	(0.006)	(0.007)
$Bank_{it}$	-0.744***	-0.607***	-0.411***	-0.709***	-0.541***	-0.332***
	(0.013)	(0.003)	(0.004)	(0.020)	(0.005)	(0.005)
$Liquid_{it}*D_{it}$				0.026***	0.013***	0.012***
				(0.010)	(0.002)	(0.002)
$Liquid_{it}$	-0.090***	-0.026***	-0.002**	-0.103***	-0.034***	-0.009***
	(0.009)	(0.001)	(0.001)	(0.012)	(0.002)	(0.002)
$Stocks_{it}*D_{it}$				0.004	0.070***	0.014
				(0.067)	(0.021)	(0.015)
$Stocks_{it}$	-0.066	-0.168***	-0.141***	-0.077	-0.205***	-0.140***
	(0.050)	(0.014)	(0.008)	(0.063)	(0.019)	(0.012)
$Tanga_{it}*D_{it}$				-0.029	-0.056***	-0.060***
				(0.040)	(0.011)	(0.008)
$Tanga_{it}$	-0.570***	-0.356***	-0.202***	-0.543***	-0.317***	-0.160***
	(0.046)	(0.008)	(0.004)	(0.056)	(0.011)	(0.006)
$Costs_{it}*D_{it}$				0.032	0.072***	0.069***
				(0.023)	(0.006)	(0.006)
$Costs_{it}$	-0.019	-0.030***	-0.009***	-0.057**	-0.088***	-0.056***
	(0.018)	(0.004)	(0.003)	(0.026)	(0.006)	(0.005)
Observations	37363	60542	60542	37363	60542	60542
Number of id	9067	11325		9067	11325	
m2 / R^2	-1.43	0.61	0.61	-1.33	0.62	0.62
Sargan (p-value)	0.00			0.00		

Note: Time dummies were included in the first-difference GMM specification. Standard errors and test statistics are asymptotically robust to heteroskedasticity. m2 is a test for second order serial correlation in the first-differenced residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. The Sargan statistic is a test of the overidentifying restrictions, distributed as chi-square under the null of instrument validity. Instruments in column (1) include lags t-2 to t-4. In columns 5 to 7 non-interacted variables correspond to unconstrained firm-years, while coefficients for constrained firm-years are given by the sum of the interacted and non-interacted variables.

and differences. Since our sample covers the period 1990-1999 this would mean losing the data for the years 1990 and 1991, which correspond to the tight money period. On the basis of these findings we favour the within-groups estimations and we only report these results in what follows.[6]

5.1 Does trade credit received by firms vary with the monetary cycle?

Preliminary analysis of the responses of the ratios of trade credit to total debt and trade credit to total assets to our monetary stance variable are reported in Tables 3a and 3b. These results are generated over the full sample (column 1), over the tight policy period (column 2), and over the loose policy period (column 3). After controlling for the firm specific variables (level of bank loans, liquidity, inventories, collateral, and cost of sales relative to sales) we find that an interest rate increase has the opposite effect in a period of monetary tightening (1990-1992) versus a period of monetary loosening (1993-1999). This means that firms increase their use of trade credit when credit conditions are tight and reduce it with a relaxing of borrowing conditions. Given that trade credit is the most expensive form of credit available to firms, this is what we would expect to occur, since trade credit is likely to be the last resort for firms that are unable to get cheaper credit elsewhere.

In what follows, we separate out the two monetary regimes and investigate whether a monetary policy tightening has a different impact on the trade credit variable for firms of different types. Firms make transitions from one category to another, so we

6) Using a similar reasoning, Mulkay, Hall and Mairesse (2001) choose the within-groups approach in their error correction model for firm investment.

【Table 3a】 Within-groups estimations

Dependent variable trade credit received/total debt

	90-99	90-92	93-99
MS_t	-0.001***	-0.006***	-0.001
	(0.000)	(0.001)	(0.001)
$Bank_{it}$	-0.634***	-0.803***	-0.620***
	(0.003)	(0.010)	(0.003)
$Liquid_{it}$	-0.025***	-0.050***	-0.020***
	(0.001)	(0.005)	(0.001)
$Stocks_{it}$	-0.180***	-0.050	-0.159***
	(0.013)	(0.047)	(0.014)
$Tanga_{it}$	-0.383***	-0.302***	-0.373***
	(0.007)	(0.030)	(0.008)
$Costs_{it}$	-0.054***	-0.029***	-0.025***
	(0.004)	(0.007)	(0.007)
Observations	72466	11062	61464
Number of id	12375	6832	12016
R^2	0.50	0.48	0.50

Note: The subscript i indexes firms, and the subscript t, time. MS stands for monetary stance; Bank, is short term bank loans in total debt; Liquid, represents the liquidity ratio defined as (current assets - inventories)/current liabilities; Stocksrepresents the inventories in total sales; Tanga, is the ratio of tangible assets in total assets; Costs gives cost of sales in total sales.

【Table 3b】

Dependent variable trade credit received/total assets

	90-99	90-92	93-99
MS_t	0.003***	0.006***	-0.002***
	(0.000)	(0.001)	(0.000)
$Bank_{it}$	-0.129***	-0.305***	-0.112***
	(0.002)	(0.013)	(0.002)
$Liquid_{it}$	-0.042***	-0.057***	-0.037***
	(0.001)	(0.004)	(0.001)
$Stocks_{it}$	0.092***	0.068**	0.100***
	(0.005)	(0.032)	(0.005)
$Tanga_{it}$	-0.149***	-0.194***	-0.142***
	(0.004)	(0.023)	(0.004)
$Costs_{it}$	-0.010***	-0.026***	0.052***
	(0.002)	(0.005)	(0.003)
Observations	71007	10846	60225
Number of id	12324	6757	11968
R^2	0.19	0.21	0.19

Note: See notes to Table 2a. and note that Bank and Stocks are scaled by total assets in Table 2b.

【Table 4】 Within-groups estimations

	90-92	93-99	90-92	93-99
	Sample split by assets		Sample split by employees	
$MS_i^* D_{it}$	0.007***	0.003***	0.006***	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)
$MS_i^*(1-D_{it})$	0.003***	-0.004***	0.003***	-0.002
	(0.001)	(0.001)	(0.001)	(0.001)
$Bank_{it}^* D_{it}$	-0.821***	-0.655***	-0.832***	-0.643***
	(0.011)	(0.004)	(0.010)	(0.004)
$Bank_{it}^*(1-D_{it})$	-0.750***	-0.558***	-0.719***	-0.540***
	(0.016)	(0.005)	(0.018)	(0.006)
$Liquid_{it}^* D_{it}$	-0.049***	-0.015***	-0.051***	-0.017***
	(0.006)	(0.002)	(0.006)	(0.002)
$Liquid_{it}^*(1-D_{it})$	-0.051***	-0.025***	-0.045***	-0.022***
	(0.007)	(0.002)	(0.008)	(0.003)
$Stocks_{it}^* D_{it}$	-0.039	-0.126***	-0.006	-0.132***
	(0.051)	(0.017)	(0.048)	(0.016)
$Stocks_{it}^*(1-D_{it})$	-0.045	-0.192***	-0.100	-0.225***
	(0.057)	(0.019)	(0.069)	(0.023)
$Tanga_{it}^* D_{it}$	-0.320***	-0.403***	-0.313***	-0.377***
	(0.032)	(0.009)	(0.031)	(0.010)
$Tanga_{it}^*(1-D_{it})$	-0.265***	-0.311***	-0.235***	-0.279***
	(0.035)	(0.011)	(0.039)	(0.013)
$Costs_{it}^* D_{it}$	-0.020**	-0.015**	-0.014*	-0.022***
	(0.008)	(0.007)	(0.008)	(0.007)
$Costs_{it}^*(1-D_{it})$	-0.062***	-0.065***	-0.063***	-0.084***
	(0.013)	(0.010)	(0.013)	(0.011)
Observations	11062	61464	10440	55491
Number of id	6832	12016	6507	11112
R^2	0.49	0.51	0.49	0.50

Note: See notes to Table 2a. Variables interacted with the dummy D give coefficients for constrained firm-years while variables interacted with (1-D) give coefficients for unconstrained firm-years.

classify firms in each year, and record the response by firm-years in each category. The first two columns in Table 4 report results when firm-years are separated according to total assets, while in

the last two columns firm-years are separated according to the number of employees.

Columns 1 and 3 show that when monetary policy is tight all types of firm-years rely more heavily on trade credit (the coefficients are positive and significant), but there is some difference in the degree to which firm-years increase the ratio of trade credit in total debt according to their type. The coefficients associated with the monetary stance (*MS*) are twice as large for small firm-years than those of large firm-years.[7] The results hold for both asset and employment criteria for separating small and large firm-years.

Different results are obtained for the period of loose monetary policy. When monetary conditions are good, only small firm-years increase their use of trade credit relative to total debt in response to an interest rate increase. Large firm-years with better access to cheaper sources of funds can actually reduce their use of trade credit when we classify firm-years according to the total assets criterion. Our results hold for both sample separation criteria. The coefficients associated with the monetary stance variable maintain sign and significance when firm-years are divided according to the number of employees in the tight money period but lose significance in the loose money period. Our results confirm the findings in Nilsen (2002), that credit constrained firms receive greater amounts of trade credit during periods of monetary tightenings, implying that their demand for credit remains steady.

The support we find for the trade credit channel is reinforced when we estimate all regressions with the dependent variable defi ned as the ratio of trade credit in total assets.[8] A monetary tightening generates an increase in the trade credit to assets ratio

7) In this study we measure the monetary stance using the level of base rates.

8) These results are relegated to Appendix B.

for both small and large firm-years and the impact is almost twice as large for small firm-years than for large firm-years. Conversely, large firm-years reduce their proportion of assets financed by trade credit in response to an interest rate increase in a benign monetary period. Results are similar using both criteria (i.e. total assets and number of employees) to classify firm-years.

We check the robustness of our results furthermore by changing the percentile at which we separate small and large firm-years. Our dummy variable D_{it}^{a}, is equal to 0if firm i's total assets are in the upper quartile of the distribution of the total assets of all firms belonging to the same industry as firm i in year t, and 1, otherwise.[9] We also set the dummy variable, D_{it}^{e}, to be equal to 0 if firm i's number of employees is in the highest quartile of the distribution of the number of employees of all firms belonging to the same industry as firm i in year t, and 1, otherwise. The robustness check is performed for both ways of defining the dependent variables as the ratio of trade credit received in total debt and the ratio of trade credit received in total assets, respectively. Results do not change qualitatively.[10] We conclude therefore that trade credit received by firm-years vary with the monetary cycle. All firm-years increase their use of trade credit when credit conditions are tight according to their type (small firm-years increase more their use of trade credit than large firm-years). Large firm-years are able to reduce their use of this expense form of external finance when monetary policy relaxes.

9) In other words, the dummy D_{it} is equal to 1 if firm i's total assets are in the lowest 75% of the distribution of the total assets of all firms belonging to the same industry as firm i in year t, and 0, otherwise.

10) We do not report these results but they are available on request.

5.2 Does trade credit depend on firm-specific factors?

Our next question relates to the wider credit channel view which advocates that firms with weaker balance sheets are likely to be most affected by a monetary tightening since they face greater difficulties in finding certain types of external finance. In the first rows of Table 3, which we evaluated in the previous section, we found that smaller firm-years, are more vulnerable to monetary tightening than larger firm-years. In this section we assess whether access to bank loans, liquidity, stock of inventories, collateral, and costs of sales influence the uptake of trade credit relative to other sources of funds by reading down the remaining rows of the table for the firm-years of given types. We do this by interacting all variables with the dummy variable. The variables interacted with D_{it} refer to constrained firm-years, while the variables interacted with $(1-D_{it})$ correspond to unconstrained firm-years.

One of the main factors affecting the ratio of trade credit to total debt is the proportion of bank loans in total debt, *Bank*. The coefficients associated with the *Bank* variable are always highly significant for all firm-year types and across all sample-separations. The coefficients are uniformly negatively signed implying that firm-years with more bank funding can reduce the use of the more expensive supplier finance. Moreover, the size of the coefficients is larger for small firm-years and especially in times when monetary policy is tight. This confirms that firms receive less bank lending and use more trade credit (gross) when monetary policy tightens. Our results underline that there is a bank lending channel, as suggested by Kashyap et al. (1993), but smaller firm-years are relatively more affected by higher interest

rates as suggested by Oliner and Rudebush (1996). A major implication of our findings is that monetary policy does not choke off funds altogether since there is substitution from bank finance to trade credit when monetary policy tightens. This confirms the results of Atanasova and Wilson (2004). One respect in which the monetary policy does separate, however, is in shifting the balance of funding away from financial institutions and towards suppliers, it increases the marginal cost of external finance.

Firm liquidity is an important explanatory variable in both panel periods. The coefficients are negative and significant at the one percent confidence level in all regressions. Moreover, coefficients are generally larger in times of a monetary contraction, suggesting that liquidity has relatively greater influence over the composition of firm finance when interest rates are high than when the economy is in recovery. In other words liquidity allows a firm to access finance higher up the pecking order than it would otherwise be able to do.

Trade credit is often related to the accumulation of inventories. Trade credit is important for the readjustment of the stocks of inventories following unexpected demand shocks. This is reflected in our results by the negative sign of the coefficient of the inventories to sales ratio.[11]

Better collateral reduces the use of trade credit as an external source of finance for all firm-years and in both monetary policy regimes. This is a strong result that matches our intuition. Also, the response of small firm-years is greater than that of large firm-years and the difference is significantly different from zero. The difference becomes even greater in benign money periods since the coefficients in the second column are greater than those

11) The positive relation between trade credit and inventories is confirmed in our alternative specification where all variables are scaled by total assets.

in the first column and again the differences are significantly different from zero. In other words, collateral seems to be of more importance for small firm-years and reduces the use of trade credit *even more* when credit conditions are good.

The ratio of cost of sales in total sales is another important factor in explaining the use of trade credit. This variable can be interpreted as a measure of firm profitability; when the cost of sales rises relative to total sales, profitability falls. Its influence on the ratio is always significant and of negative sign because firms use less trade credit when it is more costly to make sales. There seems to be no difference across monetary policy regimes but large firm-years reduce their use of trade credit relative to small firm-years in both types of monetary regimes when the ratio of cost of sales to sales increases.

We conclude that firm specific characteristics that lie behind the idea of a "balance sheet channel" in the credit channel literature can also be found to be influential over the extension of trade credit. Factors such as liquidity and collateral that generally tend to allow a firm greater access to bank lending reduce trade credit use as one would expect.

Ⅵ. Quoted versus unquoted firms

A fundamental assumption behind the interpretation of our results and those of Cunat (2003) is that firms access trade credit when bank credit is unavailable because no other alternatives are readily available. It is assumed, for example, that access to market finance is not possible as an alternative to tightening bank loan supply. If this is the case we should find greater sensitivity of trade credit for firms that do not have access to market finance.

Unquoted firms should be more reliant on bank lending, and on trade credit in its absence, than quoted firms.

We are able to identify quoted firms and unquoted firms in our data, which is something that previous studies typically could not do.[12] We can also distinguish between those quoted on the main list, and those quoted on the Alternative Investment Market (AIM) and on the OFEX ("Offexchange") market. We define a quoted firm as one on the main list or AIM/OFEX markets. Whether a firm belongs to the quoted group or the "unquoted" group is fixed over the entire sample period since there is evidence that only a small number of firms were "promoted" to a better capital market during the sample period.[13] Therefore, we can assess the influence of being quoted on the main list or on the alternative markets, or not being quoted at all.

We estimate the same regressions as before but we separate out those firms quoted on one of the alternative capital markets from unquoted firms. We surmise that monetary contractions affect mostly unquoted firms, which have fewer alternatives for external funding, as the credit channel theories would suggest.

Tables 5a and 5b report the results for our baseline specification separately for unquoted and quoted firms. Access to the stock exchange or to one of the alternative markets clearly isolates firms from the impacts of a monetary tightening. The monetary stance variable is never significant for the group of quoted firms, and their borrowing behaviour does not change according to the type

12) Most empirical studies using UK firm level data use the Datastream database, which covers only firms quoted on the London Stock Exchange. These firms tend to be larger, more solvent, less risky, and are less likely to be financially constrained. Most importantly, they all have access to market finance.

13) We classify firms as "quoted" in the period 1990-1995 even though the AIM and the OFEX market were not established until 1995. We do this because firms that had not performed well for the 1990-95 period would not have been admitted on these markets later on.

[Table 5a] Within-groups estimations for unquoted firms
Dependent variable trade credit received/total debt

	90-99	90-92	93-99
MS_t	-0.001***	0.006***	0.001
	(0.000)	(0.001)	(0.001)
$Bank_{it}$	-0.634***	-0.804***	-0.619***
	(0.003)	(0.010)	(0.004)
$Liquid_{it}$	-0.026***	-0.049***	-0.021***
	(0.001)	(0.005)	(0.001)
$Stocks_{it}$	-0.181***	-0.071	-0.159***
	(0.013)	(0.047)	(0.014)
$Tanga_{it}$	-0.388***	-0.300***	-0.378***
	(0.007)	(0.030)	(0.008)
$Costs_{it}$	-0.055***	-0.029***	-0.027***
	(0.004)	(0.007)	(0.007)
Observations	70892	10984	59970
Number of id	12112	6776	11756
R^2	0.50	0.49	0.50

Note: See notes to Table 2a.

[Table 5b] Within-groups estimations for quoted firms
Dependent variable trade credit received/total debt

	90-99	90-92	93-99
MS_t	-0.006*	-0.000	-0.004
	(0.003)	(0.013)	(0.005)
$Bank_{it}$	-0.649***	-0.901***	-0.662***
	(0.026)	(0.188)	(0.027)
$Liquid_{it}$	0.025**	-0.152*	0.030***
	(0.010)	(0.084)	(0.010)
$Stocks_{it}$	-0.124	1.350*	-0.156*
	(0.085)	(0.651)	(0.088)
$Tanga_{it}$	-0.054	-0.492	-0.054
	(0.065)	(1.096)	(0.068)
$Costs_{it}$	0.077*	-0.032	0.137**
	(0.045)	(0.149)	(0.061)
Observations	1574	78	1494
Number of id	263	56	260
R^2	0.38	0.22	0.39

Note: See notes to Table 2b.

of the monetary regime. The exact opposite happens when we look at firms that are not quoted since these firms are sensitive to the monetary stance and borrow more from suppliers when conditions are tight. Their borrowing behaviour confirms our predictions for credit constrained firms.

The monetary stance variable is highly significant in all specifications for the group of unquoted firms. It seems that only unquoted firms increase their ratio of trade credit in total debt when money is tight since they have no alternative sources of funds higher up the pecking order of finance. These results support our previous findings about the existence of the credit channel. Also, our results are in line with the findings of Kohler et al (2000), which suggest that quoted firms help unquoted firms by reducing their use of net trade credit following a monetary tightening.

We conclude that separating the quoted firms and the unquoted firms is informative and highly relevant to the credit channel argument. It confirms that the credit channel exists, and that trade credit offers some shelter for credit constrained firms with no alternative external financing options. It seems that the monetary policy regime does not have any statistical impact on the borrowing behaviour of the first, but it does for the latter, which behave as "constrained" firms.

We can go further with our analysis and separate firms unquoted into more or less likely to be financially constrained using the same dummy variable, D_{it}^{a}, which is equal to 1 if firm i's total assets are in the lowest 67% of the distribution of the total assets of all firms belonging to the same industry as firm i in year t, and 0, otherwise[14]. As before, we allow firms to transit

14) Again, we also use employees as a measure of size such that, the dummy variable, D_{it}^{e}, will be equal to 1 if firm i's number of employees is in the

between size classes and therefore, our empirical analysis focuses on small firm-years. We expect to find a stronger impact on the borrowing behaviour of firms when monetary policy tightens when we study only the unquoted firms.

【Table 6】 Within-groups estimations for unquoted firms

	90-92	93-99	90-92	93-99
	Sample split by assets		Sample split by employees	
$MS_t^* D_{it}$	0.007***	0.003***	0.006***	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)
$MS_t^*(1-D_{it})$	0.003**	-0.004***	0.003**	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
$Bank_{it}^* D_{it}$	-0.825***	-0.656***	-0.834***	-0.643***
	(0.011)	(0.004)	(0.010)	(0.004)
$Bank_{it}^*(1-D_{it})$	-0.745***	-0.556***	-0.716***	-0.539***
	(0.016)	(0.005)	(0.018)	(0.006)
$Liquid_{it}^* D_{it}$	-0.048***	-0.017***	-0.052***	-0.017***
	(0.006)	(0.002)	(0.006)	(0.002)
$Liquid_{it}^*(1-D_{it})$	-0.050***	-0.026***	-0.045***	-0.026***
	(0.007)	(0.002)	(0.008)	(0.003)
$Stocks_{it}^* D_{it}$	-0.059	-0.134***	-0.024	-0.131***
	(0.051)	(0.017)	(0.048)	(0.017)
$Stocks_{it}^*(1-D_{it})$	-0.067	-0.180***	-0.130*	-0.228***
	(0.057)	(0.020)	(0.069)	(0.023)
$Tanga_{it}^* D_{it}$	-0.319***	-0.406***	-0.312***	-0.381***
	(0.032)	(0.009)	(0.031)	(0.010)
$Tanga_{it}^*(1-D_{it})$	-0.259***	-0.323***	-0.231***	-0.290***
	(0.035)	(0.011)	(0.039)	(0.013)
$Costs_{it}^* D_{it}$	-0.020**	-0.017**	-0.013*	-0.026***
	(0.008)	(0.007)	(0.008)	(0.008)
$Costs_{it}^*(1-D_{it})$	-0.064***	-0.065***	-0.068***	-0.080***
	(0.013)	(0.010)	(0.013)	(0.011)
Observations	10984	59970	10363	54000
Number of id	6776	11756	6451	10852
R^2	0.50	0.51	0.49	0.50

Note: See notes to Table 2a. Variables interacted with the dummy D give coefficients for constrained firm-years while variables interacted with (1-D) give coefficients for unconstrained firm-years.

lowest 67% of the distribution of the number of employees of all firms belonging to the same industry as firm i in year t, and 0, otherwise.

【Table 7】 Within-groups estimations for quoted firms

	90-92	93-99	90-92	93-99
	Sample split by assets		Sample split by employees	
$MS_t * D_{it}$	-0.002	0.002	0.002	-0.001
	(0.013)	(0.006)	(0.011)	(0.006)
$MS_t * (1 - D_{it})$	-0.032	-0.015*	-0.062	-0.013
	(0.066)	(0.008)	(0.066)	(0.008)
$Bank_{it} * D_{it}$	-0.972***	-0.740***	-0.825***	-0.750***
	(0.203)	(0.032)	(0.161)	(0.031)
$Bank_{it} * (1 - D_{it})$	0.000	-0.502***	0.000	-0.445***
	(0.000)	(0.045)	(0.000)	(0.048)
$Liquid_{it} * D_{it}$	-0.162*	0.024**	0.109	0.022**
	(0.086)	(0.011)	(0.109)	(0.011)
$Liquid_{it} * (1 - D_{it})$	0.046	0.032	0.450	0.043**
	(0.520)	(0.020)	(0.375)	(0.021)
$Stocks_{it} * D_{it}$	1.600**	-0.093	1.295**	-0.134
	(0.699)	(0.093)	(0.551)	(0.093)
$Stocks_{it} * (1 - D_{it})$	0.000	-0.333**	0.000	-0.255
	(0.000)	(0.152)	(0.000)	(0.156)
$Tanga_{it} * D_{it}$	-0.832	-0.121*	-1.369	-0.071
	(1.155)	(0.073)	(1.017)	(0.072)
$Tanga_{it} * (1 - D_{it})$	0.000	0.007	0.000	0.173
	(0.000)	(0.101)	(0.000)	(0.117)
$Costs_{it} * D_{it}$	-0.069	0.146**	0.032	0.177***
	(0.155)	(0.061)	(0.136)	(0.061)
$Costs_{it} * (1 - D_{it})$	0.000	0.158	0.000	0.019
	(0.000)	(0.103)	(0.000)	(0.107)
Observations	78	1494	77	1491
Number of id	56	260	56	260
R^2	0.22	0.42	0.27	0.40

Note: See notes to Table 2a. Variables interacted with the dummy D give coefficients for constrained firm-years while variables interacted with (1-D) give coefficients for unconstrained firm-years.

Table 6 confirms our previous findings. All unquoted firm-years increase their use of trade credit in response to a tight monetary policy but the response of small unquoted firm-years is twice as

large as that of large firm-years. When credit conditions relax large unquoted firm-years reduce their use of this expensive form of external finance. The answer to the question 'does trade credit depend on firm-specific factors?' is positive. Borrowing behaviour of all firm-years, irrespective of access to capital markets, depends on firm specific factors. Access to bank loans is an important factor reducing the use of trade credit for both small and large firm-years and irrespective of access to capital markets. Better liquidity and collateral tend to shift all types of firm-years away from trade credit.

Ⅶ. Conclusions

Our study complements the work that has been done in recent years to evaluate the existence of a credit channel through the assessment of trade credit (Kohler et al. (2000), Cunat (2003), and Nilsen (2002)). We have done this by allowing for a greater range of firm-specific characteristics including whether the firm is quoted on the stock exchange. We have shown that trade credit represents an important source of external finance for firms, and that although it is lower down the pecking order of finance for firms it is taken up when offered by suppliers in order to bridge the financing gap.

Our paper analyses a panel of more than 16,000 British firms for the period 1990-1999, and draws three main conclusions. The first is that trade credit increases with a monetary tightening. This provides indirect evidence that there is a bank lending channel but also shows that the effects of monetary tightening are ameliorated to a degree by trade credit. Thus the bank lending channel does not choke off funds altogether, even for those firm-years that

receive less funding from bank sources, such as small firm-years. Rather it alters the balance of funding away from financial institutions and towards suppliers, increasing the marginal cost of external finance for these types of firm-years.

Our second main finding is that the measures of financial health such as liquidity, collateral, profitability, and quotation on the market, are used by suppliers for the same purpose with respect to trade credit. Thus firm-specific characteristics go a long way towards explaining whether firms use trade credit or not.

The third important finding is that access to the stock exchange or to one of the alternative markets isolates firms from the impact of a monetary tightening, while unquoted firms have to rely more on finance from their suppliers. This implies that there are considerable differences in the incidence of monetary policy on firms according to their type.

Trade credit is an important short-term source of funds firms. It is used extensively to cover short-term financing constraints and can compensate for the effects of a decline in bank lending in some cases. Given that it has a role as a substitute, and that this role varies according to the type of firm, we argue that trade credit is an important source of finance for firms and is influential over the impact of monetary policy in the short term since it can provide a substitute for other forms of finance.

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Appendix B

【Table 4b】 Within-groups estimations

Dependent variable: trade credit/total assets

	90-92	93-99	90-92	93-99
	Sample split by assets		Sample split by employees	
$MS_t * D_{it}$	0.007***	-0.000	0.006***	-0.001*
	(0.001)	(0.000)	(0.001)	(0.000)
$MS_t * (1 - D_{it})$	0.004***	-0.004***	0.004***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
$Bank_{it} * D_{it}$	-0.330***	-0.115***	-0.338***	-0.124***
	(0.014)	(0.003)	(0.014)	(0.003)
$Bank_{it} * (1 - D_{it})$	-0.247***	-0.102***	-0.244***	-0.097***
	(0.019)	(0.004)	(0.023)	(0.004)
$Liquid_{it} * D_{it}$	-0.059***	-0.040***	-0.062***	-0.037***
	(0.004)	(0.001)	(0.005)	(0.001)
$Liquid_{it} * (1 - D_{it})$	-0.053***	-0.032***	-0.054***	-0.034***
	(0.006)	(0.001)	(0.006)	(0.001)
$Stocks_{it} * D_{it}$	0.054	0.082***	0.036	0.096***
	(0.033)	(0.006)	(0.034)	(0.006)
$Stocks_{it} * (1 - D_{it})$	0.126***	0.128***	0.058	0.108***
	(0.040)	(0.008)	(0.045)	(0.008)
$Tanga_{it} * D_{it}$	-0.197***	-0.160***	-0.213***	-0.146***
	(0.024)	(0.004)	(0.024)	(0.004)
$Tanga_{it} * (1 - D_{it})$	-0.180***	-0.110***	-0.184***	-0.109***
	(0.027)	(0.005)	(0.030)	(0.006)
$Costs_{it} * D_{it}$	-0.017***	0.058***	-0.018***	0.048***
	(0.006)	(0.003)	(0.006)	(0.003)
$Costs_{it} * (1 - D_{it})$	-0.041***	0.030***	-0.053***	0.030***
	(0.010)	(0.005)	(0.010)	(0.005)
Observations	10846	60225	10227	54411
Number of id	6757	11968	6436	11059
R^2	0.21	0.21	0.23	0.19

Note: See notes to Table 2a. Variables interacted with the dummy D give coefficients for constrained firm-years while variables interacted with (1-D) give coefficients for unconstrained firm-years.

[Table 6b] Within-groups estimations for unquoted firms
Dependent variable: trade credit/total assets

	90-92	93-99	90-92	93-99
	Sample split by assets		Sample split by employees	
$MS_t * D_{it}$	0.007***	-0.000	0.006***	-0.001*
	(0.001)	(0.000)	(0.001)	(0.000)
$MS_t * (1-D_{it})$	0.004***	-0.004***	0.004***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
$Bank_{it} * D_{it}$	-0.330***	-0.116***	-0.338***	-0.125***
	(0.014)	(0.003)	(0.014)	(0.003)
$Bank_{it} * (1-D_{it})$	-0.247***	-0.103***	-0.240***	-0.098***
	(0.019)	(0.004)	(0.023)	(0.004)
$Liquid_{it} * D_{it}$	-0.058***	-0.040***	-0.062***	-0.037***
	(0.004)	(0.001)	(0.005)	(0.001)
$Liquid_{it} * (1-D_{it})$	-0.052***	-0.032***	-0.054***	-0.034***
	(0.006)	(0.001)	(0.006)	(0.001)
$Stocks_{it} * D_{it}$	0.049	0.081***	0.030	0.090***
	(0.033)	(0.006)	(0.034)	(0.006)
$Stocks_{it} * (1-D_{it})$	0.114***	0.122***	0.051	0.112***
	(0.040)	(0.008)	(0.045)	(0.009)
$Tanga_{it} * D_{it}$	-0.194***	-0.163***	-0.213***	-0.147***
	(0.024)	(0.004)	(0.024)	(0.004)
$Tanga_{it} * (1-D_{it})$	-0.183***	-0.111***	-0.183***	-0.112***
	(0.027)	(0.005)	(0.030)	(0.006)
$Costs_{it} * D_{it}$	-0.018***	0.058***	-0.018***	0.048***
	(0.006)	(0.003)	(0.006)	(0.003)
$Costs_{it} * (1-D_{it})$	-0.040***	0.031***	-0.055***	0.027***
	(0.010)	(0.005)	(0.010)	(0.005)
Observations	10770	58735	10152	52925
Number of id	6701	11707	6380	10798
R^2	0.21	0.21	0.23	0.19

Note: See notes to Table 2a. Variables interacted with the dummy D give coefficients for constrained firm-years while variables interacted with (1-D) give coefficients for unconstrained firm-years.

【Table 7b】 Within-groups estimations for quoted firms

Dependent variable: trade credit/total assets

	90-92	93-99	90-92	93-99
	Sample split by assets		Sample split by employees	
$MS_i * D_{it}$	0.007	-0.001	0.008	-0.000
	(0.008)	(0.002)	(0.008)	(0.002)
$MS_i * (1 - D_{it})$	-0.062	-0.004	-0.045	-0.006**
	(0.044)	(0.002)	(0.044)	(0.002)
$Bank_{it} * D_{it}$	-0.649	-0.003	-0.790	-0.023
	(0.448)	(0.017)	(0.494)	(0.018)
$Bank_{it} * (1 - D_{it})$	0.000	-0.049	0.000	-0.066**
	(0.000)	(0.036)	(0.000)	(0.032)
$Liquid_{it} * D_{it}$	-0.123	-0.025***	-0.076	-0.026***
	(0.106)	(0.003)	(0.104)	(0.003)
$Liquid_{it} * (1 - D_{it})$	0.218	-0.022***	0.154	-0.024***
	(0.363)	(0.006)	(0.252)	(0.006)
$Stocks_{it} * D_{it}$	1.021	0.171***	0.734	0.210***
	(0.604)	(0.026)	(0.617)	(0.026)
$Stocks_{it} * (1 - D_{it})$	0.000	0.340***	0.000	0.234***
	(0.000)	(0.041)	(0.000)	(0.040)
$Tanga_{it} * D_{it}$	-1.558*	-0.077***	-1.537*	-0.075***
	(0.808)	(0.021)	(0.787)	(0.020)
$Tanga_{it} * (1 - D_{it})$	0.000	0.000	0.000	-0.021
	(0.000)	(0.028)	(0.000)	(0.033)
$Costs_{it} * D_{it}$	-0.063	0.059***	-0.076	0.067***
	(0.126)	(0.017)	(0.156)	(0.018)
$Costs_{it} * (1 - D_{it})$	0.000	-0.016	0.000	0.081**
	(0.000)	(0.032)	(0.000)	(0.032)
Observations	76	1490	75	1486
Number of id	56	261	56	261
R^2	0.10	0.15	0.06	0.18

Note: See notes to Table 2a. Variables interacted with the dummy D give coefficients for constrained firm-years while variables interacted with (1-D) give coefficients for unconstrained firm-years.

영국 제조기업의 기업간신용에 대한 접근

Simona Mateut* · Paul Mizen**

논문초록

우리는 1990-1999년 사이의 영국 제조기업의 많은 패널로부터 자료를 수집하여 금융긴축 기간 (1990-1992)과 금융확장 기간 (1993-1999)을 분리하고 기업간신용의 수용은 이자율이 높을 때는 증가하고 이자율이 낮을 때는 감소하면서 통화 주기에 따라 변화함을 보이고자 한다. 이것은 은행의 대출경로의 간접적인 근거를 제공한다. 우리는 기업의 높은 신용도가 기업간 신용의 사용을 감소시킴을 보이고자 한다. 또한, 주식 거래에 대한 접근이나 심지어 대체 시장에 대한 접근마저 금융긴축의 충격으로부터 기업을 분리시킨다. 우리는 기업이 신용 제약에 걸려있는 경우 기업간신용을 은행 융자의 대체수단으로 인식하고 있다고 결론지었다.

주제분류 : B030600
핵심 주제어 : 기업간신용, 금융정책전송경로, 신용경로

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