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Does trade credit redistribution thwart monetary policy? Evidence from Italy.

by

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March 1996

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Abstract

Italy is an ideal candidate for testing the credit view of the transmission mechanism because of a bank-centered financial structure, a sizable trade debt, and an economy tilted towards small firms. An empirical analysis of trade credit and debt on an averaged panel shows that small firms act as being financially constrained and cycle-sensitive, whereas large ones aim at smoothing sales, adopt an integrated management of inventories and receivables and have a higher trade debt to purchases elasticity. On balance, the net trade credit channel does not shield, as implied by the credit view, small firms from a monetary squeeze.

Key words: trade credit, credit view, monetary transmission mechanism

JEL classification: E52, G32

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Financial support from the Consiglio Nazionale delle Ricerche (grant no. 93.00892.CT10) is gratefully acknowledged.

1. Introduction

Trade credit - credit extended by a seller who does not require immediate payment for delivery of a product - is under renewed scrutiny because some key results of the credit view of the monetary transmission mechanism hinge on the trade-off between trade and bank credit taken by (mainly) small firms. According to the credit view, with banks unable to insulate the loans portfolio from the effects of a restrictive monetary policy through asset (*via* reducing securities) and/or liabilities management, the weak substitutability between bank lending and market funding introduces an additional channel in the IS-LM transmission mechanism through shocks to the loan supply that hit mostly liquidity constrained small/young firms (Bernanke-Blinder 1988). A cross-section implication is that large firms should extend net trade credit *à la* Meltzer (1960) to smaller ones, thus at least partially thwarting a restrictive monetary policy. This theoretical point made in Kashyap *et al.*(1993, 88) is backed by empirical evidence showing, on aggregate data, that when external funds fall the share of bank loans shrinks. Oliner and Rudebusch (1995) object though that the finding depends crucially on the definition of external funds as the sum of only two types of liabilities (bank lending and commercial paper) and on a possible fallacy of composition effect, due to the different dependency of large and small firms on bank credit; in fact, including trade and long term market debt, they detect no monetary policy induced changes in external funds composition and, furthermore, in periods of monetary squeeze, an overall reallocation of funds from small to large firms.

These contrasting results on US data call for a closer examination of how interfirm credit fits the credit view in other countries, that differ for the financial structure as well as for trade credit contractual clauses and relative importance as a financing means. On several grounds, Italy is an ideal candidate to this aim. First, key features of its financial structure suggest that a credit channel is very likely to work there: the modest development of the stock and private bond markets; the absence of a commercial paper market; the high fragmentation and heterogeneity among credit institutions; the low degree of international credit market integration, partly deriving from the high fiscal and reserve burdens imposed on domestic banks; the high interest elasticity of money demand, which implies that monetary policy exerts a powerful impact on the size of bank balance sheets (Angeloni *et al.* , 1995). Second, on the real side, the industrial structure is heavily tilted towards small firms. Third, the size of trade credit is likely to be among the highest in the industrialized countries. Though statistical information is generally pretty poor, the most recent evidence brought for by the BIS (Kneeshaw, 1995) suggests that the US has, after Germany, one of

the lowest trade credit and debt to GDP ratios, with France and Japan at the opposite side; roughly the same ranking holds for the net trade credit ratio (Table 1). Estimates inferred mainly from firm balance sheets suggest that the Italian case is even more extreme than the French experience (Marotta, 1992; Rajan-Zingales, 1994, Table II)[1].

Whereas most empirical literature focuses on the substitutability between bank loans and trade liabilities, the paper examines, in order to throw some light on the Metzler hypothesis, gross and net trade credit in the Italian private manufacturing, taking advantage of a panel that, rather unusually, includes the whole gamut of firm sizes. We are thus able to show that in the Italian case the net trade credit channel does not shield small firms from a monetary squeeze. The paper set up is the following. After a select review of theoretical work on how firms determine payables and receivables (par. 2), paragraphs 3 and 4 provide a descriptive and an econometric investigation of trade credit in the Italian case using a balanced averaged panel drawn from 4888 manufacturing firms classified into 6x4 cells by sales size/by sectors over the 1982-1993 interval; paragraph 5 summarizes.

2. *Background literature*

Most empirical literature that includes trade credit among firm liabilities starts from the standard assumption of a cost hierarchy between trade and bank credit, implying that the former is taken only if the firm is credit rationed (Jaffee-Stiglitz, 1990). The assumption is motivated by the US widespread *d/D n/N* contractual clauses, where d = percent discount if payment is made within D days; otherwise the list price (n) must be paid within N days[2]. The assumed cost hierarchy is however significantly mitigated, or even reversed, if debtors take, as they frequently do (Gallinger-Healey 1987), an extra delay. Moreover, *d/D n/N* clauses that in the US help eluding, when effectively implemented, the regulatory provision (*Robinson-Patman Act*) aimed at protecting small firms from pricing discriminatory policies by monopsonistic buyers of intermediate goods, are almost unknown in Western European countries. Furthermore, on theoretical grounds, this approach neglects that, besides its role on the financing side, trade credit has a unique marketing role in non competitive markets, as it enables firms to implement an implicit intertemporal price discrimination

[1] An indirect evidence for this claim is that Italy was the country with the largest amount of account receivables factored out in 1991, followed by US, UK, Mexico, Japan, France and Germany (International Factor Chain data reported in the Financial Times issue of 1/4/1992).

[2] For instance, a 2/10, n/30 contract would imply an implicit 37 per cent interest rate, far above normal bank lending rates.

policy, as pointed out by Schwartz-Whitcomb (1979) and more recently elaborated by Brennan *et al.* (1988).

Brennan *et al.*'s paper shows that a cost comparison between trade and bank credit can be misleading if the isomorphism between a sale on credit and the bundling of a "good" and of a financial service is not acknowledged. Building on the assumptions of non competitive product markets, possibly in conjunction with adverse selection in the credit market, price discrimination between cash and credit customers is shown to be advantageous whenever the elasticity of demand of cash customers exceeds that of credit customers or whenever cash customers' reservation prices are systematically higher than those of credit customers. Unlike a pure intermediary, a non-financial firm can thus offset losses on the one side (e.g. in trade credit extension at cheaper terms than bank rates) with profits on the other side. In order to rationalize small firms extending trade credit to the large ones, the market power exploitation argument is therefore not necessarily required, though it may well be active (see, for an earlier result supporting the Galbraithian coercive hypothesis on UK data, Davis-Yeoman, 1974).

An earlier strand of literature stresses, with a straightforward application of the Baumol-Tobin framework for the transactions demand for money, that the use of trade credit provides information on future cash needs by allowing buyers to accumulate invoices for payment, thus enabling them to predict their cash needs better (Ferris, 1981). As a result, they are able to hold smaller cash balances and to incur lower brokerage costs than they would if they paid invoices immediately upon receipt. Sellers also benefit from trade credit, because it enables them to predict cash receipts more accurately and to reduce their precautionary cash balances as well. Though not fully spelled out, an implication of this approach is that, for given variability of sales and purchases, large firms, with a superior financial management ability, should be better able than smaller ones at exploiting economies of scale.

The link between financial and transactions motives, both heavily influenced by the institutional context firms operate within, bears on the design of an empirical investigation on trade credit. Though likely responsible for the largest amount of trade credit, the transactions motive relies on the slowly changing structure of the payment system and targets the short-very short term component of receivables and payables, hardly captured in balance sheet annual data. An empirical assessment of the trade credit and of its possible dampening effect of a restrictive monetary policy through a redistribution of net resources from large to small firms calls for an investigation that takes into account the multifarious roles of the instrument

3. *The Italian experience, 1982-1993*

Some key stylized facts are useful to provide a macroeconomic background for the descriptive analysis of trade credit patterns in Italy in the 1982-1993 period.

1. The Italian economy recovered from the effects of the 2nd oil shock of the early '80s through 1988 (with a peak of 4.1 per cent of GDP growth) and subsequently experienced a slowdown bottoming out with a GDP decrease of 1.2 per cent in 1993, despite the boost in net exports provided by the end 1992 through 1993 sharp (15 per cent) depreciation of the real exchange rate.

2. After the removal of credit ceilings in 1983, competition among banks for market shares resulted in a steady increase of the loans to total bank assets ratio (in tune with lower loan interest rates). A new equilibrium in asset composition was possibly reached after 1991, when the securities/assets ratio hit a historic low and there was a contraction in credit lines made available by banks to their clients; the positive credit supply shock implied however an excessive easing in the creditworthiness assessment of borrowers, as testified by mounting bad debts. Banks have gradually strengthened their control over the supply of credit, which has become more dependent on their fund-raising ability; a generalized increase in the speed of adjustment of lending rates to money market conditions has been the result (Angeloni *et al.*, 1995).

3. Bank financing still accounts for nearly all financial (i.e. excluding trade) debt raised by firms. The absence of active secondary markets for commercial paper and private bonds explains the overwhelming role of banks in channeling funds to the private sector and precludes important alternative sources of finance when bank loans tend to dry up.

A fairly systematic examination of the trade credit policy of Italian firms is allowed by the Centrale dei Bilanci panel of 4888 private manufacturing firms (with a coverage rate of 42 % both for value added and sales; see Data Appendix), which provides averaged indicators computed out of aggregate balance sheet and income accounts data for subsets (classified by sales/by sectors or by number of employees) of firms for the years 1982-1993, as well as some statistics on the distribution of individual data (Centrale dei Bilanci, 1995).

The average trade credit period (measured in days per year), already high by international standards at the beginning of the period, has kept rising through 1993, especially among small and medium firms; considering the median values, the differential with respect to the largest firms has gone down from a maximum of 16 days in 1985 to minus 12 in 1993. Though less pronounced,

upward trends can be detected also in the median values of the average trade debt period (Figures 1-2). Even considering a finer disaggregation by sales size/by sectors the same patterns on averaged values are easily spotted (Table 2). Consequently, despite of sizable changes in the vertical integration indicator, the net trade credit to sales ratio[3] has kept rising, especially among small and medium firms. Trade debt is a key component of firms' liabilities: though the lifting of credit ceiling in 1983 has marked the beginning of a steady increase in loan supply, in 1993 trade debt was, except for a few cases, larger than short term bank debt (Table 3).

These stylized facts, that seem largely cycle-insensitive, clearly warrant an explanation, because they are hard to explain as driven by changes in the payment practices, as a transactions-based approach would suggest; furthermore, the progressive stretching of the terms of trade financing increases, *ceteris paribus*, the likelihood of liquidity shocks, the more so among bank-dependent small firms.

What do we know about the institutional features of trade credit in Italy? Not very much, except for anedoctal evidence. Various sources agree on detecting very informal arrangements, rarely enforced by law. As an example, discounts are not usually granted nor interest rates penalties are imposed because of extra delays in payments, incidentally longer than in near countries. Rules of thumb are thus bound to prevail when creditors can enforce contractual terms only through the very time consuming, and transactionally costly, formal judiciary way. Large firms are able to exploit their market power even indirectly: for instance, they often impose not to factor out their receivables, unless to captive factors (Marotta, 1995).

Frasca and Marotta (1989) hinted that the financial recovery of large firms during the 80s could be partly accounted for by the redistribution of net trade credit towards them, thus implying that the effective cost of this resource was, at least for these firms, *de facto* lower than bank credit. The following paragraph provides an econometric investigation in order to assess more formally different behaviors among large and smaller firms.

4. An econometric analysis on panel data

The econometric investigation exploits a set of averaged indicators computed from 1982 (for some variables from 1983) to 1993 by the Centrale dei Bilanci for firms classified according to 6 sales size (as of 1993) classes and to Pavitt's 4 macrosectors - high tech, scale, specialization, and

[3] Net trade credit/sales = receivables/sales - payables/purchases · (1 - value added/sales), where a higher value added/sales means higher vertical integration.

traditional - they belong to (see Data Appendix for more details). The novelty of the data set, despite the shortcoming of non having individual data, is that in the literature papers on trade credit using panel data restrict themselves to a subset of firms: large ones (Chiplin-Wright, 1985, and Crawford, 1992, for UK) or small ones (Chant-Walker, 1988, for US); also the Elliehausen-Wolken (1993) cross-section study deals with small (with at most 500 employees) US firms.

The estimation strategy of simple reduced form regressions for both trade credit and debt as well as for net credit aims at detecting whether large and small firms, having controlled for their idiosyncratic financial structure as well as for their own selling and buying market institutional settings, react differently to interest rates and to some indicators of their cyclical situation. The basic setup for the trade debt and credit equations for the i-th averaged "firm" acknowledges the role played by transactions and financial determinants:

$$TD = TD(\underset{+}{q}, \underset{+}{mix}; \underset{-}{r}, \underset{-/+}{inv}, \underset{+}{P}) \quad ; \quad TC = TC(\underset{+}{q}, \underset{+}{mix}; \underset{-/+}{r}, \underset{-/+}{inv}, \underset{-/+}{g}, \underset{+}{S}),$$

where:

TC(D) = gross trade credit (debt) stock at constant prices; *q* = quick (i.e. current assets net of inventories to current liabilities) ratio; *mix* = share of short term bank debt to the sum of short term bank and trade debt; *r* = bank loan economy-wide rate of interest or implicit own borrowing cost; *inv* = inverse of inventory turnover (inventories/sales); *P* = purchases at constant prices; *g* = sales annual rate of change; *S* = sales at constant prices.

Whereas the sign suggested by the transactions approach for the scaling variables, purchases and sales, respectively, is definitely positive, no such clues are offered on theoretical grounds for most other determinants. Taking into account the Italian institutional setting, though, the signs attached can be rationalized as follows. The two financial structure control variables are expected to be positive signed, given their signaling role for external lenders: a more liquid firm is better at offering/obtaining payment delays[4]; a larger share of bank loans to total short term liabilities (remember that in Italy the commercial paper is as yet missing), that mirrors firm's creditworthiness, *a)* enhances the ability to get payment postponements from suppliers and *b)* enables the extension of payment delays to buyers, because of the shield to liquidity shocks provided by the access to bank lending. The expected signs for the other variables are instead *a*

[4] It could be argued that a lower quick ratio, because of increased short term liabilities, actually implies greater liquidity in the short run; on annual data, however, a signal of opposite sign is more likely.

priori ambiguous, especially when large/small firm considerations are taken into account, and deserve to be discussed separately for trade debt and credit.

Gross trade debt. Changes in the market interest rates lead to a substitution out of bank debt, if the relative stickiness of the implicit cost of trade debt, due to its slowly changing institutional determinants, implies corresponding changes in the rate differential. A lower inventory turnover, if interpreted as an indicator of financial distress, can reduce the (possibly smaller) firm's ability to get forbearance on payment delays from its suppliers; an opposite effect can work if firms shift to their suppliers the costs of unintended inventory accumulation.

Gross trade credit. The substitution effect of higher market interest rates leading to lower borrowing from banks and hence to shorter payment delays granted to buyers could be reversed by an anticyclical use of trade credit as a marketing device in order to offset the deflationary consequences on sales. This is actually one instance of possible divergent policies followed by large and small firms: whereas the former could try to implement, possibly because not financially constrained, a sales smoothing policy, the latter could instead, because of the cash flow enhancing effects of higher sales, prefer to further bolster demand through larger payment delays to buyers. A lower inventory turnover could finally be signed negatively if, following an integrated current assets management, the implied heavier financial charges are offset by cuts in trade credit, or positively, should the perspectives of demand elasticity to lower effective prices suggest instead a trade credit extension.

The basic setup for the i-th firm's gross trade debt and credit is specified for the econometric investigation in a log-linear form; in order to let the financial and cyclical variables to affect the economies of scale parameter, they enter interacted with the scaling variable[5]. Furthermore, in order to detect differences in the behaviors of large and small firms, the coefficients of the interacted variables are allowed to vary with firm's size, with a sales cutoff set at 50 billion lire in the final year 1993[6]; finally, in order to account for sector specific payment practices and other structural factors, the estimated specification allows for direct elasticities to the scaling variables varying with the macrosector the i-th averaged firm belongs to.

Estimation issues. The chosen fixed (individual and time), instead of the random, effects OLS estimation procedure is motivated by the likely correlation of intercepts terms, picking up time

[5] An alternative linear specification, such as the one chosen in Elliehausen-Wolken (1993), arbitrarily imposes separability between transactions and financial determinants of trade credit.
[6] These firms have in 1993 on average less than 150 employees.

invariant individual characteristics, with the regressors. Due to the short term nature of trade credit, a lagged dependent variable specification with annual data was excluded *a priori* (though statistically checked *ex post).* In fact, allowing for fixed individual effects should adequately capture inertial components, due to the institutional specific context, contrary to Chiplin-Wright (1985) justification for a lagged dependent specification. Being the variables included in the regressions computed averaging individual data within the 24 cross-section cells, the scope for simultaneity bias is likely to be reduced[7]. In order to cope with heteroscedasticity[8], though the log specification should help reducing it, White consistent standard errors are computed.

The unrestricted estimated log-linear specification for the *i*-th firm's trade credit is as follows:

$$tc_{it} = [\alpha_0 + \sum_{j=1}^{3} \alpha_j k_j + (\beta_0 + \beta_1 d) q_{i,t-1} + (\beta_2 + \beta_3 d) mix_{i,t-1} + (\beta_4 + \beta_5 d) inv_{it} + \\ + (\beta_6 + \beta_7 d) g_{it} + (\beta_8 + \beta_9 d) r_{it}] s_{it} + u_{it}; \quad u_{it} = \gamma_i + \eta_t + \varepsilon_{it}; \quad \varepsilon_{it} = w.n.$$

where : tc = log (TC), s = log (S), k_j = binary variable equal to one for firms belonging to one macrosector (j = 1 for high tech, j = 2 for specialization, j = 3 for traditional) and 0 otherwise and d = binary variable equal to one for small firms (1993 sales less than 50 billion lire) and zero otherwise. The trade debt regression has the same format, with purchases as scaling variable and excluding among the regressors the sales rate of change[9].

Estimation results: trade debt. Having controlled for the financial structure - both indicators are positively signed as expected - the substitution effect, between bank and trade debt, attached to the interest rate, empirically proxied by the own specific cost of borrowed funds, is well determined across all firms. The sign conflict for the inventories to sales ratio appears to fit the different financial constraints faced by firms according to their size: the coefficient is negative and much larger in absolute terms for small firms, hinting at the difficulties they experience to obtain payment delays when such an indicator of financial distress worsens (Table 4). Measured at the average values of the interacting variables, the elasticity coefficient of trade debt to purchases is sizably different between large and small firms (.91 vs. .61). The result hardly fits the assumption of a cost hierarchy with trade debt on top among the short term liabilities, unless large firms are rather implausibly less skilled than smaller ones in financial management.

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[7] Some checks for possible simultaneity bias were though performed; see Table 5.
[8] Heteroscedasticity can be induced by data construction when using grouped data (Greene 1993, par. 9.4).
[9] Empirically, the inventories to sales ratio enters the debt equation lagged once. Another difference between the trade and the debt equation is the interest rate variable definition, as detailed in the main text.

Estimation results: gross trade credit. Overall, the estimates support the claim of significant differences between large and smaller firms: except for the financial structure indicators that show up positively signed, the other three interacting variables are differently signed, with coefficients larger in absolute terms for small firms. As for the interest rate, the average economy-wide variable turns out to be empirically preferable to the own implicit borrowing cost, though barely significant for large firms (Table 5). The pattern of signs attached to the sales rate of change (+/-), the inventories to sales ratio (+/-) and the interest rate (-/+), respectively for the small/large firms, fits a picture where small firms behave as being financially constrained and hence cycle-sensitive; large firms, unsurprisingly, look much better at smoothing the sales profile and at following an integrated management of their current assets. Measured at the average values for the interacting variables, the elasticity coefficient of trade credit to sales (.65) suggests that economies of scale are common to all firms. The results are robust running the same regression with the lagged sales rate of change, in order to check for possible simultaneity biases[10].

The estimation results presented so far lend mixed support to the Meltzer hypothesis, especially because of the sizably different elasticities to purchases of trade debt. Though no theoretical framework deals explicitly with net trade credit as a choice variable, in order to shed more light on the combined effects of the determinants included in the gross credit and debt loglinear equations the following linear regression equation was run:

$$[(TC-TD)/S]_{it} = \alpha_0 + (\beta_0 + \sum_{j=1}^{3}\beta_{0j}k_j)s_{it} + (\beta_1 + \sum_{j=1}^{3}\beta_{1j}k_j)p_{it} + (\beta_2 + \beta_3 d)r_{it} + (\beta_4 + \beta_5 d)mix_{it} + \\ + (\beta_6 + \beta_7 d)q_{i,t-1} + (\beta_8 + \beta_9 d)g_{it} + u_{it}; \quad u_{it} = \gamma_i + \eta_t + \varepsilon_{it}; \quad \varepsilon_{it} = w.n.$$

Overall, the estimates turn out pretty precisely determined (Table 6). When the effect on net credit is ambiguous considering jointly the payables and the receivables equations, the sign of the latter generally dominates, as summarized below:

[10] The regression results are unaffected (output available on request) by the one year shorter time period imposed by data availability.

explanatory variables *large firms / small firms' differential*	trade debt (Table 4)	trade credit (Table 5)	net trade credit (Table 6)
interest rate (*r*)	+**	+/-**	-/-***
inventories to sales ratio (*inv*)	+/-**	-***/+***	-***/+***
sales rate of change (*g*)		-***/+***	-/+**
s.t. bank debt/(s.t. bank+trade debt) (*mix*)	+	+***	+**
quick ratio (*q*)	+***/-***	+**/-*	

*** significant at the .01 level; ** significant at the .05 level; * significant at the .1 level.

Focusing on the interest rate as an indicator of the monetary policy stance, as well as on the sales rate of change, whereas their coefficients for large firms are negligible, they are fairly precisely determined and negatively signed for small firms. The bottom line of the econometric exercise is thus that in the Italian case there is no empirical support for the Meltzer hypothesis: small bank-dependent firms are not shielded from a monetary squeeze through a redistribution towards them of net trade credit.

5. Concluding remarks

The often neglected (due mainly to data problems) trade credit is under renewed scrutiny because some key implications of the credit view on the efficacy of a restrictive monetary policy hinge on the differential behavior of large and small firms, the latter being more likely to be rationed in the bank loan market. The assumption, taken for granted in the US-based literature, of a cost hierarchy between trade debt and bank lending, derives from *d/D n/N* contractual features that are however unknown to most other industrialized countries. Furthermore, in order to assess the relevance of the credit view implication that a monetary restrictive policy can be weakened by the reallocation of *net* trade credit from large firms, able to access to market funds, to small firms, an empirical investigation of both trade credit and debt is called for.

The paper provides an extensive analysis of trade credit and debt in a country, Italy, that provides an ideal setting for the working of the credit view because of its bank-centered financial structure, of the incidence, among the highest in an international comparison, of trade debt in firm balance sheets, and of an industrial structure tilted towards small firms. The econometric investigation takes advantage of an averaged panel that, rather unusually in the literature, includes the whole gamut of firm sizes.

The main results of the paper can be summarised as follows. *First*, large and small (according to whether 1993 sales are above o below the 50 billion lire cutoff) firms do show significant differences as to the sign of the determinants of their trade credit and debt, suggesting that smaller firms behave as being financially constrained and hence cycle-sensitive, whereas large ones smooth the sales profile and adopt an integrated management of inventories and receivables. *Second*, trade debt, in an institutional context where formalized contracts are not widespread and/or rarely enforceable, does not compare so unfavorably to bank lending, as suggested by an elasticity to purchases a one third higher for large firms compared to small ones. *Third*, a preliminary assessment of the combined effect on net trade credit of the interest rate, taken as an indicator of the monetary policy stance, and of the sales rate of change, shows that in the Italian case there is no empirical support for the Meltzer hypothesis: small financially constrained firms are not shielded from a monetary squeeze through a redistribution towards them of net trade credit, thus casting some reservations on the working of the standard credit view of the monetary transmission mechanism.

Data Appendix

The indicators computed as weighted averages for firms cross-classified according to 6 classes by 1993 sales size and to 4 Pavitt's macrosectors - high tech, specialization, scale and traditional - and published in Centrale dei Bilanci (1995), refer to a balanced panel of 4888 private manufacturing firms (with balance sheet and income accounts data reconstructed in case of mergers or acquisitions or spin-offs) over the 1982- (for some variables 1983-) 93 interval. The statistical coverage of the panel in 1991 goes from 42 % for sales and for value added to 33 % for number of employees; across sales sizes the coverage is pretty satisfactory (close to 25 %) for sales above 10 billion lire and rises till approximately 70 % for the largest firms.

Trade credit includes short and long term receivables; trade debt includes short and long term payables, net of debt to plant suppliers and of customers' advances. All variables at current prices are deflated with the GDP deflator. Centrale dei Bilanci (1995) is the source for all the variables included in the regressions except for the economy-wide average interest rate *i*, included among the regressors in Table 5, and for the GDP deflator, both provided in the Bank of Italy's Annual Report.

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Table 1

Non financial sector trade credit and debt

(per cent of GDP)

	Credit		Debt	
	1983	**1993**	**1983**	**1993**
Canada	20.4	19.3	22.5	21.1
France	42.4	49.3	40.2	39.4
Germany	7.5	5.7	4.6	3.5
Japan	64.4	50.8	52.1	39.0
Spain	40.1	32.1	30.6	20.8
United Kingdom	19.4	14.7	20.3	15.5
United States	17.5	15.8	14.2	12.8

Source: Kneeshaw (1995), Table 6.

Table 2

Average trade credit and debt period (days)

(360 days· credit/sales and debt/purchases; manufacturing firms classified by Pavitt macrosectors and sales size; no of firms in brackets)

	credit days			*debt days*		
	1982	*1989*	*1993*	*1982*	*1989*	*1993*
1-5 bn lire						
-high tech (3)	180.0	186.2	300.0	180 .0	126.0	450.0
-specialization(111)	123.7	134.3	148.4	127.3	102.8	143.3
-scale (96)	106.7	126.7	132.1	121.8	132.8	145.7
-traditional (242)	88.3	116 .0	146.5	111.7	114.2	131.9
5-10 bn lire						
-high tech (24)	106.6	107.4	128.3	117.9	124.3	147.7
-specialization(267)	107.4	124.2	129.7	117.5	122.1	130.4
-scale (223)	96.2	121.9	133.6	115.8	121.8	139.4
-traditional (487)	81.4	116.0	146.5	111.7	114.2	131.9
10-25 bn lire						
-high tech (54)	100.7	121.7	140.9	87.2	114.1	123.8
-specialization(396)	114.7	133.3	136.4	110.9	115.5	126.3
-scale (399)	104.8	120.2	129.5	116.8	118.1	130.0
-traditional (802)	86.7	106.0	117.6	85.0	94.8	105.5
25-50 bn lire						
-high tech (35)	142.0	146.4	149.2	102.6	89.7	101.1
-specialization(167)	137.1	156.9	149.9	113.8	122.4	136.9
-scale (189)	106.9	125.2	135.8	115.4	117.9	129.3
-traditional (380)	84.3	108.5	115.1	82.1	93.0	98.4
50-100 bn lire						
-high tech (31)	115.6	134.2	151.9	109.6	106.0	119.3
-specialization(111)	143.2	149.3	151.6	113.8	122.4	136.9
-scale (156)	112.8	117.7	124.6	96.1	105.3	119.3
-traditional (205)	88.5	106.9	113.3	85.0	91.8	98.1
>100 bn lire						
-high tech (76)	157.6	150.0	159.8	110.9	111.6	103.8
-specialization (84)	142.3	136,3	125.0	97.8	99.8	102.2
-scale (192)	114.0	108.5	128.9	113,7	118.8	124.5
-traditional (158)	82.0	98.8	100.8	64.2	77.0	80.8

Source: Centrale dei Bilanci (1995). See also Data Appendix.

Table 3

Net trade credit to sales and short term bank debt to s.t bank and trade debt ratios

(manufacturing firms classified by Pavitt macrosectors and sales size; no of firms in brackets)

	net trade credit to sales			*s.t. bank debt/(s.t bank + trade debt)*		
	1982	*1989*	*1993*	*1982*	*1989*	*1993*
1-5 bn lire						
-high tech (3)	25.0	31..2	-20.9	25.0	40.1	32.3
-specialization(111)	11.6	17.9	16.9	34.6	44.1	50.4
-scale (96)	7.6	11.2	12.3	32.3	37.4	48.1
-traditional (242)	4.5	11.3	17.5	42.6	43.3	55.6
5-10 bn lire						
-high tech (24)	7.8	5.2	6.1	28.3	29.8	45.2
-specialization(267)	8.7	11.7	13.3	31.8	33.9	44.9
-scale (223)	5.4	11.0	11.8	33.7	35.9	44.7
-traditional (487)	4.3	9.3	11.9	36.4	43.1	52.4
10-25 bn lire						
-high tech (54)	11.8	13.4	17.5	30.2	40.3	49.7
-specialization(396)	12.2	15.1	14.6	33.6	35.7	42.6
-scale (399)	7.4	10.7	11.7	28.3	32.6	44.2
-traditional (802)	7.1	10.1	12.1	39.0	43.8	49.7
25-50 bn lire						
-high tech (35)	20.6	24.0	22.5	37.9	41.9	50.9
-specialization(167)	17.9	20.2	16.1	35.6	38.4	46.3
-scale (189)	7.3	11.5	12.8	27.6	37.8	45.3
-traditional (380)	6.6	10.7	11.8	33.8	40.4	49.2
50-100 bn lire						
-high tech (31)	11.2	15.7	18.5	41.7	49.1	47.9
-specialization(111)	21.9	20.1	20.0	39.6	41.0	44.5
-scale (156)	13.0	12.5	11.8	34.0	37.0	47.0
-traditional (205)	7.5	10.2	11.0	37.9	42.3	47.4
>100 bn lire						
-high tech (76)	26.2	21.8	24.1	38.8	31.8	46.7
-specialization (84)	20.4	17.4	14.3	37.1	38.0	42.3
-scale (192)	9.7	6.2	10.0	38.2	26.3	42.0
-traditional (158)	9.2	10.9	10.7	46.5	49.5	52.7

Source: see Table 2.

Table 4

Trade debt panel regressions

LHS variable: t(rade)d(ebt), 1983-1993; individual and time fixed effects coefficients omitted; White heteroscedasticity consistent standard errors in brackets

	unrestricted	**restricted**
p_{it}	0.639 (0.098)***	0.657 (0.081)***
$p_{it,1}$	-0.396 (0.171)**	-0.427 (0.179)**
$p_{it,2}$	0.042 (0.090)	-
$p_{it,3}$	0.270 (0.105)**	0.240 (0.084)***
$r_{it} \cdot p_{it}$	0.344 (0.134)**	0.332 (0.151)**
$mix_{i,t-1} \cdot p_{it}$	0.060 (0.047)	0.060 (0.048)
$q_{i,t-1} \cdot p_{it}$	0.162 (0.045)***	0.152 (0.041)***
$inv_{i,t-1} \cdot p_{it}$	0.050 (0.029)*	0.045 (0.029)
$r_{it} \cdot p_{it} \cdot d$	**-0.093 (0.260)**	-
$mix_{i,t-1} \cdot p_{it} \cdot d$	**0.253 (0.203)**	**0.259 (0.186)**
$q_{i,t-1} \cdot p_{it} \cdot d$	**-0.165 (0.050)*** **	**-0.154 (0.046)*** **
$inv_{i,t-1} \cdot p_{it} \cdot d$	**-0.352 (0.168)** **	**-0.349 (0.170)** **
# obs.	264	264
SER	0.074	0.074
DW	1.26	1.26
Hausman test	$\chi^2(14)$: 165.8 ***	$\chi^2(14)$: 24.1 **
exclusions test		F(2,218): 0.164

Legenda:

td_{it} = end-year trade debt at 1985 prices (logs) of the i-th averaged "firm" (i =1, ..., 24) with 1993 sales included in the intervals, in billion lire, 1-5, 5-10, 10-25, 25-50, 50-100 and at least 100 for each of the 4 Pavitt's macrosector

$p_{.,k}$ = purchases at 1985 prices (logs); k=1: high tech sector; k=2 : specialization sector; k=3 : traditional sector

r_{it} = i-th firm own implicit borrowing cost computed as financial charges/ average financial liabilities

$mix_{i,t-1}$ = end-year short term bank debt to short term bank and trade debt ratio

$q_{i,t-1}$ = end-year quick (current assets net of inventories to current liabilities) ratio

inv_{it} = inventories to sales ratio at year t

d = binary variable equal to 1 for firms with sales below 50 bn lire and zero otherwise

DW = Durbin Watson statistic for general misspecification

Hausman statistic = tests for the null hypothesis of random against the alternative of fixed effects model

* significant at the 10% level; ** significant at the 5% level; *** significant at the 1% level.

See Data Appendix for further details.

Table 5

Trade credit panel regressions

LHS variable: t(rade)c(redit); individual and time fixed effects coefficients omitted; White heteroscedasticity consistent standard errors in brackets

	unrestricted	restricted	unrestricted	restricted
	1983-93	**1983-93**	**1984-93**	**1984-93**
s_{it}	0.638 (0.118)***	0.625 (0.079)***	0.701 (0.142) ***	0.657 (0.086)***
$s_{it,1}$	-0.188 (0.128)	-0.192 (0.092) **	-0.227 (0.153)	-0.196 (0.095)**
$s_{it,2}$	0.147 (0.117)	0.156 (0.086)*	0.135 (0.141)	0.170 (0.096)*
$s_{it,3}$	-0.020 (0.129)	-	-0.092 (0.146)	-
$i_t \cdot s_{it}$	0.142 (0.145)	0.166 (0.141)	-0.025 (0.204)	-0.012 (0.198)
$mix_{i,t-1} \cdot s_{it}$	0.091 (0.023)***	0.074 (0.018)***	0.084 (0.024)***	0.062 (0.021)***
$q_{i,t-1} \cdot s_{it}$	0.040 (0.016)**	0.033 (0.014)**	0.030 (0.017)*	0.009 (0.003)***
$g_{it\cdot} \cdot s_{it}$	-0.034 (0.017)**	-0.039 (0.015)***		
$g_{i,t-1} \cdot s_{it}$			-0.027 (0.021)	-0.029 (0.019)
$inv_{it} \cdot s_{it}$	-0.034 (0.014)**	-0.037 (0.013)***	-0.035 (0.016)**	-0.045 (0.012)***
$i_t \cdot s_{it} \cdot d$	**-0.171 (0.074)****	**-0.148 (0.069)****	**-0.190 (0.098)***	**-0.159 (0.087)***
$mix_{i,t-1} \cdot s_{it} \cdot d$	**-0.035 (0.030)**	-	**-0.033 (0.032)**	-
$q_{i,t-1} \cdot s_{it} \cdot d$	**-0.034 (0.016)****	**-0.027 (0.014)***	**-0.021 (0.018)**	-
$g_{it\cdot} \cdot s_{it} \cdot d$	**0.062 (0.024)*****	**0.069 (0.023)*****		
$g_{i,t-1} \cdot s_{it} \cdot d$			**0.062 (0.030)****	**0.065 (0.028)****
$inv_{it} \cdot s_{it} \cdot d$	**0.077 (0.030)****	**0.079 (0.030)*****	**0.086 (0.032)*****	**0.094 (0.030)*****
# obs.	264	264	240	240
SER	0.053	0.052	0.053	0.053
DW	1.77	1.74	1.82	1.81
Hausman test	$\chi^2(14)$:128.3 ***	$\chi^2(12)$: 114.6 ***	$\chi^2(14)$: 140.9 ***	$\chi^2(11)$: 141.7 ***
exclusions test		F(2,216): 0.609		F(3,193): 0.695

Legenda:

tc = end-year trade credit at 1985 prices (logs)

$s_{.,k}$ = sales at 1985 prices (logs); k=1: high tech sector; k=2 : specialization sector; k=3 : traditional sector

i_t = Italian lira denominated economy-wide loans average interest rate

g_{it} = sales annual rate of change at year t.

See Table 4 and Data Appendix for further details.

Table 6

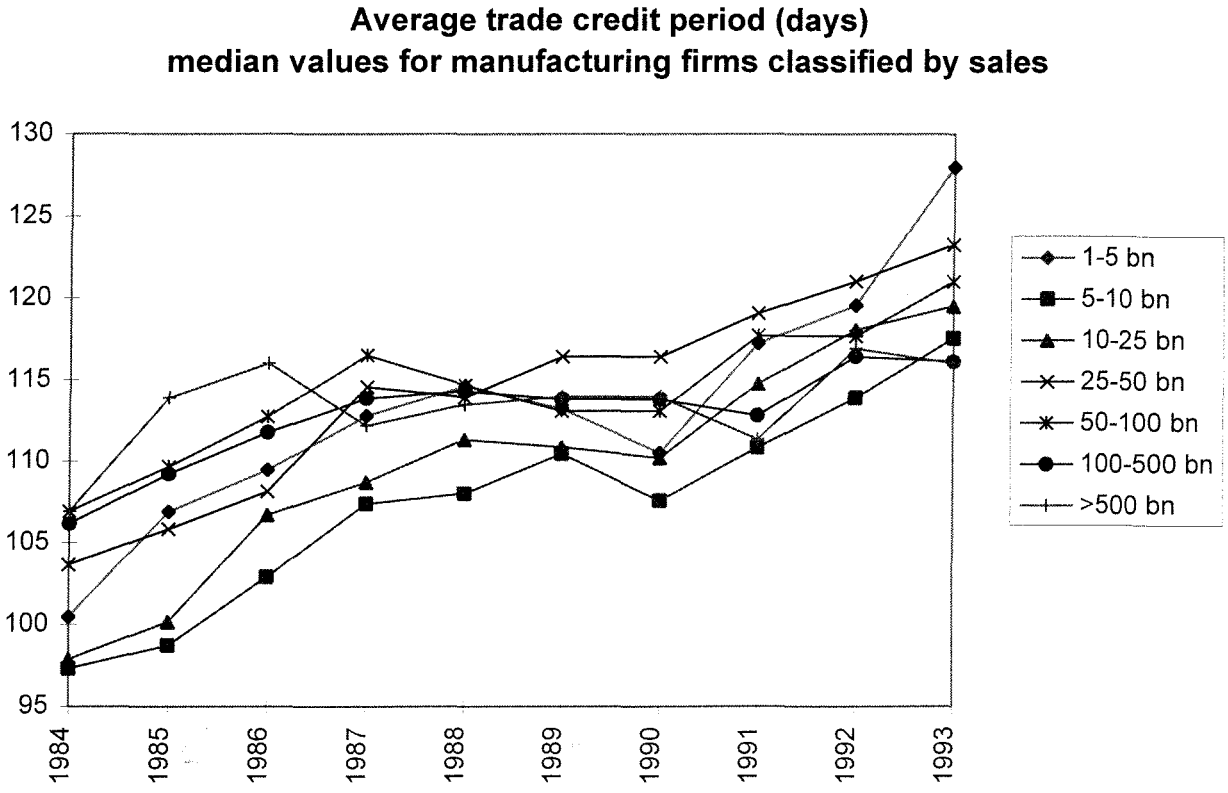
Net trade credit panel regressions

LHS variable: $[(TC-TD)/S]_{it}$, 1983-1993; individual and time fixed effects coefficients omitted; White heteroscedasticity consistent standard errors in brackets

	unrestricted	**restricted**
s_{it}	-0.059 (0.185)	-0.095 (0.125)
$s_{it,1}$	0.702 (0.192) ***	0.751 (0.133) ***
$s_{it,2}$	-0.033 (0.313)	-
$s_{it,3}$	0.137 (0.317)	-
p_{it}	0.012 (0.183)	0.056 (0.113)
$p_{it,1}$	-0.563 (0.189) ***	-0.622 (0.124) ***
$p_{it,2}$	0.067 (0.286)	-
$p_{it,3}$	-0.150 (0.292)	-
r_{it}	0.008 (0.153)	-0.050 (0.138)
$mix_{i,t-1}$	0.198 (0.070) ***	0.134 (0.057) **
$q_{i,t-1}$	0.077 (0.049)	-
inv_{it}	-0.091 (0.043) **	-0.118 (0.041) ***
g_{it}	-0.062 (0.062)	-0.058 (0.053)
$r_{it} \cdot d$	**-0.292 (0.101)** ***	**-0.255 (0.088)** ***
$mix_{i,t-1} \cdot d$	**-0.082 (0.091)**	-
$q_{i,t-1} \cdot d$	**-0.073 (0.049)**	-
$inv_{it} \cdot d$	**0.165 (0.065)** **	**0.191 (0.060)** ***
$g_{it} \cdot d$	**0.129 (0.063)** **	**0.131 (0.050)** **
# obs.	264	264
SER	0.016	0.017
DW	1.68	1.61
Hausman test	$\chi^2(18)$: 56.4 ***	$\chi^2(11)$: 65.5 ***
exclusions test		F(7,212): 1.275

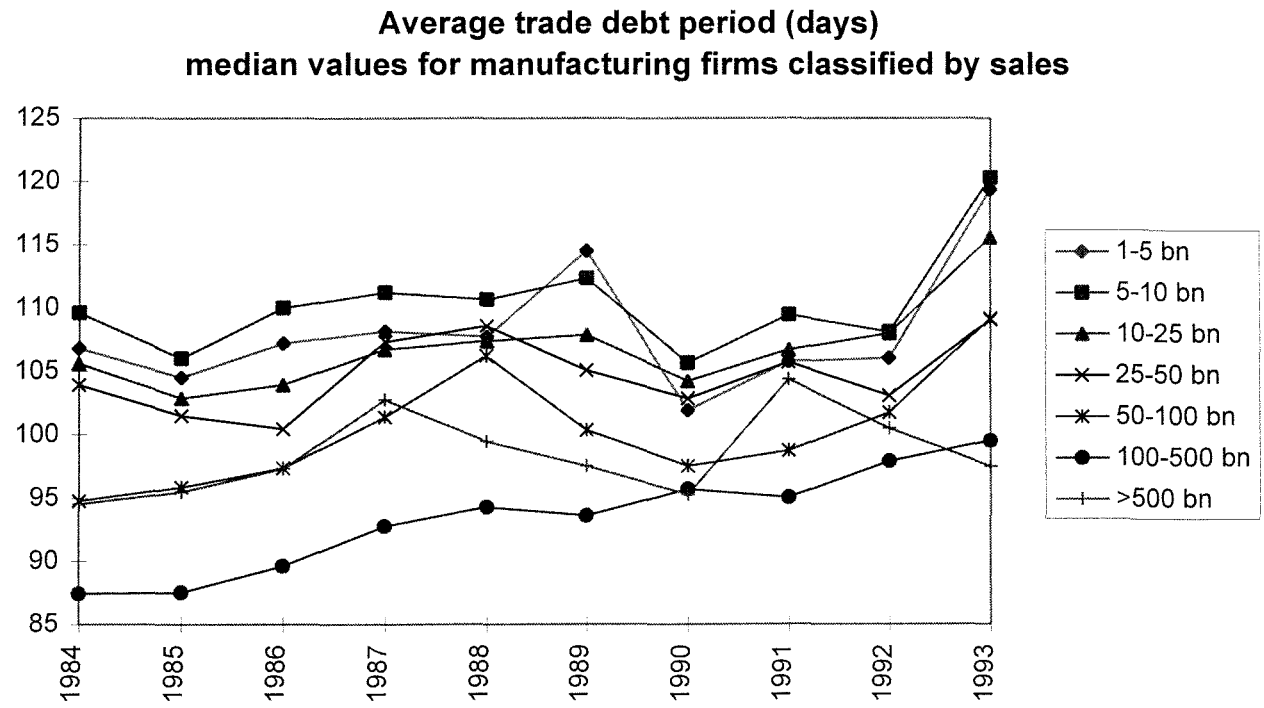
Legenda: see Tables 4 and 5.

Figure 1



Source: Centrale dei Bilanci (1995); sales in billion lire.

Figure 2



Source: see Figure 1

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