

## **Trade credit in Italy: Evidence from individual firm data**

**Giuseppe Marotta (\*)**  
**Università di Modena e Reggio Emilia**  
**Dipartimento di Economia Politica**

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### **Abstract**

Interfirm late payments are a hot issue in the EU, as witnessed by the 1998 bills passed in Italy and in the U.K. and by the soon to be approved EU Directive. Comprehensive information, especially on the effective own cost, is however almost absent in the literature. The paper provides the first detailed evidence of the trade debt own cost for the Italian manufacturing firms, arising out of discounts offered and of penalties for late payments. It is shown that, comparing also self-defined bank lending rationed and non rationed firms, interfirm credit received is, if ever, only slightly more expensive than bank credit. Cross-section econometric analysis, besides establishing the greater reactivity of credit received rather than granted to the external funds implicit cost, finds that the discount offered for early payments affects significantly credit granted to buyers. The estimates obtained for the basic specifications are robust when the sample is split according to various criteria; larger firms, probably because less financially constrained, react more strongly to sales reductions via longer credit and debt periods.

*Keywords:* trade credit, late payments, credit rationing

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(\*)marotta@unimo.it

## 1. Introduction

Interfirm credit is an often neglected theme in the theoretical and empirical studies on the heterogeneity of financial systems among EMU countries and on the regional implications for the transmission mechanism of a single monetary policy (see for instance Schmidt, 1999). A careful scrutiny of the subject is however warranted for at least two reasons. First, widely different national practices and legislation disrupt the EU single market objective, thus hindering the development of financial techniques such as trade credit securitization and obstructing the assessment of firms' creditworthiness, because of the different incidence of trade credit (TC)<sup>1</sup> in their books. A stylised fact is that the share of TC among liabilities is greater in France, Italy, Portugal, Spain; there is also evidence, in the recent past, in Italy (Marotta 1997b) and in France (Dietsch-Kemp 1998, Dietsch 1998), of a TC reallocation from smaller to larger firms, with a strengthening of a structural dependence of the former from banks. Second, the comparability across the EU of effective prices, though expressed in euro, is undermined if the discounts for quicker settlements are neglected<sup>2</sup>.

Institutional innovations, such as the legislation introduced in Italy<sup>3</sup> and in the U.K.<sup>4</sup> or the soon to be approved by the European Parliament EU draft directive on late payments, are however bound to modify the balance between larger and smaller firms. A likely development, at least in the Mediterranean countries, is a changed composition of bank borrowers by size and the growth of markets for short-term financing instruments such as commercial paper, with a pattern of relationships between banks and firms and within firms more similar to what is thought to be standard in the US literature. To name only three well-known papers, the common theme underlying the theoretical discussion of credit rationing in Jaffee-Stiglitz (1990), the examination of some implications of the credit view in Kashyap *et al.* (1993) and the justification for identifying empirically credit rationed firms with the dependence on TC taken in Petersen-

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<sup>1</sup> A terminological clarification can be helpful. Trade credit can be treated *as if* interfirm credit, provided final consumers' (households or public sector) share in direct sales is sufficiently small. This assumption is roughly acceptable if firms, as in this study, belong to the manufacturing sector (see also fn 28).

<sup>2</sup> Blinder *et al.* (1998) find that price stickiness, according to the managers surveyed, is *de facto* accompanied by changes in non price contractual terms, including terms of payment.

<sup>3</sup> The bill was approved on June 16<sup>th</sup>, 1998.

<sup>4</sup> *Late payment of commercial debts (interest) Act 1998.*

Rajan (1994), is that larger firms, exploiting their superior credit standing with banks and financial markets, act as an intermediary granting longer payment delays when the smaller firms are credit squeezed during a monetary restriction.

The coincidence of the introduction of the new legislation in Italy – a country whose economic and financial structure make an almost ideal environment for the credit view approach (Cecchetti 1999) - with the start of the EMU motivates a research on its likely effects. A first step is an enquiry on the TC terms: effective cost, contractual and real time interval before settlement, penalties for late payments. On all of these crucial aspects the literature provides only scattered information, with the recent partial exceptions of Ng *et al.* (1999) and Wilner (2000) for the United States. One of the contributions of this paper is to fill this information gap for the Italian manufacturing sector exploiting the Mediocredito Centrale dataset (1997).

The paper is organized as follows. Section 2 provides a comparison on terms of payments in the EU countries, summarises some issues on the implications of bank-firm relationships in the Italian case and illustrates the main features of the new legislation in Italy and in the U.K. and of the coming draft EU directive. Section 3 describes the Mediocredito Centrale database and illustrates an explorative analysis of interfirm credit, based on the answers to a specific survey and on a set of financial indicators; the last subsection concentrates on the link bank credit rationing-commercial debt. Section 4 provides a cross-section econometric analysis on trade gross credit and debt and on net credit, with a special focus on heterogeneous behaviour by firm size. Section 5 concludes.

## **2. Trade credit: an international comparison**

Though perhaps surprising, the literature does not provide information on the effective cost of trade debt. Even in the U.S., recent papers (Ng *et al.* 1999, Wilner 2000) show how, even if more costly with respect to short term loans, the spread cannot be easily computed, because it depends on how common is the two-part contract, including discount for quicker settlements, and on the size of, and how frequent are, penalties for late payments<sup>5</sup>.

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<sup>5</sup> As Ng *et al.* (1999) remark, before their paper, based on an original survey, the only documentation sufficiently detailed for the U.S., though with a focus on sectors rather than on individual firms, is dated 1970, based on the records of Dun & Bradstreet in the management of receivables of medium-large firms in various countries.

In Europe, though with non homogeneous data on contractual and effective credit periods, *not* on the totally unavailable own cost, the differences across countries are wide, as often remarked by the European Commission, who has tried to promote, during the early 90's, a greater harmonization, at first through the softer instrument of a recommendation to the States and later through a directive. Overall, the anecdotal evidence at mid 90's pointed to Italy as the country in the EU with longer effective credit periods - from one third to two thirds longer - and average delays beyond agreed dates (Table 1). The shortest period was found in Germany, a country where a 2 per cent discount is usually granted for payments within 15 days, even though with sizable differences across sectors (Harhoff-Körting 1998). The information does not basically differ from what reported for 1999 by Dun and Bradstreet on contractual time terms and on effective delays for trade financing among its customers, mostly medium-sized to large firms (Table 2).

A comparison among the main EMU countries, based on a representative sample of the manufacturing sector, can be done through the harmonised accounts data base BACH (Bardes 2000). The ratios to total assets of TC granted and taken in the period 1989-1997 are stably ranked across countries, with Italy on top (in the last year, respectively 35 and 25 per cent), followed by Spain (27 and 23 per cent) and France (25 and 20 per cent), while Germany's indicators are significantly lower (10 and 7 per cent)<sup>6</sup>. A divergent trend for the two ratios shows up however during the period: the first one falls everywhere, most especially in France and in Germany; the second one, instead, rises in Italy and in Spain and falls in the other two countries. On average 1998 data for France, the indicator of days of credit<sup>7</sup> goes from 76 for medium-sized/small firms to 72 for large ones to 71 for smaller ones; the days of debt indicator<sup>8</sup> goes from around 74 for smaller and medium-sized/small firms to 71 for the larger ones. For Spain, the 1995 median values for the days of credit and debt indicators are 92 and 100 (Hernández de Cos-Hernando 1998).

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<sup>6</sup> German data are even slightly lower than US ones. Of course, the usual *caveat* on international comparisons of accounts data applies. In Germany, for instance, trade credit and debt are net of the items vis-à-vis other firms in the same group.

<sup>7</sup> Days of credit = [end of year trade credit/sales]\*360 days.

<sup>8</sup> Days of debt = [end of year trade debt/purchases]\*360 days.

## **2.1 The Italian case: a closer look**

A stylised fact in the Italian manufacturing sector was the persistent, in the 80's and early 90's, reallocation of net TC granted from medium-sized and smaller firms to larger ones (Marotta 1997b). A back-of-the-envelope estimate suggests how sizable were the implied extra interest charges paid to banks on the stock of loans required, assuming a one to one substitution rate, to finance net TC extension through the lengthening of credit periods beyond a stated date (say, 90 or 60 days). In the decade 1984-1993, "excess" (relative to 90 days) net trade credit, as a ratio to outstanding short term loans, was on average for large, non-state controlled, firms 20 percentage points less than for medium-sized ones in the Mediobanca open sample. Assuming conservatively as an opportunity cost the average lending rate, which disregards the lower rates practiced to larger firms and the surcharges for very short term uncollateralized loans, the extra financial charges, as a percent of the effective ones on bank loans, can be estimated to be 25 and 6 per cent, respectively for medium-sized and large ones, with a 90-days stated date (34 and 14 with a 60-days date).

This counterfactual exercise shows how the credit period width generates a relevant cost for the Italian non-financial sector, in aggregate<sup>9</sup>, with opaque distributive effects within it and a much increased financial fragility for some components, which partly offsets, through a higher borrowers' credit risk, the overall benefit for the banking sector.

## **2.2 Institutional innovations in the EU**

The common feature of the legislation introduced in 1998 in Italy and in the U.K. were an explicit penalty rate for late payments and the provision of shorter credit periods. To be more specific on this last point, in the Italian case, contracts between private parties should by default be written and payments scheduled within 60 days (within 90 days in case of regional or national agreements)<sup>10</sup>. Late payments imply a penalty interest rate on the principal owed of at least 500 basis points above the EBC marginal refinancing rate. Moreover, if the delay exceeds 30 days, the debtor pays an extra penalty of a 5 per cent of its debt.

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<sup>9</sup> Being the small firms almost totally missing in the Mediobanca sample, the estimates are definitely downward biased.

<sup>10</sup> As can be easily gauged inspecting Tables 1 and 2, the time limits are far lower than the effective ones so far.

The European Council has approved in May 2000 a draft directive, that should be definitely passed by the European Parliament this year (and adopted in the national legislation by the EU countries within the next two years), with the following key features: a standard 30 days credit period (60 only for some types of contracts); a default penalty interest rate of at least a 800 basis points spread above the EBC main refinancing operations interest rate<sup>11</sup>; the rules apply to private and, a key difference with respect to current Italian legislation, to public sector contracting parties.

### **3. Cost and length of trade credit in the Italian manufacturing sector**

The 1994 edition of the triennial Mediocredito Centrale survey on more than 5000 manufacturing firms – a representative sample for the ones with 11 to 500 employees and every one with more than 500 employees - includes a questionnaire on TC taken and extended. This database allows for the first time to gather in a systematic way information on the components of the TC effective own cost in the Italian manufacturing sector: discounts taken and offered for quicker settlements, penalties for late payments, how common are these practices. The sample size, even after the shrinking to a maximum of 1549 firms, due to missing values and accounts data internal inconsistency (Appendix 1), with an under-representation of smaller firms (as hinted by the high, for Italian standards, average employees in the first quintile; Table 4), is comparable with the few available studies<sup>12</sup>.

#### **3.1 Methodological issues**

The potentially most attractive feature of the database is the rather in-depth questionnaire on TC taken, whereas only two questions refer to TC extended, with answers that can be linked to idiosyncratic characteristics of firms and to accounts data for the period 1989-94. However, besides the issues of missing answers and of anomalous accounts data, the structure of the questionnaire raises some methodological issues when interpreting the gathered information.

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<sup>11</sup> Being this rate included in the corridor having the marginal refinancing rate as an upper limit, the minimum penalty interest rate is *de facto* similar in the Italian law and in the EU draft directive.

<sup>12</sup> For instance, the data used by Ng *et al.* (1999) were obtained from a survey originally addressed to 2538 firms, subsequently reduced to 950, of which 747 in the manufacturing sector.

1. The answers, clustered around some focal points (see for instance the average period of TC taken, the average delays beyond contractual agreements, discounts offered or extended for quicker settlements), seem to mirror what an interviewee thinks to be the "normal" practice in the sector the firm belongs to, rather than the individual case. The low variability of the data thus gathered severely hinders an econometric investigation linking their determinants to firms' idiosyncratic features.

2. All answers refer separately to three contracting parties of the surveyed firm: other firms in the same group, non-group Italian and foreign firms. Unfortunately, for the first and the third category there is a severe drop in answers; moreover, the questionnaire structure does not include a grand total for each question, a rather serious weakness because it prevents checking for the mutual consistency of single items and, as in the case of TC taken and given annual flows, for the compatibility with the stock figures in the balance sheet and with the underlying transaction variables (sales and purchases) in the income accounts.

3. There is a question on whether an offer was made or received for discounts for quicker settlements; there is not, however, a question on whether the proposal was accepted.

For these reasons, the econometric analysis uses predominantly accounts data; the answers to the questionnaire will be mainly used in order to examine more closely a given phenomenon on some suitably defined subsets of answering firms.

### **3.2 An exploratory data analysis**

This subsection illustrates the results of a descriptive data exploration.

1. The average period of the TC taken vis-à-vis Italian independent suppliers is greater than with respect to foreign ones, though with a high dispersion across firms; the difference, detected both on average and median data, does not show up in the 25<sup>th</sup> or in 75<sup>th</sup> quantile. It is also interesting to remark that the difference widens with the asset size, more noticeably in the case of Italian suppliers; the phenomenon surfaces only comparing the lower fifth with the remaining firms, when sales are used as a dimensional indicator. The average contractual credit period with Italian parties, reflecting the perception of the

“normal” practice in each sector rather than the individual experience, is of about three times the normal length (one month) according to the draft directive<sup>13</sup>.

2. The proportion of suppliers offering discounts is low on average (slightly above 8 per cent for the Italian ones and almost 5 for the foreigners). Moreover, the option is available to a limited subset of firms: the median value is in fact zero for the Italian suppliers, going to 5 per cent only in the 75<sup>th</sup> quantile; this statistic is zero for foreign suppliers. Looking closely at the dimensional cells, smaller firms (in the lower fifth for total assets, up to the 60<sup>th</sup> quantile for sales) receive most discount offers.

3. The annual rate of interest implied by the discount offered for settlements 30 days earlier than the agreed credit period is on average (using the 2.9 per cent discount for Italian suppliers) 12.5 per cent if the agreed period is 120 days (19.3 and 23.6 per cent, respectively, for 90 or 80 days)<sup>14</sup>. It is useful to notice that short term bank lending rate was in 1994, on average, 11.2 per cent, a figure bounding from below the average rate for uncollateralized very short term loans, i.e. the closest substitute to TC taken<sup>15</sup>. Discounts offered hardly suggest a definite cost advantage for bank lending compared to TC, as is the usual result in the U.S. experience, with implied interest rates, based on the two-part contract, above 40 per cent (Ng *et al.* 1999). It is interesting to notice that discount size is negatively correlated with firms’ dimension: a plausible explanation could be the incentive for suppliers to mitigate credit and liquidity risks. From the debtor point of view, however, given that also bank lending rates show a similar correlation

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<sup>13</sup> The 1999 data in Table 2 suggest that the situation has not changed compared to 1994, the year of the Mediocredito survey.

<sup>14</sup> Given the wording of the question (see Appendix 1), the offered discount can be expressed as the classical two-part contractual formula  $d/D$ ,  $n/N$ , where  $D = 30$  and  $N = 120, 90$  or  $80$  days, with an implied annual rate, computed as:

$$\text{implied interest rate} = \left[ \left( \frac{100}{100-d} \right)^{\frac{360}{N-D}} - 1 \right]. \text{ On 1999 data, the implied rate, with } d = 1.95\%, D$$

= 15 - a clause according to Dun & Bradstreet (2000) applied in the 2.5% of Italian large firms - is equal 17.1 per cent, 9.9 or 7 for  $N = 60, 90$  or  $120$  days.

<sup>15</sup> It may be useful to remember that the closest approximation to the ECB marginal refinancing for the Bank of Italy, namely the discount rate plus a policy determined spread (*tasso per le anticipazioni fisse*) was in 1994 around 8.5 per cent. A counterfactual application of the 1998 Italian legislation would imply a penalizing rate for late payments equal to 13.5 per cent, quite similar to the effective average bank lending rate.

(see Table 4, for the implied cost of external funding; see Appendix 2 for how it is computed), the cost differential could be uncorrelated with firms' size.

4. The above result - cost considerations are, if ever, a weak incentive to taking less TC - is corroborated by the very low probability of penalties for late payments (slightly over 4 per cent for Italian suppliers and almost zero for foreign ones). Even though the reduced number of answers suggests caution, a positive proportion at most in the upper fourth of interviewees is a striking finding; surprising is also the low incidence of acknowledged late payments. The positive correlation between the proportion of late payments and total assets does not show up when firms are ordered by sales: this latter finding is also noticed in the 1999 Dun & Bradstreet (2000) survey and is rationalized with the argument that shorter delays of Italian larger firms arise because of the longer contractual credit periods they are able to obtain<sup>16</sup>. On average, the proportion of late payments vis-à-vis foreign suppliers is a half compared to Italian ones.

5. With the *caveat* of few answers, penalties are imposed only after sizable delays in settlements (one to two months). The question on the size of the penalty, if ever imposed by Italian suppliers for a month of delay, has even fewer answers (62; just 7 for the foreign suppliers): the median values for Italian suppliers generate an implicit annual interest rate of approximately 20 per cent, comparable with the ones computed for discounts for quicker settlements.

6. At least a half of firms state that they do not offer discounts for settlements 30 days earlier than the agreed credit period. The implied interest rate is on average even lower than for TC taken, going from 7.5 to 9.1 per cent according to whether the credit period is 90 or 80 days. The first finding is somehow puzzling, if compared to the Ng *et al.* (1999) result, for the U.S., of a much lower proportion - only a quarter of firms, manufacturing and not - than in Italy offering a two-part TC contract. We take this finding as a further warning against the commonly held view of a typical (for the US)  $d/D$ ,  $n/N$  contract (see Jaffee-Stiglitz 1990, Petersen-Rajan 1997), when in fact it is adopted by only a minority of firms.

Table 4 summarizes, keeping the same firms' ordering, some indicators computed from accounts data, that allow a greater comparability with most other

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<sup>16</sup> Considering the effective credit periods of the 50 largest Italian firms, 42% settles after more than 90 days, compared to only 23% for all Italian firms surveyed (Dun & Bradstreet 2000).

studies and at the same time a better interpretation of the answers to the questionnaire. Some aspects deserve comments.

1. The average number of employees in the 25<sup>th</sup> quantile - 33 - signals the low incidence of small and micro firms in the sample. This is a serious warning on how well the sample is representative for the entire manufacturing sector: in 1996, the average labor force (employees and self-employed) per manufacturing firm was 8.9, lower than in 1991 (9.5). 1994 was a year of recovery, as witnessed by the high growth rates of nominal (and real) sales, though with an uneven distribution across dimensional classes: closely inspecting the quintiles by sales, it is easy to spot a positive correlation between levels and growth rates of sales.

2. The days of credit and debt indicators are on average larger than 4 months; for one fourth of firms they are larger than 5. A comparison with the average credit period answer in the questionnaire, under the joint hypothesis of an infra-annual and within size cell uniform distribution of underlying transactions<sup>17</sup>, suggests that *ex post* delays in settling obligations are systematic and at least longer than 30 days, as acknowledged by the few firms answering this question (see Table 3). Examining more closely the cell values, the days of credit indicator is on average similar for the first four fifths (by sales) of firms, falling only for the largest fifth; a positive correlation can be detected instead ordering firms by total assets. The days of debt indicator (median values), slightly positively correlated with the total assets, shows a clear negative correlation with sales. This last result contrasts with direct surveys as the, already quoted, Dun & Bradstreet (2000) one. Finally, net TC is negative for at least a fourth of firms; the ratio to sales rises quite regularly with total assets and, more slowly, with sales<sup>18</sup>.

3. The ratio of TC taken to short term bank loans is on average approximately one, with a widely scattered distribution, as shown by a median value of 0.7; the highest values show up in the 20<sup>th</sup> and in the 80<sup>th</sup> quantiles. The argument put forward in Petersen-Rajan (1994) – TC taken is a financing instrument used by (small) firms more likely to be credit rationed – fits with this

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<sup>17</sup> Evidence indicating that the different number of cases per cell does not invalidate the exercise is available on request.

<sup>18</sup> Comparing firms with positive and negative net TC, the latter are slightly over 27 % of the total, and are smaller (65 employees vs 81 on average), with a higher implied cost for external funding (22 vs 17.3 per cent), a lower TC taken to bank loans ratio (0.65 vs 1.13), a lower proportion of late payments (5.1 vs 6 per cent), a lower gross operating profits to value added ratio (5.5 vs 6.3

result for smaller firms; it does not for larger ones, with a sophisticated financial expertise that should enable them to correctly rank by cost the two financing instruments.

4. The implied cost of external funding is negatively correlated with firm size, most especially when taking into account the median values.

### **3.3 Credit rationing**

The logical link between smaller firms rationed in the bank credit market and recourse to the more expensive TC granted by the larger firms is, in the Italian case, highly implausible on *a priori* grounds; the information drawn from the Mediocredito Centrale database provides empirical support to this proposition (Table 5).

Firms are asked two questions, in order to ascertain whether they are credit rationed: first, have they applied for larger loans than in fact obtained; second, would they have accepted to pay more (for the exact wording, see Appendix 1)?<sup>19</sup> Under the usual caveat for the few observations on firms acknowledging to be rationed (6 per cent)<sup>20</sup>, a rather large set of indicators computed for rationed and non rationed firms suggest no links with the amount of TC taken and granted: days of credit and debt, implied cost for external funding, sales growth rate, *ROA* are, on average, the same; loan growth rate is even higher for rationed firms<sup>21</sup>. The only hints of a link between financial fragility and a TC larger demand for rationed firms are a lower quick ratio and a higher TC taken to bank loans ratio for the latter.

## **4. Econometric analysis**

The focus of the econometric investigation is on the TC granted to sales and on the TC taken to purchases ratios, computed from accounts data and therefore including also the delays beyond agreed dates. A further motivation for this choice is that it allows to consider the relationships with all suppliers and

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per cent). The two types of firms, instead, do not differ on average for growth rates of sales, return on assets (*ROA*) and qualitative indicators on credit rationing.

<sup>19</sup> For a careful discussion of how and whether these questions relate to credit rationing theories see Messori (1999, pp. 285-6).

<sup>20</sup> Just an illuminating example: only 3 firms answer differently to the two questions, but average and median values for employees differ by 12.

<sup>21</sup> The ratio of self-financed investment (ratio to fixed investment expenditure of gross operating surplus, not reported) is similar as well across rationed and non-rationed firms.

buyers, an obvious requirement inhibited by the missing grand total in the questionnaire structure.

As it is well-known (see Petersen-Rajan 1997), accounts data on TC, with no matching with the corresponding parties, do not allow to disentangle demand and supply motivations for the single firm: explanatory equations are bound to be reduced forms. The determinants can be classified as “transaction” and “financial”, a loose approximation given the double nature of TC as a financing and a marketing instrument (see Schwartz-Withcomb 1979; Brennan *et al.* 1988; for a survey of micro and macro trade credit theories see also Marotta 1992). A set of idiosyncratic variables – financial strength, reputation, organizational complexity – can as well be interpreted from both a transactions and a financial perspective. On the one hand, the “customary” features of interfirm trade – sector and region firms belong to, inclusion in a group, openness to foreign markets (with parties practicing different rules) etc. - can be easily classified as transaction variables; on the other hand, almost always they can be interpreted as determinants of a firm’s credit and liquidity risks, and consequently of the ability to attract external funding. The inevitable difficulties of rationalizing sign and size of estimated coefficients in equations “explaining” trade credit and debt, can be partially mitigated through a battery of robustness checks, such as the estimation of equations for net TC (as in Marotta 1997b), but also, as done in this study, exploiting the opportunities of suitably splitting the sample thanks to the answer to the questionnaire.

The basic assumption underlying the interpretation of the econometric results in this Section is, in contrast with the US experience, the low cost differential of TC taken compared to bank lending, because of the scarcity of TC two-part contracts and of penalties for late payments. The few answers on the proportion and the size of discount offers received (see Table 3) does not unfortunately allow to compute a reliable indicator of the TC taken own cost: it is implicitly included in the constant in the estimated equations where the other element of the cost differential – bank lending rate, proxied by the implied external funding rate<sup>22</sup> - appears.

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<sup>22</sup> The approximation is acceptable in the 1994 Italian case because debt financing is almost exclusively bank lending, mostly short term.

## 4.1 Basic specifications

### 4.1.1 Commercial debt

A basic specification of the reduced form equation for the TC taken to purchases ratio (*deb*) is the following:

$$deb = \beta_0 + \beta_1 r + \beta_2 marg + \beta_3 ROA + \beta_4 unitprch + \beta_5 g_t + \beta_6 g_{t-1} + \beta_7 age + \sum_{i=1}^4 \gamma_i type_i + \sum_{j=1}^3 \delta_j SETT_j + \sum_{k=1}^3 \eta_k REG_k + \varepsilon.$$

A higher implied cost of external funding ( $r$ ) should, from the demand side, lengthen the debt period. A higher value of an indicator of profitability ( $ROA$ )<sup>23</sup> can have two opposite effects: being the signal of a superior managerial ability, it could reduce the association of a firm with the use of an “unfair” instrument, such as postponing debt settlements with suppliers; taken as an indicator of creditworthiness, it could increase the willingness of the latter to supply credit. The last argument, however, is less plausible, because the short term nature of TC makes more relevant the liquidity risk – i.e. the risk of delayed payments – rather than the credit risk. The gross operating profit to sales margin (*marg*) can also be read as a liquidity risk indicator, because it reflects the ability to generate cash flow: for this reason, the expected sign is positive. Firm’s age (*age*) is usually introduced, in the literature on long term lending relationships, as a proxy for the borrower’s reputation, with a positive expected sign.

Among the “transaction” determinants, some are control variables for the 4 Pavitt macrosectors, for the region (*REG*) where the firm operates and for the type of production and of marketing channels (*type*)<sup>24</sup>. A higher proportion of sales through own distributive channels to detailers or trough wholesalers, reducing the risk of finding final buyers, should lower the incentive to lengthen the period debt to the suppliers, waiting for settlement by buyers; an opposite case could be made with a higher proportion of sales as subcontractor or with the public sector as the other contracting party, because a firm could transfer to its own suppliers the delays of these customers, most especially – in the Italian case - of the latter one

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<sup>23</sup> A better indicator of profitability, such as *ROE*, was discarded because of data problems in the income accounts for a large number of firms.

<sup>24</sup> Though firms provide the proportion of sales for each category, the resulting regressors are similar to dummies, because of the low number of firms reporting positive values. See also footnote 28.

(see Marotta 1995)<sup>25</sup>. The coefficient expected sign of the (log of) purchases per supplier (*unitprch*) is uncertain: a firm with more dependent suppliers could enjoy a monopsonistic power in setting longer debt periods; however, the same indicator could instead proxy suppliers' greater contractual leverage, with an opposite effect on *deb*.

Finally, in order to control for cyclical effects<sup>26</sup>, the specification includes sales growth rate (*g*) for the last two years, separately for positive and negative variations, in order to account for asymmetric effects of cyclical downturns on *deb*. The same reasoning motivates the inclusion of both negative and positive *ROA*.

The OLS estimates of the basic specification for 957 firms fit overall the *a priori*, with many highly significant regressors (Table 6, column (1))<sup>27</sup>. *r* enters positively signed and with a non negligible effect: one additional percentage point translates in 0,17 per cent higher *deb*. One additional percentage point of *marg*, taken as a proxy of a lower liquidity risk, corresponds to an increase in *deb* by a half percentage point. The negatively signed *ROA* supports this interpretation: firms with inferior managerial ability try to offset this weakness by lengthening debt periods, and this is particularly so (absolute value of the coefficient larger by a half) when *ROA* is negative. The same asymmetric effect, with a larger absolute value of the coefficient, shows up for *g*, contemporaneous and one-year lagged. As expected, because the very short term nature of TC downplays the role of the credit risk, of which a good proxy can be firm *age*, this regressor has a low statistical significance; the negative sign, moreover, does not fit a reputational interpretation.

Among the transaction variables, the negatively signed *unitprch* suggests that the bargaining power of (large) suppliers more than offsets the monopsonistic leverage of their contracting parties; with the expected positive sign, and jointly highly significant, are the *type* variables<sup>28</sup>. The relevance of nationwide customary

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<sup>25</sup> A raw materials and unfinished goods inventories turnover indicator, *a priori* with an expected negative sign, turned out always to be hardly significant (t statistic less than one).

<sup>26</sup> Though annual data do not allow to account for the mechanical effects of the cycle on infraannual items, we try this way to control for the heterogeneity, across firms' size, of sales growth rates detected in table 4.

<sup>27</sup> Besides the usual statistic of explained variability (corrected  $R^2$ ), the DW statistic is also reported, as a generic misspecification indicator.

<sup>28</sup> Estimates omitting these variables were carried out, in order to check for their dummy effect, being variables with positive values only for a reduced subset of firms. More precisely, of the 1115

practices by sectors is signaled by the high/very low joint significance of the Pavitt macrosectors/regions dummies.

The other columns in Table 6 report the estimates on two subsets of firms, chosen according to the answer on whether they grant a discount to contracting parties (only Italian, not belonging to the same group, in order to get a sufficiently high number of valid answers<sup>29</sup>) for settlements 30 days earlier than the agreed debt period. The underlying rationale is that an active credit management is a clue to a firm greater financial ability, and consequently to a greater reactivity to other financial determinants. Indeed, comparing the estimates of column (2), for firms who practice discount policies, with the other ones who do not (column (3)), the former show coefficients with larger absolute values and higher statistical significance for the financial variables – *r*, *ROA*, *marg* – to the detriment of “transaction” variables.

Column (4) reports the estimates of the basic specification for the subset of exporting firms: besides a further successful check of robustness of the estimates of column (1) for a sample shrunk by a fourth, the choice is motivated by reasons of comparison with the subsequent equation for gross and net TC, which include among their regressors the proportion of sales abroad.

#### 4.1.2 Commercial credit

A basic specification for TC offered (as a ratio to sales, *cre*) is the following:

$$cre = \varphi_0 + \varphi_1 r + \varphi_2 marg + \varphi_3 ROA + \varphi_4 quick + \varphi_5 disc + \varphi_6 g_t + \varphi_7 g_{t-1} + \varphi_8 group + \varphi_9 exp + \\ + \sum_{i=1}^3 \gamma_i type_i + \sum_{j=1}^3 \delta_j SETT_j + \sum_{k=1}^3 \eta_k REG_k + \varepsilon$$

The equation is similar to the previous one for *deb*; the interpretation of some determinants is however different, because of the likely prevalence of the marketing over the financial investment instrument role of TC granted. Extending credit periods can be a valuable tool to stabilize sales (hence a negatively signed *g*), though with likely asymmetric effects for positive or negative changes in sales, as well as to implement a structural implicit price discrimination policy

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firms providing valid answers, zero values are found at least up to the eighth, the seventh and the sixth decile for the proportion of sales to the public sector, to detailers and to wholesalers or out of subcontracting, respectively. The coefficient estimates for the main explanatory variables turn out highly robust (results available on request).

<sup>29</sup> Out of the 1087 valid answers, almost a half have a value of zero.

(positively signed  $g$ ). An element enabling to better carry on the latter is, as suggested in Petersen-Rajan (1997), a high gross profit to sales margin ( $marg$ ), because it generates the required resources and incentives, at margin, sales. An additional variable, and this is a novel contribution of the study, is the size of the discount ( $disc$ ) firms acknowledge they offer for settlements 30 days earlier than the agreed date to Italian parties not belonging to the same group, with expected negative sign.

Considering the financial variables *strictu sensu*, for given  $r$ , with expected negative sign even though unlikely to be highly significant because of the prevailing above mentioned marketing aspects, the liquidity position, proxied by the *quick ratio* (liquid assets to current liabilities, net of the commercial component), should enter negatively signed, if a higher value disincentives promoting sales through the investment in a low-return financial instrument such as TC<sup>30</sup>. This interpretation would be buttressed should a negative coefficient of an indicator of economic profitability, such as *ROA*, confirm that better managed firms, *ceteris paribus*, do not use the expensive TC<sup>31</sup>. Finally, the TC opportunity cost can be mitigated if the firm belongs to a *group*, because of the enhanced credit standing; it must be remembered, however, that the data do not allow, for a sufficiently large number of firms, to measure the infragroup component of TC, with the obvious consequences of possible distortions caused by policies aiming at a suitable localization of profits in order to minimize the overall tax burden.

An important, and additional, indicator of the type of customers is the proportion of exports to sales ( $exp$ )<sup>32</sup>; because of the known shorter credit periods in the other larger EU countries and in the US, the expected sign is negative.

The OLS estimates lend overall support to the *a priori* (Table 7)<sup>33</sup>. Looking at column (1), the negatively signed  $g$ , contemporaneous and lagged once, is easily rationalized on the grounds of stabilizing sales around the levels

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<sup>30</sup> The indicator is computed on end-1993 data, in order to avoid simultaneity effects with the dependent variable, because of accounting identities. Estimates with the indicator computed on end-1994 data are not however sizably different (results available on request).

<sup>31</sup> An alternative argument would be the following. Firms can try to offset a low liquidity position and a low *ROA* by more intense marketing efforts, in a context of a likely weaker bargaining leverage with customers. Though empirically disentangling the two arguments is hard, we speculate that the first one in the main text is more convincing because, after having controlled for sales, it accounts for the low convenience of granting payment delays.

<sup>32</sup> Almost all 843 firms with a valid answer report a positive value for the ratio.

<sup>33</sup> Additional regressors – age, inventory turnover index – added to the basic specification in order to test for robustness turned out to be not significant (t statistics largely less than one).

already attained: indeed, as in the case for *deb*, firms are more reactive (as indicated by the absolute values and by the statistical significance) to falling rather than to rising sales. An additional percentage point for *marg* translates in a *cre* higher by one third.

Examining the financial determinants, *r*'s coefficient is negative and sufficiently well determined ( $t = 1.84$ ): an additional percentage point implies a 8 per cent lower *cre*. Both *ROA*<sup>34</sup> and *quick* are negatively signed and highly significant, confirming that more profitable and with stronger liquidity position firms are less keen on using a low return financial instrument such as TC. A change in *quick* from the first percentile to the median value (around 30 percentage points; see Table 12) implies a reduction for *cre* by slightly over one point; a similar reduction is produced by almost two additional points in *ROA*.

Finally, like for *deb*, the influence of customary nationwide practices across sectors is signaled by the strong rejection of the joint zero restrictions on *SETT* dummies, whereas the same restriction is easily accepted for the *REG* dummies; also rejected is the joint zero restriction for the *type* regressors<sup>35</sup>. As expected, *exp* is strongly significant: an additional percentage point implies a lower *cre* by more than one tenth of point.

The more interesting feature is however the significance ( $t = 1.88$ ) and the negative sign for the novel variable *disc*. It is true that this result is to be considered with some caution, because the relatively large practice of discount offers, suggested from the answers to the questionnaire, looks hardly compatible with the low proportion of firms in the same sample acknowledging to *receive* discount offers<sup>36</sup>. A first attempt at clarifying the issue is provided in columns 2 and 3, which report, as in Table 6, estimates for firms who state they do/do not offer discounts to Italian parties for earlier settlements. Indeed, besides providing an overall check for robustness of the estimated basic specification on samples reduced by a half, a comparison of columns (1) and (2) shows that the *r* and *disc*

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<sup>34</sup> The estimated coefficients for negative and positive *ROA* are very similar and the equality restriction is easily accepted.

<sup>35</sup> The pattern of the coefficient signs (estimates not reported here, available on request) is easily interpretable: the typology of sale markets reduce the credit period the higher the proportion of sales through own distributive channels to detailers or to wholesalers and the lower acting as a counterpart to the public sector or as a subcontractor.

<sup>36</sup> Note, however, that a qualitatively similar remark applies also in the US case, though considering two different samples. According to Ng *et al.* (1999), around a quarter of

coefficients double in absolute value and become more strongly significant; unsurprisingly, looking at column (3), the transactions variables turn out to be relatively more relevant.

Column (4) reports the estimates for the basic specification augmented for the *deb* regressor. In spite of the risks of reverse causation (see e.g. Petersen-Rajan 1997, fn. 16) in the intuitive argument that the capability to extend the credit period is positively correlated with the length of payment delays obtained, it is interesting to note that the additional regressor enters with the expected sign, has a sizable effect (an additional percentage point implies a larger by more than a fourth of point of *cre*) and, though highly significant, does not alter the estimates reported in column (1) for the main variables coefficients.

#### 4.1.3 Net trade credit

TC taken and granted are not close substitutes, being the first primarily a financial instrument and the second one mostly a marketing one; net TC, though useful to compute some aggregate financial structure indicators, can thus hardly be “explained” at the micro level. The estimated net TC (as a ratio to sales) reduced form equations have then to be rather interpreted as another way to check on how robust are the results so far obtained for the two gross components. The maintained hypothesis is that, because almost three quarters of firms have positive net TC stocks (see also fn. 18), the explanatory variables be overall those of TC given<sup>37</sup>.

The estimated equation (Table 8, column (1)) carries no surprises. Rather precisely estimated, and negatively signed, is the *r* coefficient (an additional percentage point translates into lower *cre* by almost one fifth of point); marginally significant ( $t = 1.55$ ) is *disc* (an additional percentage point implies lower *cre* by more than half a point). The distinction between negatively and positively valued *ROA* and *g* helps to pick the net effect, their coefficients having the same sign in the *cre* and *deb* equations. Columns (2) and (3) report the estimates for the two subsets of firms offering/not offering discounts. The remarks on the correspondent

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manufacturing firms offer discounts; in Petersen-Rajan (1997) about three quarters of small and medium sized firms report to have received discount offers.

<sup>37</sup> Also in this case, informal misspecification checks were carried out adding regressors used only in the TC taken equation (*age*, *unitprch*); they were always poorly significant ( $t$  statistics less than one).

columns in Table 7 apply here as well; an additional one is that the *disc* and *r* coefficients show absolute values larger three and two times, respectively.

#### 4.2 A closer look at the dimensional effect

In order to examine more closely the link between TC and firms' size, a recurring theme in the literature as previously remarked, the last column in Tables 6-8 shows the estimated basic specification (column 1) augmented with four (additive) dummies, one for each of the first four quintiles (defined over the 1549 firms in the sample) by total assets. It turns out that, besides a further support for the robustness of the estimates in column 1, dimension matters, because the joint zero restriction on dummies is soundly rejected; after having controlled for the other determinants, an inverse relation seems to come out for (the ratio to sales of) gross and net TC and, though less neatly, for *deb*<sup>38</sup> as well.

Using additive, rather than (also) multiplicative dummies could, however, fail to fully account for the effects of a different dimension on determining the reactivity to the determinants of TC granted and received. For this reason, tables 9-11 report the estimates of the basic specifications for *deb*, *cre* and net TC, splitting the sample between firms with total assets in the lower three quintiles (column 1), in the upper two quintiles (column 2), in the lower four quintiles (column 3) and in the upper quintile (column 4).

Table 9 roughly confirms the estimates for *deb* in Table 6; the interesting differential feature between larger firms (column 4) and the other ones is the loss of statistical significance for *marg* and for *ROA* and a greater reactivity to sales reductions. The first two phenomena are compatible with the role attributed to liquidity risk, the two variables are indicators of: this risk is likely to be rather low for suppliers to large firms, and at any rate overwhelmed by the ability of the latter to translate to suppliers, through lengthened payment delays, the effects of reduced sales. The *age* coefficient, negatively signed and more significant for the not so large firms, could hint to younger firms having more difficulties in getting bank rather than commercial credit.

Also Table 10 suggests some interesting differences between large and other firms in explaining *cre*. First, the reactivity of former ones to *r* is almost negligible, as it could be expected because of the prevailing use as a marketing

tool. Though less neatly, compared with Table 9, also the objective of sales stabilization turns out to be more relevant for larger firms. A plausible interpretation is that they are better, being less financially constrained, at smoothing their cycle<sup>39</sup>. Less easily rationalizable is the loss of statistical significance for *marg*: larger firms should be more able to implement a policy of price differentiation, though the puzzling result fits the reduced significance, compared to smaller firms, of *disc*. As expected, belonging to a group can help to raise the borrower's standing of medium-sized firms (not of smaller ones; compare columns (1) and (3)); it does not really matter for larger firms.

Table 11 for net TC provide no additional insights compared to Tables 9 and 10.

### 4.3 Related empirical studies

An assessment of the results so far examined in comparison with those of the few available empirical studies is severely hindered, because of the impact on trade credit features to be examined, by the highly country-specific legal and institutional context and by the definition of the sectors firms belong to. More specifically on this last issue, US (Elliehausen-Wolken 1993, Petersen-Rajan 1997) and French (Dietsch-Krémp 1998) studies include, besides manufacturing, as in the panel data Italian and Spanish studies, also construction and service industries, among which large retailers, with sizable monopsonistic power in product markets and ample recourse to credit to final consumers.

To my knowledge, this is the first paper in the Italian literature examining a cross-section of firms; previous studies were based on accounts data for a fixed number of manufacturing firms included in the Centrale dei Bilanci database (averaged panel data for 24 cells: 4 Pavitt macrosectors by 6 dimensional – sales – subsets; see Marotta 1997b) or on times series of aggregated data for medium-sized and large firms included in the Mediobanca database (Marotta 1997a).

Bearing in mind the heterogeneity of the samples under scrutiny, two of the key results in Marotta (1997b) are confirmed:

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<sup>38</sup> Similar results are obtained when using, as a size criterion, sales (ordered by quintiles) instead of total assets.

<sup>39</sup> Of course, the credit period lengthening is partly imputable, rather than to own choices, to the mechanical worsening of contracting parties' conditions.

1. the greater reactivity to the cost of external (mostly bank) borrowing in the equation for *deb* rather than for *cre*, as expected because of the marketing role for TC granted;

2. the lengthening of credit and debt periods, as a way to partially offset reductions in sales, practiced more intensely by larger firms.

A third result - the negatively, instead of positively, signed *quick* coefficient in the *cre* equation - fits actually better the basic assumption of this study, namely that better financially managed firms are reluctant to invest in a low return instrument such as TC.

## **5. Concluding comments**

A first contribution of this study is to provide detailed information on the cost of interfirm credit in the Italian manufacturing sector, exploiting a questionnaire included in the 1994 edition of the triennial Mediocredito Centrale survey. The empirical evidence supports the argument that the Italian case is different from the one usually considered as “normal”, instead of being acknowledged to be confined to the US experience (and perhaps to the German one), with a cost hierarchy between commercial credit and the cheaper bank credit. The main justifications are the low percentage of suppliers offering discounts for quicker settlements, the agreed long credit periods, the low incidence of penalties for late payments, mostly because of a legal-institutional environment that does not effectively protect creditors’ rights. Further evidence against a cost hierarchy can be inferred comparing a set of indicators computed separately for firms acknowledging to/not to have had difficulties in obtaining bank credit.

A puzzling, though not uncommon, result is the relatively large percentage (about a half) of firms acknowledging they offer discounts for debt settlements one month earlier than the agreed date and, at the same time, the very low percentage (less than one tenth) of firms who declare they receive discount offers by their suppliers. It is true, though, even in this case, that combining the effective credit periods (agreed plus delays) and the size of offered discounts, the estimated interest rate differential between commercial and bank credit is by far lower than in the US experience.

Another contribution is the first cross-section econometric analysis on a large set of firms. Some findings are worth commenting: first, firms are reactive to the external funding cost, most especially considering TC taken rather than granted, a result that fits the prevailing marketing role of the latter; second, more profitable or more liquid firms are reluctant to invest in a low return instrument such as TC; third, the discount offered enters with the expected negative sign in the explaining equation for the TC to sales ratio; fourth, splitting the sample between firms declaring to/not to offer discounts for quicker settlements, the former show overall a greater reactivity, for both TC taken and offered, to financial determinants rather than to transaction ones, a result that fits a superior expertise in an integrated economic and financial management.

An attempt at econometrically investigating whether size affects firms' behavior shows that the upper (total assets) quintile is comparatively less reactive to financial determinants and that debt and credit periods are modified more intensely, in order to partially offset cyclical sales (and above all sales reductions). A further finding, worth to be explored more carefully in later research, is the low statistical significance, for larger firms compared to others, of two variables – gross profit to sales margin and discount offered – in the explanatory equation of TC granted.

The main objective of future research are three. The first is to investigate the characteristics of firms answering the questionnaire, in order to better assess the possible biases, in the information set so far produced and analyzed, because of the patterns of missing values. The second is to explore finer subsets of firms, defined according to the answers provided to the questionnaire or to indicators of financial stress or idiosyncratic characteristics (age, types of competitors), in order to further test the rather surprising robustness of the estimates so far obtained. The third one is to simulate the effects on firms' accounts of the new legislations – the Italian one already passed and the soon to be implemented EU directive - on credit periods and on late payments penalties.

## **Appendix 1. The data**

### **Trade debt and credit questionnaire**

1. What's the average period for commercial debt in 1994?
2. How many suppliers (per cent) that offered in 1994 payment delays proposed also a discount for quicker settlements?
3. What's the average monthly discount for quicker settlements, i.e. the percent price reduction a firm can obtain on average anticipating the settlement by one month (e.g. cash instead of paying thirty days later)?
4. In 1994, what percentage of trade debt was settled by the firm beyond the agreed date and what was the average extra delay?
5. During 1994, what percentage of commercial debt, settled beyond the agreed date, implied an effective pecuniary penalty?
6. What's the average pecuniary penalty imposed by suppliers, as a percentage of price, for each month of delay?
7. What's the average monthly discount for quicker settlements, i.e. the per cent price reduction the firm offers to its buyers if they pay one month earlier than agreed (e.g. cash instead of paying thirty days later)?

### **Rationing in the bank credit market questionnaire**

1. In 1994, has the firm applied for but not obtained more bank loans?
2. In 1994, would the firm have accepted tighter terms (higher interest rates or more collateral) in order to obtain more bank loans?

### **The dataset used**

The information processed refers to a subset of 1549 firms out of the original Mediocredito Centrale survey. Firms were selected if the 1994 accounts information were consistent and plausible (e.g. non-negative depreciation charges): violating this minimal criterion was considered to cast doubts on any other information gathered on the firm. For each item of the questionnaire, 1549 is the upper limit for the valid answers. The following variables (mostly indicators computed on accounts data) took implausible values and were accordingly recoded to the 99° percentile: implied cost for external debt, quick ratio, 1993 and 1994 positive sales growth rates, 1993 negative sales growth rate, ratio to sales of trade credit, ratio to purchases of trade debt. For details on variables computation see Appendix 2.

## **Appendix 2: The regressors**

### **Indicators, in percentage points, computed on firms' 1994 accounts data:**

- ratio to sales of trade credit (*cre*);

- ratio to purchases of trade debt (*deb*);
- ratio to sales of net trade credit;
- implied borrowing cost ( $r$ ), computed as ratio of financial charges to bank lending and bonds (average of end-1993 and end-1994 stock data);
- growth rate of sales (*g*);
- *ROA*, computed as gross returns to total assets ratio;
- *quick ratio*, computed as liquid assets to short term liabilities, net of commercial items;
- purchases per supplier (*unitprch*): ratio of total purchases to the average number of suppliers (questionnaire information), in logs.

**Direct information from the questionnaire (percentage points):**

- monthly discount for 30 days earlier than the agreed date settlement (*disc*), see question 7. in Appendix 1;
- proportion of exported sales (*exp*);
- firm belonging to a *group*: binary variable;
- type of sales market (*type*):
  - a) direct sales to detailers (through own commercial organization);
  - b) sales to public sector parties;
  - c) sales to wholesalers;
  - d) sales to other non final consumers customers;
  - e) proportion of sales on commitment by other firms;
  - f) subcontracting as a proportion of total sales.

**Other firms' characteristics:**

- *age* :  $\ln(1+1994\text{-birth year})$ ;
- Pavitt sector (*SETT*): 3 binary variables, assuming values 1/0 if the firm belongs/does not belong to the traditional sector, to the scale one, to the specialization one;
- macroregion (*REG*): 3 binary variables, assuming values 1/0 if the firm is/is not in the North-West regions, in the North-East regions, in the Central regions.

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## Tables

**Table 1.**

### Trade credit in larger EU countries (1996)

	effective credit period (days)	days of delay	% payments within agreed date	% late (at least 30 days) payments
France	58	10	31.6	5.3
Germany	34	7	63.2	7.0
Italy	87	22	43.2	12.7
Spain	74	6		
United Kingdom	49	18	24.9	9.8
Source: <a href="http://www.europa.int">www.europa.int</a>				

**Table 2.**

### Trade credit in EU countries (1999)

	contractual credit periods (days)	days of delay	% payments within 15 days after agreed date
Belgium	45-90	17	53
France	60-90	16	57.9
Germany	30-60	11	79
Italy	60-120	17	62.1
Netherlands	25-40	17	49.8
Portugal	60-90	n.d.	n.d.
Spain	60-90	n.d.	n.d.
United Kingdom	30-60	15	60.3
Source: Dun & Bradstreet (2000)			

Trade credit and debt of manufacturing firms (1994 data) with Italian and foreign contracting parties																
	average debt period (days)		% of suppliers offering discounts		% discount for payments within 30 days earlier than agreed		% of late payments		days of delay		% of suppliers imposing penalties		% average penalty for late payments per month		% discount offered for payments within 30 days earlier than agreed	
	Italian	Foreign	Italian	Foreign	Italian	Foreign	Italian	Foreign	Italian	Foreign	Italian	Foreign	Italian	Foreign	Italian	Foreign
<b>quintiles (total assets)</b>																
1 <sup>^</sup> (no of firms)	196	50	196	64	60	8	196	60	44	7	44	7	15	7	190	98
average	76.6	70.5	10.2	3.1	3.6	2.4	5.0	4.2	34.0	30.7	6.1	0	2.5	0	1.6	0.6
median	75	75	0	0	3	2.5	0	0	30	30	0	0	1.5	0	0	0
2 <sup>^</sup> (no of firms)	215	91	216	100	59	16	215	101	43	11	43	11	8	8	213	130
average	79.3	75.3	7.6	6.7	2.8	2.2	5.1	2.5	31.4	25.2	6.2	0	1.5	1	1.3	1.1
median	80	75	0	0	3	2	0	0	30	30	0	0	1.5	0	0	0
3 <sup>^</sup> (no of firms)	228	114	228	120	63	12	226	121	42	14	44	14	12	12	224	165
average	82.3	71.4	8.7	5.2	2.9	2.3	5.8	4.8	31.5	30	1.6	0	1.6	1	1.2	0.9
median	90	72.5	0	0	3	1.8	0	0	30	30	0	0	1.3	0	0	0
4 <sup>^</sup> (no of firms)	242	156	241	168	78	17	241	166	54	10	56	12	17	3	236	179
average	83.4	73.8	8.1	3.8	2.9	2.4	4.7	0.7	32.9	23.1	5.1	0.2	3.7	1.3	1.1	0.9
median	90	75	0	0	3	2	0	0	30	30	0	0	1.4	1	0	0
5 <sup>^</sup> (no of firms)	229	169	227	176	78	33	230	177	59	21	59	22	10	2	224	189
average	83.5	74.2	7.0	4.9	2.5	2.3	8.4	3.5	31.5	24.1	2.9	0.0	2.7	1	1.1	0.8
median	90	80	0	0	2	2	0	0	30	30	0	0	1.5	0	0	0
<b>quintiles (sales)</b>																
1 <sup>^</sup> (no of firms)	197	46	197	58	57	11	197	55	57	6	57	6	18	1	195	89
average	79.5	77.3	9.2	5.7	3.2	2.4	8.0	3.8	36.8	28.3	7.6	0	2.5	1	1.4	0.5
median	80	82.5	0	0	3	2	0	0	30	30	0	0	1.5	1	0	0
2 <sup>^</sup> (no of firms)	224	94	224	105	70	13	222	106	44	9	45	10	13	10	221	138
average	82.6	73.5	10.5	4.5	3.1	2.2	4.8	2.2	36.6	36	6.9	0	3.1	0	1.3	0.9
median	90	75	0	0	3	1.5	0	0	30	30	0	0	1.5	0	0	0
3 <sup>^</sup> (no of firms)	223	121	225	133	64	14	225	131	47	19	48	20	14	2	221	161
average	81.0	73.1	8.4	5.1	3.0	2.0	5.1	4.6	30.2	25.4	1.2	0.1	2.0	1	1.3	0.9
median	90	75	0	0	3	2	0	0	30	25	0	0	1.2	1	0	0
4 <sup>^</sup> (no of firms)	234	142	231	149	69	24	233	149	48	14	50	14	12	3	228	176
average	82.4	73.9	6.8	4.4	2.7	2.5	6.3	2.7	28.0	25.7	3.6	0.1	3.1	1.3	1.2	1.0
median	90	75	0	0	3	2.8	0	0	30	30	0	0	1.4	1	0	0
5 <sup>^</sup> (no of firms)	232	177	231	183	78	24	231	184	46	15	46	16	5	1	222	197
average	80.2	72.1	6.5	4.7	2.6	2.3	5.1	1.9	29.0	20.8	1.8	0.1	1.6	1	1.1	0.9
median	90	75	0	0	2	2	0	0	30	15	0	0	1.5	1	0	0
<b>total (no of firms)</b>	1110	580	1108	628	338	86	1108	625	242	63	246	66	62	7	1087	761
average	81.2	73.4	8.2	4.8	2.9	2.3	5.8	2.9	32.3	26.2	4.3	0.0	2.6	1.1	1.2	0.9
1 <sup>^</sup> quartile	60	60	0	0	1.5	1	0	0	15.8	15	0	0	1	1	0	0
median	90	75	0	0	3	2	0	0	30	30	0	0	1.5	1	0	0
3 <sup>^</sup> quartile	90	90	5	0	4	3	0	0	30	30	0	0	2	1	3	1.5

Source: own calculation (see Appendix 1) from Mediocredito Centrale (1997); Italian and Foreign indicate, respectively, Italian and Foreign suppliers/customers, and foreign ones.

Table 4

Economic and financial indicators of manufacturing firms (1994 data)										
	days of credit	days of debt	net credit sales (%)	trade to bank loans	trade debt/s.t.	financial leverage (%) <sup>1</sup>	implied borrowing cost (%) <sup>2</sup>	ROA (points) <sup>3</sup>	sales growth rate (%)	employees (yearly average)
<b>quintiles (total assets)</b>										
1 <sup>^</sup> (no of firms)	310	310	310	310	310	310	310	310	310	198
average	103.7	133.3	6.2	1.0	298.6	22.0	8.7	10.0	29.6	
median	98.7	122.4	6.2	0.7	124.0	18.2	0.3	10.9	23.0	
2 <sup>^</sup> (no of firms)	310	310	310	310	310	310	310	310	310	215
average	115.3	136.1	6.5	0.9	247.4	19.2	7.3	14.4	48.2	
median	111.3	127.6	5.2	0.6	129.3	16.4	6.8	11.7	40.0	
3 <sup>^</sup> (no of firms)	310	310	310	310	310	310	310	310	310	229
average	126.1	135.6	9.9	0.9	193.0	18.0	7.1	15.9	67.8	
median	121.3	129.2	8.9	0.7	129.2	15.3	6.8	11.3	60.0	
4 <sup>^</sup> (no of firms)	310	310	310	310	310	310	310	310	309	244
average	131.9	141.8	10.2	1.0	196.0	16.6	7.1	14.7	83.6	
median	123.5	130.1	9.2	0.7	117.2	13.6	6.4	12.2	75.5	
5 <sup>^</sup> (no of firms)	309	309	309	309	309	309	309	309	309	235
average	142.1	134.7	14.7	1.2	176.3	17.3	6.6	12.8	144.8	
median	130.0	130.3	11.1	0.8	115.8	13.6	6.2	10.5	123.0	
<b>quintiles (sales)</b>										
1 <sup>^</sup> (no of firms)	310	310	310	310	310	310	310	310	310	198
average	124.3	156.4	8.0	1.2	285.6	20.7	6.5	4.8	29.1	
median	112.0	137.9	7.3	0.9	139.2	16.6	6.4	5.8	23.0	
2 <sup>^</sup> (no of firms)	310	310	310	310	310	310	310	310	310	224
average	124.3	139.1	9.7	0.9	266.8	19.0	7.5	11.4	52.8	
median	120.2	129.3	8.3	0.7	121.9	16.1	6.5	10.6	46.0	
3 <sup>^</sup> (no of firms)	310	310	310	310	310	310	310	310	309	226
average	127.8	140.4	10.0	0.9	187.7	17.7	7.3	19.7	66.8	
median	121.5	130.4	8.8	0.7	127.6	15.0	7.2	12.0	62.5	
4 <sup>^</sup> (no of firms)	310	310	310	310	310	310	310	310	310	235
average	127.0	130.9	10.2	0.9	172.1	17.9	7.2	15.1	87.2	
median	119.6	127.9	8.5	0.6	124.4	14.5	6.5	13.0	78.0	
5 <sup>^</sup> (no of firms)	309	309	309	309	309	309	309	309	309	238
average	115.7	114.6	9.6	1.0	199.1	17.7	8.2	16.8	138.7	
median	110.6	116.3	8.9	0.6	108.2	13.5	7.4	13.8	115.5	
<b>total (no of firms)</b>										
<b>average</b>	<b>123.8</b>	<b>136.3</b>	<b>9.5</b>	<b>1.0</b>	<b>222.3</b>	<b>18.6</b>	<b>7.4</b>	<b>13.6</b>	<b>76.9</b>	
<b>1<sup>^</sup> quartile</b>	<b>81.6</b>	<b>99.5</b>	<b>-1.0</b>	<b>0.3</b>	<b>45.5</b>	<b>11.2</b>	<b>4.1</b>	<b>-1.7</b>	<b>33.0</b>	
<b>median</b>	<b>116.3</b>	<b>128.1</b>	<b>8.3</b>	<b>0.7</b>	<b>122.5</b>	<b>15.1</b>	<b>6.8</b>	<b>11.3</b>	<b>60.0</b>	
<b>3<sup>^</sup> quartile</b>	<b>154.0</b>	<b>159.0</b>	<b>19.0</b>	<b>1.3</b>	<b>264.4</b>	<b>21.7</b>	<b>10.4</b>	<b>24.6</b>	<b>97.5</b>	

Source: own calculation from Mediocredito Centrale (1997). <sup>1</sup> Outstanding bank loans and bonds to net worth ratio. <sup>2</sup> Ratio of financial charges to outstanding bank loans and bonds (average of end-1993 and end-1994 data). <sup>3</sup> Gross operating profits over total assets.

Table 5

## Economic and financial indicators of credit rationed and not rationed manufacturing firms

	trade credit to sales ratio (%)	trade debt to purchases ratio (%)	net trade credit to sales ratio (%)	trade debt/s.t. bank loans	leverage (%) <sup>1</sup>	quick ratio (% points)	implicit borrowing cost (%) <sup>2</sup>	bank loans annual growth rate (%)	ROA (%) <sup>3</sup>	1994 sales annual growth (%)	1993 sales annual growth (%)	sales abroad (%)	employees (annual average)
<b>not rationed<sup>1</sup></b>													
(no of firms)	905	905	905	905	905	904	905	853	905	905	790	694	903
average	33.8	37.9	9.1	0.9***	233.6	58.4***	18.2	337.5	7.6	13.4	6.4	39.5	79.4**
median	32.7	35.8	8.4	0.7	120.0	31.6	14.9	5.0	6.8	12.7	4.1	34.7	64.0
standard deviation	15.9	15.9	17.3	0.9	592.7	76.6	11.4	6154.0	8.2	22.5	24.7	29.5	66.8
<b>rationed<sup>1</sup></b>													
(no of firms)	58	58	58	58	58	58	58	53	58	58	52	42	58
average	34.3	38.9	7.9	1.3***	327.6	28.9***	17.6	20.6	5.9	14.7	2.0	46.0	62.1**
median	33.8	36.9	6.9	1.1	184.4	18.0	16.0	6.5	6.3	12.6	5.6	47.5	47
standard deviation	15.7	18.2	17.0	1.2	604.6	31.7	8.7	65.7	7.6	28.1	20.1	31.8	45.0
<b>not rationed<sup>2</sup></b>													
(no of firms)	902	902	902	902	902	901	902	850	902	902	786	687	900
media	33.8	38.0	9.1	0.9**	236.3	57.9*	18.1	338.1	7.6	13.5	6.3	40.1	78.6
median	32.4	35.7	8.4	0.7	120.9	31.7	14.8	4.4	6.8	12.8	4.2	35.0	62.5
standard deviation	15.8	16.1	17.4	0.9	604.9	75.1	11.4	6164.9	8.4	23.0	24.5	29.6	66.5
<b>rationed<sup>2</sup></b>													
(no of firms)	61	61	61	61	61	61	61	56	61	61	56	49	61
average	34.5	37.5	8.8	1.2**	283.1	40.4*	18.7	32.1	6.6	13.0	3.9	36.7	75.3
median	34.9	38.6	6.7	0.9	203.0	21.2	16.2	10.6	6.7	11.6	3.7	30.0	60.0
standard deviation	16.8	14.6	14.7	1.4	389.9	77.5	8.6	84.1	4.8	20.7	23.7	30.0	57.0

Source: own calculation from Mediocredito Centrale (1997). For how the indicators are computed see Table 4 and Appendix 2. The exponents 1 and 2 indicate the rationed/not rationed firms according to the answer to question 1 or 2, on credit rationing (see Appendix 1). Significantly different averages, between rationed and not rationed firms, at the 10% (\*), the 5% (\*\*), the 1% (\*\*\*).

Table 6

Dependent variable: trade debt as a per cent ratio of purchases (*deb*)

OLS; t-statistic in brackets; coefficients of constant, additive dummies for Pavitt sectors and regions and buyers' type regressors not reported

Regressors	(1)	(2)	(3)	(4)	(5)
<i>r</i> : implied borrowing cost (%)	<b>0.17</b>	<b>0.27</b>	0.08	<b>0.17</b>	<b>0.19</b>
	(3.96)	(4.39)	(1.33)	(3.65)	(4.48)
<i>marg</i> : gross operating profits to sales margin (%)	<b>0.44</b>	<b>0.51</b>	<b>0.33</b>	<b>0.62</b>	<b>0.41</b>
	(5.53)	(4.43)	(2.83)	(6.53)	(5.17)
ROA ≤0 (%)	<b>-0.88</b>	<b>-1.25</b>	<b>-0.71</b>	<b>-0.68</b>	<b>-0.86</b>
	(5.64)	(3.62)	(3.80)	(3.30)	(5.60)
ROA >0 (%)	<b>-0.54</b>	<b>-0.78</b>	<b>-0.37</b>	<b>-0.73</b>	<b>-0.51</b>
	(5.75)	(5.05)	(2.89)	(6.38)	(5.37)
<i>unitprch</i> : purchases per supplier (log)	<b>-2.07</b>	<b>-1.90</b>	<b>-2.29</b>	<b>-2.01</b>	<b>-2.54</b>
	(4.70)	(2.91)	(3.68)	(4.29)	(5.45)
<i>g<sub>t</sub></i> : non positive sales growth rate (%)	<b>-0.24</b>	-0.16	<b>-0.28</b>	<b>-0.30</b>	<b>-0.24</b>
	(4.03)	(1.61)	(3.58)	(4.36)	(4.11)
<i>g<sub>t</sub></i> : positive sales growth rate (%)	0.03	-0.02	0.07	0.04	0.03
	(1.07)	(0.47)	(1.71)	(1.24)	(1.11)
<i>g<sub>t-1</sub></i> : non positive sales growth rate in 1993 (%)	<b>-0.13</b>	0.01	<b>-0.21</b>	-0.06	<b>-0.13</b>
	(2.54)	(0.14)	(2.98)	(1.00)	(2.53)
<i>g<sub>t-1</sub></i> : positive sales growth rate in 1993 (%)	<b>0.07</b>	0.01	<b>0.12</b>	<b>0.06</b>	<b>0.07</b>
	(2.31)	(0.27)	(2.76)	(1.90)	(2.32)
<i>age</i> : ln (1+ firm's age)	-1.17	-1.46	-0.71	-0.56	<b>-1.52</b>
	(1.65)	(1.39)	(0.72)	-(0.75)	(2.14)
total assets (1 <sup>^</sup> quintile)					<b>-4.00</b>
					(2.21)
total assets (2 <sup>^</sup> quintile)					-1.65
					(1.09)
total assets (3 <sup>^</sup> quintile)					-1.08
					(0.76)
total assets (4 <sup>^</sup> quintile)					2.54
					(1.87)
No of observations	957	421	511	736	957
R <sup>2</sup> c	0.23	0.23	0.22	0.26	0.24
DW	1.95	1.82	2.04	1.92	1.98
Test su joint zero restrictions					
Pavitt macrosectors	<b>F(3,935)=9.81</b>				
macroregions	F(3,935)=0.15				
buyers' markets typology	<b>F(6,935)=8.43</b>				
total assets size					<b>F(4,931)=4.25</b>

(2) e (3): firms offering/not offering discounts for payments 30 days or less earlier than the agreed date to Italian customers, not belonging to their group; (4) firms acknowledging sales abroad.

In bold characters: coefficients and test statistics significantly different from zero at 5 per cent or less.

Table 7

Dependent variable: trade credit as a per cent ratio of sales (*cre*)

OLS; t-statistic in brackets; coefficients of constant, additive dummies for Pavitt sectors and regions and buyers' type regressors not reported

Regressors	(1)	(2)	(3)	(4)	(5)
<i>r</i> : implied borrowing cost (%)	-0.08 (1.84)	<b>-0.15</b> (2.40)	-0.02 (0.35)	<b>-0.12</b> (2.82)	-0.06 (1.35)
<i>marg</i> : gross operating profits to sales margin (%)	<b>0.35</b> (3.77)	0.20 (1.59)	<b>0.47</b> (3.23)	<b>0.19</b> (2.01)	<b>0.30</b> (3.20)
ROA (%)	<b>-0.57</b> (5.50)	<b>-0.57</b> (4.03)	<b>-0.57</b> (3.68)	<b>-0.37</b> (3.62)	<b>-0.51</b> (4.93)
<i>quick ratio</i> end 1993 (%)	<b>-0.03</b> (4.52)	<b>-0.02</b> (2.97)	<b>-0.03</b> (3.75)	<b>-0.03</b> (4.90)	<b>-0.03</b> (4.50)
<i>discount</i> for quicker payments (%)	-0.58 (1.88)	<b>-1.22</b> (2.32)		<b>-0.59</b> (1.97)	-0.49 (1.59)
<i>g<sub>t</sub></i> : non positive sales growth rate (%)	-0.10 (1.51)	0.15 (1.44)	<b>-0.26</b> (2.91)	-0.01 (0.20)	<b>-0.13</b> (1.96)
<i>g<sub>t</sub></i> : positive sales growth rate (%)	-0.03 (0.95)	-0.08 (1.79)	-0.00 (0.08)	-0.04 (1.22)	-0.03 (0.98)
<i>g<sub>t-1</sub></i> : non positive sales growth rate in 1993 (%)	<b>-0.20</b> (3.19)	<b>-0.23</b> (2.61)	-0.14 (1.63)	<b>-0.17</b> (2.98)	<b>-0.20</b> (3.345)
<i>g<sub>t-1</sub></i> : positive sales growth rate in 1993 (%)	-0.01 (0.45)	-0.03 (0.58)	0.00 (0.09)	-0.03 (0.91)	-0.02 (0.55)
firm belonging to a <i>group</i>	<b>2.83</b> (2.38)	2.01 (1.14)	<b>3.44</b> (2.08)	<b>3.12</b> (2.72)	1.69 (1.40)
<i>exp</i> : export to sales ratio (%)	<b>-0.11</b> (5.93)	<b>-0.10</b> (3.39)	<b>-0.13</b> (5.00)	<b>-0.11</b> (6.14)	<b>-0.12</b> (6.57)
<i>deb</i> : trade debt as a ratio to purchases (%)				<b>0.26</b> (7.44)	
total assets (1 <sup>^</sup> quintile)					<b>-7.95</b> (4.10)
total assets (2 <sup>^</sup> quintile)					<b>-4.81</b> (3.03)
total assets (3 <sup>^</sup> quintile)					-2.74 (1.86)
total assets (4 <sup>^</sup> quintile)					-1.61 (1.17)
No of observations	722	341	380	722	722
R <sup>2</sup> c	0.26	0.23	0.29	0.32	0.28
DW	2.06	1.90	2.11	2.08	2.07
Test su joint zero restrictions					
Pavitt macrosectors	<b>F(3,699)=13.93</b>				
macroregions	F(3,699)=0.81				
buyers' markets typology	<b>F(6,699)=7.24</b>				
total assets size					<b>F(695,4)=5.10</b>

(2) e (3): firms offering/not offering discounts for payments 30 days or less earlier than the agreed date to Italian customers, not belonging to their group.

In bold characters: coefficients and test statistics significantly different from zero at 5 per cent or less.

Table 8

## Dependent variable: net trade credit as a ratio of sales (%)

OLS; t-statistic in brackets; coefficients of constant, additive dummies for Pavitt sectors and regions and buyers' type regressors not reported.

Regressors	(1)	(2)	(3)	(4)
<i>r</i> : implied borrowing cost (%)	<b>-0.19</b>	<b>-0.38</b>	-0.03	<b>-0.18</b>
	(3.72)	(5.03)	(0.49)	(3.42)
<i>marg</i> : gross operating profits to sales margin (%)	<b>0.30</b>	0.09	<b>0.55</b>	<b>0.25</b>
	(2.79)	(0.62)	(3.38)	(2.31)
ROA ≤0 (%)	<b>-0.76</b>	-0.61	<b>-0.84</b>	<b>-0.75</b>
	(3.22)	(1.50)	(2.76)	(3.20)
ROA >0 (%)	-0.07	0.00	-0.27	-0.01
	(0.51)	(0.02)	(1.40)	(0.05)
<i>quick ratio</i> end 1993 (%)	<b>-0.03</b>	<b>-0.03</b>	<b>-0.04</b>	<b>-0.03</b>
	(4.59)	(3.20)	(3.72)	(4.55)
<i>discount</i> for quicker payments (%)	-0.55	<b>-1.65</b>		-0.49
	(1.53)	(2.66)		(1.36)
<i>g<sub>t</sub></i> : non positive sales growth rate (%)	0.11	<b>0.43</b>	-0.08	0.10
	(1.49)	(3.47)	(0.75)	(1.30)
<i>g<sub>t</sub></i> : positive sales growth rate (%)	<b>-0.09</b>	<b>-0.15</b>	-0.06	<b>-0.09</b>
	(2.54)	(2.87)	(1.40)	(2.61)
<i>g<sub>t-1</sub></i> : non positive sales growth rate in 1993 (%)	<b>-0.24</b>	<b>-0.35</b>	-0.15	<b>-0.24</b>
	(3.45)	(3.42)	(1.56)	(3.55)
<i>g<sub>t-1</sub></i> : positive sales growth rate in 1993 (%)	<b>-0.07</b>	-0.03	-0.08	<b>-0.08</b>
	(1.96)	(0.63)	(1.47)	(2.078)
firm belonging to a <i>group</i>	<b>3.93</b>	3.16	<b>4.62</b>	<b>2.93</b>
	(2.88)	(1.54)	(2.521)	(2.10)
<i>exp</i> : export to sales ratio (%)	<b>-0.12</b>	<b>-0.13</b>	<b>-0.12</b>	<b>-0.13</b>
	(5.71)	(3.94)	(4.23)	(6.12)
total assets (1 <sup>^</sup> quintile)				<b>-7.06</b>
				(3.15)
total assets (2 <sup>^</sup> quintile)				<b>-4.38</b>
				(2.40)
total assets (3 <sup>^</sup> quintile)				-3.18
				(1.88)
total assets (4 <sup>^</sup> quintile)				<b>-4.18</b>
				(2.62)
No of observations	722	341	380	722
R <sup>2</sup> c	0.17	0.22	0.17	0.18
DW	2.04	1.98	2.03	2.03
Test su joint zero restrictions				
Pavitt macrosectors	<b>F(3,698)=4.29</b>			
macroregions	F(3,698)=1.56			
buyers' markets typology	F(6,697)=1.95			
total assets size				<b>F(4,694)=3.20</b>

(2) e (3): firms offering/not offering discounts for payments 30 days earlier or less than the agreed date to Italian customers not belonging to their group.

In bold characters: coefficients and test statistics significantly different from zero at 5 per cent or less.

Table 9

**Dependent variable: trade debt as a per cent ratio of purchases (*deb*)  
differently sized, by total assets, firms<sup>1</sup>**

OLS; t-statistic in brackets; coefficients of constant, additive dummies for Pavitt sectors and regions and buyers' type regressors not reported.

<b>Regressors</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
<i>r</i> : implied borrowing cost (%)	<b>0.19</b> (3.41)	<b>0.17</b> (2.52)	<b>0.18</b> (3.75)	0.14 (1.71)
<i>marg</i> : gross operating profits to sales margin (%)	<b>0.45</b> (4.18)	<b>0.38</b> (3.09)	<b>0.54</b> (5.69)	0.10 (0.64)
<i>ROA</i> ≤0 (%)	<b>-0.86</b> (5.04)	<b>-1.02</b> (2.83)	<b>-1.02</b> (6.11)	-0.48 (0.80)
<i>ROA</i> >0 (%)	<b>-0.51</b> (4.58)	<b>-0.56</b> (3.13)	<b>-0.68</b> (6.40)	0.07 (0.31)
<i>unitprch</i> : purchases per supplier (log)	<b>-2.25</b> (3.73)	<b>-2.57</b> (3.67)	<b>-1.77</b> (3.35)	<b>-2.92</b> (3.37)
<i>g<sub>t</sub></i> : non positive sales growth rate (%)	<b>-0.24</b> (3.15)	<b>-0.28</b> (2.86)	<b>-0.20</b> (2.99)	<b>-0.46</b> (3.80)
<i>g<sub>t</sub></i> : positive sales growth rate (%)	0.05 (1.19)	0.03 (0.67)	0.04 (1.16)	0.01 (0.17)
<i>g<sub>t-1</sub></i> : non positive sales growth rate in 1993 (%)	<b>-0.14</b> (2.02)	-0.12 (1.53)	-0.07 (1.09)	<b>-0.27</b> (2.80)
<i>g<sub>t-1</sub></i> : positive sales growth rate in 1993 (%)	0.05 (1.15)	0.08 (1.72)	0.07 (1.90)	0.04 (0.73)
<i>age</i> : ln (1+ firm's age)	<b>-2.58</b> (2.62)	-0.24 (0.22)	-1.62 (1.90)	-1.21 (0.94)
No of observations	503	453	738	218
R <sup>2</sup> c	0.22	0.26	0.22	0.33
DW	1.88	2.03	1.98	1.78

<sup>1</sup>Firms ranked by total assets (quintiles): (1) lower three quintiles; (2) upper two quintiles; (3) lower 4 quintiles; (4) upper quintile.

In bold characters: coefficients and test statistics significantly different from zero at 5 per cent or less.

Table 10

**Dependent variable: trade credit as a per cent ratio of sales (*cre*)  
differently sized, by total assets, firms<sup>1</sup>**

OLS; t-statistic in brackets; coefficients of constant, additive dummies for Pavitt sectors and regions and buyers' type regressors not reported.

<b>Regressors</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
<i>r</i> : implied borrowing cost (%)	<b>-0.13</b>	0.03	-0.10	0.02
	(2.29)	(0.38)	(1.88)	(0.18)
<i>margin</i> : gross operating profits to sales margin (%)	<b>0.42</b>	0.16	<b>0.40</b>	0.02
	(3.78)	(1.00)	(3.79)	(0.11)
ROA (%)	<b>-0.60</b>	<b>-0.38</b>	<b>-0.57</b>	-0.44
	(5.20)	(2.07)	(5.07)	(1.72)
<i>quick ratio</i> end 1993 (%)	<b>-0.03</b>	<b>-0.02</b>	<b>-0.03</b>	-0.01
	(4.12)	(2.51)	(4.73)	(0.84)
<i>discount</i> for quicker payments (%)	-0.45	-0.58	-0.60	-0.39
	(1.27)	(1.10)	(1.75)	(0.53)
<i>g<sub>t</sub></i> : non positive sales growth rate (%)	-0.03	<b>-0.35</b>	-0.11	-0.17
	(0.40)	(3.00)	(1.51)	(1.05)
<i>g<sub>t</sub></i> : positive sales growth rate (%)	-0.00	-0.02	-0.03	-0.02
	(0.05)	(0.50)	(0.92)	(0.29)
<i>g<sub>t-1</sub></i> : non positive sales growth rate in 1993 (%)	-0.05	<b>-0.29</b>	<b>-0.16</b>	<b>-0.26</b>
	(0.67)	(3.14)	(2.35)	(2.15)
<i>g<sub>t-1</sub></i> : positive sales growth rate in 1993 (%)	-0.04	-0.02	-0.00	-0.05
	(0.89)	(0.36)	(0.06)	(0.70)
firm belonging to a <i>group</i>	0.79	<b>3.24</b>	<b>3.10</b>	0.94
	(0.42)	(2.00)	(2.07)	(0.42)
<i>exp</i> : export to sales ratio (%)	<b>-0.11</b>	<b>-0.14</b>	<b>-0.10</b>	<b>-0.16</b>
	(4.49)	(4.63)	(4.75)	(3.78)
No of observations	354	367	534	187
R <sup>2</sup> c	0.32	0.27	0.29	0.23
DW	2.02	2.03	2.14	2.19

<sup>1</sup>Firms ranked by total assets (quintiles): (1) lower three quintiles; (2) upper two quintiles; (3) lower 4 quintiles; (4) upper quintile.

In bold characters: coefficients significantly different from zero at 5 per cent or less.

Table 11

**Dependent variable: net trade credit as a per cent ratio of sales  
differently sized, by total assets, firms<sup>1</sup>**

OLS; t-statistic in *Italic*; coefficients of constant, additive dummies for Pavitt sectors and regions and buyers' type regressors not reported.

<b>Regressors</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>
<i>r</i> : implied borrowing cost (%)	<b>-0.24</b>	-0.11	<b>-0.21</b>	-0.12
	<i>(3.85)</i>	<i>(1.27)</i>	<i>(3.68)</i>	<i>(1.05)</i>
<i>margin</i> : gross operating profits to sales margin (%)	<b>0.39</b>	0.09	<b>0.38</b>	-0.13
	<i>(3.14)</i>	<i>(0.47)</i>	<i>(3.23)</i>	<i>(0.53)</i>
<i>ROA</i> ≤0 (%)	<b>-0.91</b>	-0.45	<b>-0.85</b>	-0.71
	<i>(3.79)</i>	<i>(0.89)</i>	<i>(3.61)</i>	<i>(0.59)</i>
<i>ROA</i> >0 (%)	-0.18	0.20	0.01	-0.16
	<i>(1.19)</i>	<i>(0.88)</i>	<i>(0.06)</i>	<i>(0.52)</i>
<i>quick ratio</i> end 1993 (%)	<b>-0.04</b>	<b>-0.03</b>	<b>-0.04</b>	-0.00
	<i>(4.38)</i>	<i>(2.44)</i>	<i>(5.22)</i>	<i>(0.02)</i>
<i>discount</i> for quicker payments (%)	-0.44	-0.51	-0.58	-0.20
	<i>(1.09)</i>	<i>(0.82)</i>	<i>(1.52)</i>	<i>(0.23)</i>
<i>g<sub>t</sub></i> : non positive sales growth rate (%)	<b>0.22</b>	-0.14	0.09	0.11
	<i>(2.45)</i>	<i>(0.99)</i>	<i>(1.11)</i>	<i>(0.58)</i>
<i>g<sub>t</sub></i> : positive sales growth rate (%)	-0.05	-0.10	-0.08	-0.09
	<i>(1.17)</i>	<i>(1.80)</i>	<i>(1.94)</i>	<i>(1.25)</i>
<i>g<sub>t-1</sub></i> : non positive sales growth rate in 1993 (%)	0.04	<b>-0.42</b>	<b>-0.16</b>	<b>-0.39</b>
	<i>(0.43)</i>	<i>(3.90)</i>	<i>(2.12)</i>	<i>(2.72)</i>
<i>g<sub>t-1</sub></i> : positive sales growth rate in 1993 (%)	<b>-0.13</b>	-0.05	<b>-0.08</b>	-0.05
	<i>(2.89)</i>	<i>(0.87)</i>	<i>(1.97)</i>	<i>(0.61)</i>
firm belonging to a <i>group</i>	1.39	<b>4.70</b>	<b>4.95</b>	-0.65
	<i>(0.66)</i>	<i>(2.45)</i>	<i>(2.95)</i>	<i>(0.25)</i>
<i>exp</i> : export to sales ratio (%)	<b>-0.08</b>	<b>-0.18</b>	<b>-0.10</b>	<b>-0.20</b>
	<i>(2.89)</i>	<i>(5.23)</i>	<i>(4.22)</i>	<i>(4.01)</i>
No of observations	354	367	534	187
R <sup>2</sup> c	0.25	0.17	0.2	0.2
DW	1.86	2.07	2.05	2.12

<sup>1</sup>Firms ranked by total assets (quintiles): (1) lower three quintiles; (2) upper two quintiles; (3) lower 4 quintiles; (4) upper quintile.

In bold characters: coefficients significantly different from zero at 5 per cent or less.

Table 12

## Regressors' summary statistics

	no of firms	average	median	1° percentile	99° percentile	std. dev.
<b>regressors</b>						
<i>cre (%)</i>	1549	34.00	32.1	0	97.07	17.08
<i>deb (%)</i>	1549	37.60	35.57	5.21	110.26	16.71
<i>net trade credit to sales (%)</i>	1549	9.50	8.34	-35.49	63.18	19.66
<i>r (%)</i>	1549	18.52	15.07	3.77	66.22	11.54
<i>g (%)</i>	1548	12.24	11.25	-49.84	102.12	25.31
<i>ROA (%)</i>	1549	7.36	6.75	-18.32	31.01	8.52
<i>quick (%)</i>	1549	61.20	31.19	1.20	560.66	89.08
<i>unitprch (log)</i>	1109	3.74	3.63	1.23	6.79	1.15
<i>disc (%)</i>	1087	1.25	0	0	5.00	1.69
<i>exp (%)</i>	843	39.68	35.00	0.50	100	29.73
<i>group</i>	1123	0.22	0	0	1	0.41
<i>age (log)</i>	1123	2.93	3.00	1.10	4.54	0.71
<i>type (%)</i> :						
<i>a)</i>	1115	11.87	0	0	100	28.49
<i>b)</i>	1115	3.82	0	0	88.40	14.95
<i>c)</i>	1115	20.87	0	0	100	34.52
<i>d)</i>	1115	10.16	0	0	100	27.17
<i>e)</i>	1114	76.27	100	0	100	37.51
<i>f)</i>	1113	7.83	0	0	90.00	16.64
<b>SETT:</b>						
<i>traditional</i>	720					
<i>scale</i>	513					
<i>specialization</i>	265					
<i>high technology</i>	41					
<b>REG:</b>						
<i>North-West</i>	610					
<i>North-East</i>	486					
<i>Centre</i>	287					
<i>South</i>	156					

See Appendix 2 for details.