Is trade credit more expensive than bank loans?
Evidence from Italian firm-level data

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Abstract

The study, aimed at evaluating the likely effects of the EC Directive on late payments, provides direct evidence that interfirm credit received by Italian manufacturing firms is, if ever, only slightly more expensive than bank loans. An econometric exercise shows that financial determinants have a stronger impact on recorded credit and debt periods for larger firms, able to use trade credit to smooth their cycle; smaller firms seem to adapt more passively to counterparties' supply and demand. A novel finding is that shorter credit periods are associated to the directly measured discount offered for quicker payments.

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1. Introduction*

Interfirm credit is a neglected theme in theoretical and empirical studies on the heterogeneity of financial systems among EMU countries and the regional implications for the transmission mechanism of a single monetary policy (see for instance Schmidt, 1999), though an investigation into the subject is warranted for at least two reasons. *First*, widely different national practices and legislations disrupt the EU single market objective, thus hindering the development of financial techniques, such as asset-backed securitization, and obstructing the standardization of criteria for assessing firms' creditworthiness, because of the different incidence of trade credit (TC) and trade debt (TD) on their books[1]. A stylised fact is that the TD to total assets ratio is larger in Mediterranean countries (France, Italy, Portugal, Spain) compared to Northern countries (Germany, Scandinavia); there is also evidence, for the past decade, in France (Dietsch-Kemp, 1998; Dietsch, 1998) and Italy (Marotta, 1997), of a net TC structural reallocation from smaller to larger firms, with a strengthening of the financial dependence of the former from banks. *Second*, the comparability across the EU of effective prices, though the nominal ones are denominated in a common currency, is undermined if discounts for quicker payments are neglected[2].

Institutional innovations, such as the legislations introduced in Italy[3] and the U.K.[4] or the recently passed EC Directive on late payments[5], are however bound to modify key aspects of TD, raising its relative cost compared to short term loans, especially for larger firms. A likely development, at least in the Mediterranean countries, is thus a larger incidence of big borrowers in bank lending and a growing reliance on 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 literature based on the US experience. Indeed, the common theme underlying the theoretical discussion of credit rationing in Jaffee-Stiglitz (1990) and the justification for adopting a high TD to liabilities ratio as an indicator to identify empirically credit rationed firms

[1] TC can be treated *as if* interfirm credit, provided the share of sales to final consumers (households or public sector) is sufficiently small. This assumption is roughly acceptable if firms, as in this study, belong to the manufacturing sector (see also fn 25, Table 9 and Appendix 2).
[2] Blinder et al. (1998) report that price stickiness, according to the managers interviewed, is *de facto* accompanied by changes in non price contractual terms, including terms of payment. The finding is not however robust: according to the survey in Ng et al. (1999, Table III) there is little willingness among firms to vary TC terms in lieu of product price changes.
[3] The bill was approved on June 16th, 1998.
[4] *Late payment of commercial debts (interest) Act 1998*.
[5] EC Official Journal dated 8/8/2000, L.200/35. EU countries have to comply, modifying their national legislations, within two years from the publication of the Directive.

in Petersen-Rajan (1994) is that larger firms, exploiting their superior credit standing with banks and financial markets, may act as intermediaries granting longer payment delays when smaller firms are credit squeezed during a monetary restriction. A key policy implication, as inferred in Kashyap et al. (1993), is that because of this Meltzer (1960) effect the credit channel of the monetary transmission mechanism is weakened; empirical evidence, using data on TC, is however inconclusive: Marotta (1997), on an averaged panel of Italian manufacturing firms, does not find evidence of a Meltzer effect, whereas an opposite result is claimed in Kohler et al. (2000), on a large panel of U.K. quoted firms.

New legislation on TC in Italy – a country whose economic and financial structure is an almost ideal environment for the credit view approach, compared to U.K. (Kashyap-Stein, 1997; Cecchetti, 1999) – provides a first justification for research on its likely effects on bank-firm and interfirm credit patterns; a second justification can be found in the attempt at exploring the distributive implications of a single monetary policy in countries with different TC patterns. Because of data availability – a rather binding constraint in this area - this study focuses on Italy; the lessons drawn from it can however, I would contend, be extended to other Mediterranean countries, because of the similarities at least in the relevance of TD compared to bank loans among firms' liabilities.

A prerequisite for an evaluation of the effects of a new legislation is an enquiry into some current TC key features: contractual and ex post payment delays, *ex-ante* monetary costs, because of discounts for quicker payments and of penalties for late payments. This information has some bearing also on the literature on TC because, though it may be surprising, there is only very scattered evidence on these crucial aspects, with the recent partial exceptions of Ng *et al.* (1999) and Wilner (2000) for the U.S.

These are the grounds for justifying why a first contribution of the paper is to provide a descriptive analysis on the TC contractual clauses for the Italian manufacturing sector, exploiting the Mediocredito Centrale (MC) dataset. The 1994 edition of the triennial MC survey on more than 5000 manufacturing firms – a representative sample for the ones with 11 to 500 employees and all larger ones – includes, besides a short time series of annual accounts and information on a set of firms' idiosyncratic characteristics, a questionnaire on TC and TD: credit and debt periods, average ex-post delays, percent of TD paid late, size of discounts taken and offered for quicker payments, penalties for late payments, how common are these pricing practices. The sample size, even after the shrinking to a maximum of 1549 firms, because of missing values and accounting data inconsistencies, is comparable with other cross-section studies.

The main result is that there is no evidence of a significant cost difference between TD and bank loans, basically because of long credit periods and of relatively rare discount offers and even less

widespread penalties applied for late payments. An important implication of this finding is that the link between high TD and credit rationing, taken for granted on a priori grounds in recent studies for the US and the German experiences (Petersen-Rajan, 1994, Harnhoff-Körting 1998) is, if it ever exists, very weak.

A second contribution of the paper is a cross-section study on the determinants of credit and debt periods, integrating accounting data with firms' answers to a questionnaire on TC. A novel aspect in the econometric exercise is the inclusion, among the explanatory variables, of the reported discount offers for quick payments. The survey findings are also exploited to suitably split the sample – by size, by financial expertise – in order to assess possibly different elasticities to financial determinants. The main result is that larger/more financially expert firms do react more strongly to financial determinants, thus suggesting that the new European legislations on TC could impact differently across firms and countries, given the high heterogeneity in their current practices. The similarities of the Italian experience with other Mediterranean countries in interfirm credit hint at sizable reallocation effects among TC, bank loans and short-term market financing instruments.

The paper is organized as follows. Section 2 provides a comparison on TC features in the main EU countries and reports the main aspects of the new legislations in Italy and the U.K. and of the EC Directive. Section 3 (and the Appendices), after an illustration of the MC database and of some of its shortcomings, offers a rather detailed descriptive analysis of interfirm credit features, including the possible links with credit rationing. Section 4 provides a cross-section econometric analysis on credit and debt periods, with a special focus on heterogeneous responses to financial determinants, including the reported discount offers, of firms differentiated by financial expertise and size, and offers some tentative policy implications. Section 5 concludes.

2. Trade credit in the EU

2.1 International comparisons

In Europe, though on scattered data for contractual and effective credit periods, the differences across countries are wide, as often remarked by the European Commission, who 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 anedoctal evidence at mid 90's showed that Italy was the EU country with longer - from one third to two thirds - effective credit periods and average delays beyond agreed dates; Germany was the symmetric case (Table 1). The information does not basically differ from what reported for 1999 by a primary operator (Dun&Bradstreet, 2000) on contractual credit periods and on effective delays for trade financing among its customers, mostly medium-sized and larger firms.

A comparison, based on averaged data from a representative sample of the manufacturing sector in the harmonised accounts data base BACH (Bardes, 2000), shows a stable ranking for the ratios to total assets of TC and TD in the period 1989-1997, 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)[6]. 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 rises in Italy and in Spain and falls in the other two countries. On 1998 data for France, the average credit period[7] goes from 76 days for medium-sized/small firms to 72 for larger ones to 71 for smaller ones; the debt period[8] 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 credit and debt periods are 92 and 100 days (Hernandéz de Cos-Hernando, 1998).

A study comparing French and German manufacturing firms on 1995 firm-level data (Deutsche Bundesbank, 1999) finds, besides the almost triple average debt period in France with respect to Germany, that the TD to total assets ratio is about two times for French firms compared to German ones (23.4 and 12 per cent, respectively, on median data), whereas the TC ratio to total assets differs by more than 10 percentage points (33 and 21 per cent); a striking difference is the short term loans to TD ratio, equal to 4 and 62 per cent, respectively. Another interesting aspect, splitting the sample into five classes by size, is that the ratio to total assets of net TC goes from around 9-10 percentage points for French firms up to 2000 employees to a tiny 2.4 per cent for the largest ones; the same indicator, in the German case, from around 8-9 percentage points shrinks only slightly to 6.7 per cent. These statistics suggest a much larger role as net lenders in the interfirm credit market for the largest German firms compared to the French ones, a finding empirically supported for the last country by the evidence on the exploitation of their market power in interfirm credit with smaller counterparties (Dietsch-Kemp, 1998; Dietsch, 1998). A similar pattern during the 80's and early 90's was detected for Italy in Marotta (1997).

Searching for an explanation of the differences between the German case, similar to the US one, and the experience of the Mediterranean countries (and of the UK as well[9]) a plausible answer is that a high/low TD own cost, compared to the immediate substitute, namely short term bank loans, depends on both the monetary component – implied interest rates in two-part contracts allowing for

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[6] 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.

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

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

[9] Data on UK manufacturing firms referring to early nineties show that on average less than 50% of invoices were paid in time; small firms, in the manufacturing and in the services sectors, suffer disproportionately from payment delays (Bank of England, 2000).

discounts in case of quicker payments[10] and penalties for ex post delays – and the efficiency of institutional arrangements in protecting creditors' claims in case of late payments[11]. Even a tentative check on how well this answer squares with the facts, borrowing from other national experiences, is however hindered because the literature does not provide comprehensive information on the monetary TD own cost. In the U.S., recent papers (Ng et al., 1999; Wilner, 2000) show how, even if TD is more expensive with respect to short term loans, the actual cost spread cannot be easily computed, because it depends on how common is the two-part contract[12]: according to the first study it is offered by only a quarter of firms, manufacturing and not. An additional component, not even considered in these studies, is the size of, and how widespread are, penalties for late payments. Among the largest EU countries, only in Germany a 2 per cent discount is usually granted for payments within 15 days, even though with sizable differences across sectors (Harhoff-Körting, 1998); in France this contractual clause is far less widespread. The non-monetary cost component is very important as well, because "French payment patterns are not shaped by reservation-of-ownership rules designed specially to safeguard the interest of creditors […]. The German legal system strongly encourages the settlements of trade creditors. The far-reaching legal claim, in the form of the extended or expanded reservation of ownership, also assures the seller who has agreed such a clause with the purchaser the right of access to the processed product and a claim to the proceeds of a later resale and expands the reservation of ownership to claims on the corporate group as a whole or on existing current account debtors" (Deutsche Bundesbank, 1999, p. 36).

These remarks on the French legal and contractual framework for TC apply very closely to the Italian case as well and justify the claim that the results drawn from the MC database have a bearing on other EU Mediterranean countries.

2.2 Institutional innovations in the EU

The common feature of the legislations introduced in 1998 in Italy and the U.K. are a default penalty rate for late payments and normal credit periods much shorter than the current ones.

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)[13]. Late payments imply automatically a penalty interest rate on the principal owed of at least 500 basis

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[10] A two-part contract, *d/D, n/N*, offers the choice of a per cent discount *d* if the payment is done within *D* days, or of a net period, *n*, with a full payment *N* days after the invoice date, with *N* usually two to three times *D*. The implied annual opportunity cost, should the buyer decide to forgo the discount in exchange for *N-D* additional days of financing can be computed as $\left[100\left/\left(100-d\right)\right.\right]^{360/\left(N-D\right)} - 1$.

[11] This is of course a partial possible explanation, because it does not take into account the TC sales promoting role, with effective prices being different from nominal ones merely because of delayed payments beyond contractual dates.

[12] As Ng *et al.* (1999) remark, before their paper, based on an original survey, the only comprehensive documentation for the U.S., though with a focus on sectors rather than on firm level data, goes back to 1970 and is based on the records of a primary operator, Dun & Bradstreet, in the management of receivables of medium-large firms in various countries.

[13] As can be easily gauged inspecting Tables 1 and 2, credit periods are far lower than the current effective ones.

points above the EBC marginal refinancing rate. Moreover, if the delay exceeds 30 days, the debtor pays an extra penalty equal to 5 per cent of the debt.

In the U.K., since November 1st, 1998, small firms (up to 50 employees) can charge a penalty rate on any late paid TD due from larger firms and the *public sector*; from November 1st, 2000 the same rules apply also to small firms counterparties. The creditors' willingness to enforce the new rules is as yet however pretty low and experts' expectations are very cautious, because of the direct costs involved in making use of the Act and of the indirect ones created by the fear of hindering relationships with suppliers and customers (Bank of England, 2000).

These new legislations will soon be strengthened as a consequence of the EC Directive on late payments, published in August 2000, setting a common *minimum* reference standard national legislations of EU countries have to comply with within two years. The key features of the Directive are: a standard 30 days credit period (60 only for some types of contracts) with private and *public* counterparties; a default penalty interest rate at least 7 percentage points above the EBC main refinancing operations interest rate[14]. The Directive considers also legal instruments able to minimize the transaction costs incurred by small firms in order to make use of the new legal framework.

An obvious first step, in order to assess the effective impact of these new rules – supposing they are fully enforced - aimed at combating late payments, is an empirical investigation on the current TC monetary cost in countries most likely affected, because of much larger credit periods. The MC dataset, though with many shortcomings, allows to perform this task using firm-level data, besides helping to fill a gap in the TC literature, where as already remarked only Ng et al. (1999) and Wilner (2000) have provided for the US a much needed updated evidence on TC practices on average data by sectors.

3. Trade credit practices in the Italian manufacturing sector

The 1994 edition of the triennial MC survey on more than 5000 manufacturing firms – a representative sample for firms with 11 to 500 employees and all largest ones – includes, besides a short time series of annual accounts and information on a set of firms' idiosyncratic characteristics, a questionnaire on credit and debt periods, average ex-post delays, percent of TD paid late, size of discounts taken and offered for quicker payments, penalties for late payments, how common are these pricing practices; every question refers separately to three counterparties: firms in the same group, other non-group Italian and foreign firms. The sample size, even after the shrinking to a

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[14] Being this rate approximately in the middle of the two percentage points wide corridor having the marginal refinancing rate as an upper limit, the minimum penalty interest rate is *de facto* higher than in the actual Italian law. The

maximum of 1549 firms, due to missing values and accounts data internal inconsistencies (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.

3.1 Data interpretation

The potentially most attractive feature of the database is the in-depth questionnaire on TD, whereas only two questions deal with TC (for the wording of the main questions see Appendix 1), with answers that can be linked to firms' idiosyncratic characteristics and annual accounts for the period 1989-94. However, besides the usual cases of missing answers and of anomalous accounting data, the structure of the questionnaire raises some methodological problems when interpreting the collected information.

First, The answers, clustered around some focal points (for instance the average debt period, the average delays beyond contractual agreements, discounts offered or extended for quicker payments; Table 2), seem to mirror what a respondent thinks to be the "normal" practice in the sector the firm belongs to, rather than the own experience. The low data variability is a serious drawback for an econometric investigation linking their determinants to firms' idiosyncratic features.

Second, the drop rate for answers referred to two counterparties - firms in the same group, foreign ones – is pretty high; moreover, the questionnaire structure does not include a grand total answer for each question, a rather serious weakness because it prevents checking for the mutual consistency of single items and, as in the case of annual flows for TC and TD, for the compatibility with the stock figures in the balance sheet and with the underlying transaction variables (sales and purchases) in the income account.

Third, the questionnaire asks whether a discount offer for payments one month earlier than agreed was made or received; there is not, however, a question on whether the proposal was accepted by the counterparty. The wording of the question is also open to different interpretations. Literally, the discount refers to *any* payment made one month earlier than the agreed deadline: in a two-part contract, it would be like setting $D = N – 30$, with $N > D$; however, it is very likely that the respondent interpretation be of a standard two-part contract with $N=\alpha D$, with $\alpha=2$ or 3, similar to the actual practice in the US and in Germany or to the wording in the quoted Dun&Bradstreet (2000) study. The implied interest rate in foregoing the discount for quicker payment would of course be very different in the two cases, the lower the larger the $N - D$ period; moreover, respondents' answers could refer to effective – i.e. including ex-post delays – rather than agreed upon N, the more so if penalties for late payments are not enforced. Indeed, an upper bound to the

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reference interest rate, revised at the beginning of each semester, is the marginal or EBC set interest rate for the last

implied interest rate could be found in the *penalty* imposed for each month of delay beyond the agreed date: unfortunately, there is a dramatic drop in the percentage of answers to this question.

These shortcomings notwithstanding, the answers to the questionnaire provide a unique snapshot of the practices on TC and TD among Italian manufacturing firms. The data refer to a not so recent year, 1994, but the 1999 evidence on debt periods, contractual and effective (Table 1), suggests that in the meantime very little has changed.

3.2 An exploratory data analysis

This subsection provides the results of a descriptive data analysis of the MC survey.

-     The average debt period vis-à-vis Italian independent suppliers is longer than for foreign ones, though with a high dispersion across firms; the difference, both on average and median data, does not show up in the 25th or in 75th quantile (Table 2). The difference widens with the asset size, more noticeably in the case of Italian suppliers; the phenomenon shows up only comparing the lower fifth with the remaining firms, when sales are used as a dimensional indicator. The average contractual credit period with Italian counterparties, the likely expression of the "normal" practice in each sector, rather than of the own experience, is of about three times the normal length (one month) according to the EC Directive.

-     The proportion of suppliers offering discounts is low on average (slightly above 8 per cent for Italian ones and almost 5 for foreigners). Moreover, the option is acknowledged to be available to a limited subset of firms: the median value is in fact zero for Italian suppliers, going to 5 per cent only in the 75th quantile; this statistic is zero for foreign suppliers.

-     The annual interest rate implied by the discount offered for quicker payments is on average (using the 2.9 per cent discount for Italian suppliers) above 40 per cent, very much like the U.S. experience with a the two-part contract, (Ng et al., 1999), if the interpretation of a fixed *N-D* = 30 of the wording of the question is accepted; the rate of interest would drop instead to 19.3 per cent, for an agreed period of 90 days, accepting the second interpretation with a variable *N-D*[15]. It is useful to notice that the average short term bank lending rate in 1994 was 11.2 per cent, a figure bounding from below the average rate for uncollateralized very short term loans, i.e. the closest substitute to TD[16]. Some other pieces of information that can be drawn from the questionnaire - spread and size of penalties for late payments and of discount offers, a comparison between rationed and non-

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main refinancing operation before the beginning of the solar semester.

[15] On 1999 data, the implied rate, with *d* = 1.95%, *D* = 15 - a clause similar to the German one and according to Dun & Bradstreet (2000) applied in the 2.5 % of Italian large firms - is equal to 9.9 for *N* = 90.

[16] 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 short term lending rate.

rationed firms in the loan market – may help to shed some light on which interpretation is more plausible.

- Penalties for late payments are applied pretty rarely (slightly over 4 per cent from Italian suppliers and almost zero from foreign ones). Even though the reduced number of answers suggests caution, a non-null proportion at most in the upper fourth of respondents is a striking result; surprising is also the low incidence of acknowledged late payments, when compared with the measured (on accounting data) debt periods. 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[17]. On average, the proportion of late payments vis-à-vis foreign suppliers is a half compared to Italian ones.

- With the *caveat* of few answers, penalties are imposed only after considerable delays in payments (one to two months). The question on the size of the penalty, if it is ever imposed by Italian suppliers per month of delay, receives even fewer answers (62; just 7 for the foreign suppliers): the median/third quantile[18] values for Italian suppliers imply an annual interest rate of approximately 20/27 per cent, signit is icantly lower than the interest rate due to the proposed discount according to the first interpretation.

- At least a half of firms state that they do not offer discounts for quicker payments. The implied interest rate is on average even lower than for TD, going from 15.6 to 7.5 for a stated credit period of 90 days, according to the first or the second interpretation of the wording of the question. The first finding is somehow puzzling, when 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. The second finding raises some doubts about the plausibility of a high TD effective cost: from the answers of a much larger number of firms than for the corresponding question on TD (1087 vs 338), and under the assumption that discounts offered/received from/by Italian firms be roughly the two sides of a coin, the implied interest rate is, even accepting the interpretation of a fixed *N-D=30* days, far nearer to the lower bound computed for TD accepting the second, of a variable *N-D*, interpretation.

- Do these outcomes raise doubts on the overall coherency of the respondents' answers? It does not seem to be the case: as an informal check, regressing the percentage of debt paid later on

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[17] 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).
[18] The average value of 2.6 per cent is heavily influenced by some outliers, as can be easily gauged from the much lower median and 3rd quantile values (1.5 and 2 per cent).

the discount offer received, controlling for firms' characteristics – Pavitt macrosector, macroregion, ROA – the result is a negative and significant ($t = 2.9$) coefficient, implying that an extra point in discount on a monthly basis is associated with a decrease of late payments by 1.7 percentage points.

- The logical link, emphasized in Petersen-Rajan (1994), between smaller firms rationed in the bank credit market and recourse to the more expensive TC extended by larger firms[19] is, in the Italian case, implausible on *a priori* grounds, at least before the new legislations become effective; this claim has support in the information gathered from the MC dataset.

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)? Under the usual *caveat* for the few firms acknowledging to be rationed (6 per cent), a rather large set of indicators - answers to the TC section of the questionnaire and economic and financial indicators (on accounting data) – suggests, at most, a weak link (Table 3) [20]. The answers for the average debt period, the discount offer received, the ratio to debt paid after the scheduled date, the average delay and the penalty applied by suppliers are the same on median data; on average data they are higher for rationed firms, with the remarkable exception of the discount offer received. Even less different are the statistics computed from accounting data – credit and debt periods, ROA, implicit borrowing cost, sales growth rate – , with the exceptions of two financial indicators – TD as a ratio to bank loans and leverage – much higher for rationed firms.

Table 4 summarizes, keeping the same firms' ordering of Table 2, some economic and financial indicators computed from accounting data, that allow for comparability with most other studies and at the same time for a better interpretation of the answers to the TC questionnaire. Some aspects deserve comments.

a. The average number of employees in the 25th 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 of the manufacturing sector: in 1996, the average labor force (employees and self-employed) per firm was 8.9, lower than the 9.5 figure in 1991. 1994 was a year of recovery, as witnessed by the high growth rates of nominal (and real) sales, though with an uneven distribution

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[19] Note however that according to Ng et al. (1999, Table III), the answers distribution of respondents offering two-part contracts, when asked whether taking TC suggests that the customer cannot obtain financing elsewhere is the following: never (49,4%), occasionally (40.3), half of the time (3.4), frequently (5.6), always (1.3).

[20] The set of indicators is computed for a subset of non-rationed firms with a number of employees in 1994 at most equal to the largest rationed firm, in order not to bias the comparison including larger firms unlikely to be rationed. The results (available on request) do not change however when including all larger firms.

across size: inspecting the quintiles by sales, it is easy to spot a positive correlation between levels and growth rates.

b. The credit and debt periods, measured on accounting data, are on average longer than 4 months; for one fourth of the sample they are longer than 5. A comparison with the average period answer, under the joint hypothesis of an infra-annual and within size cell uniform distribution of underlying transactions, suggests that *ex post* payment delays are systematic and at least longer than 30 days, as acknowledged independently by the few firms answering this question (see Table 2). Examining more closely the cell values, the credit period is on average similar for the first 80th quantile (by sales) of firms, falling in the largest fifth; a positive correlation can be detected instead ordering firms by total assets. The debt period (median values), slightly positively correlated with total assets, shows a clear negative correlation with sales.

c. The ratio of TD 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 20th and in the 80th quantiles. This is an additional finding that does not fit the argument put forward in Petersen-Rajan (1994) – TD is an expensive financing instrument used by (small) firms more likely to be credit rationed – because larger firms, with a superior financial expertise, should be able to correctly rank by cost the two financing instruments.

4. Econometric investigation

The previous Section has provided plenty of univariate statistics; in order to explore in a multivariate setting the determinants of credit and debt periods, however, the many shortcomings of the questionnaire and of the patterns of answers suggest to adopt in the econometric investigation as dependent variables the ratios to the underlying transaction variables (annual sales and purchases, respectively) of end-of-year TC and TD figures. Besides an easier comparison with most studies, other motivations for this choice are that it allows us to consider the relationships with all suppliers and buyers, an obvious requirement inhibited by the missing grand total in the questionnaire structure, and to include also payment delays beyond agreed dates. The choice does not imply discarding the evidence provided by firms' answers, because it has a key role in the econometric investigation in providing: 1. compelling evidence on the basic assumption, shaping the interpretation of the results, that in the Italian case TC is not sizably more expensive than bank lending and actually can be even cheaper; 2. a directly measured offered discount as a determinant for TC; 3. clues to suitably define subsets of answering firms to check for the robustness of the estimates and to explore firms' heterogeneous responses to financial determinants.

As it is well-known, accounting data on interfirm credit, with no matching with the counterparties, do not one to disentangle demand and supply motivations: explanatory equations are

bound to be reduced forms[21]; in addition, whereas for TD the funding role is overwhelming – and consequently financial determinants more relevant - , TC is a sales promoting instrument (see Schwartz-Withcomb, 1979; Brennan et al., 1988) as well as a financing one.

In order to try to disentangle own policy effects from counterparties' decisions using accounting data for TC taken and granted the econometric exercise relies on two basic assumptions. *First*, a firm has a greater leverage on TC, because it depends first of all on the sales promotion policy and, to a lesser extent, on the financial strategies chosen; TD, instead, is basically the result of suppliers' – sales promotion and financial – choices, with a reduced role for indicators of a firm's current performance, based on inside information and only later known by other operators[22], to modify – usually upwards - the debt period beyond the agreed date. A battery of robustness checks can be devised exploiting the opportunities of suitably splitting the sample thanks to the answers to the questionnaire. For example, firms acknowledging they adopt as sellers a discount policy can be taken to be comparatively more financially expert and hence to be more reactive to return considerations in their TD policy. *Second*, as a key for interpreting the results of the estimates, in contrast with the US and the German experiences, the cost differential of TD compared to bank lending, because of the scarcity of two-part contracts, of the length of credit periods and of penalties for late payments, is low. The few answers on the size of discount offers received and of the penalties for late payments (see Table 2) however do not allow one to build a reliable comprehensive indicator of the TD own monetary cost: it is therefore implicitly included in the constant in the estimated equations, that include instead the other element of the cost differential – bank lending rate, proxied by the implied external borrowing rate[23] . The TC explanatory equations, instead, include the discount offered to Italian independent counterparties, given the sufficiently high number of answering firms (see Table 2).

To sum up, the suggested reduced form equation for the credit period (computed a ratio to sale of end-year TC, *cre*) is:

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[21] A way out suggested in the influential Petersen-Rajan (1997) study is, at least for TD, to estimate a sort of notional "normal trade debt" demand equation, exploiting the information in their data-set on the percentage of purchases bought on invoice, and then using the predicted values as a determinant, together with various financial indicators, of the actual trade debt stock figures. The same methodological problem encountered in the MC survey, namely that such an information could refer to normal practices in the sector rather than to the answering firm's own experience, could however cause a flawed indicator. In the MC database, anyway, a percentage of purchases bought on invoice would be uninformative, because of the tripartite split of counterparties without a grand total; moreover, relatively to Italian independent counterparties, the percentage is close or equal to one hundred.

[22] In the Italian case most firms, unlisted, provide only annual income and balance sheet accounts some months after the end of the year.

[23] The approximation is acceptable in the 1994 Italian case because debt financing is almost exclusively bank lending, mostly short term.

$$cre = f\left(\underbrace{\underset{-}{r}, \underset{-}{disc}, \underset{-}{ROA}}_{financial\ determinants}, \underbrace{\underset{+}{sales\ margin}, \underset{-}{sales\ growth}}_{sales\ promoting\ determinants}; transaction\ technology,\ idiosyncratic\ characteristics \right) \quad (1)$$

where the explanatory variables can be grouped into four categories.

1.   *Financial determinants:* implied cost of external borrowing, *r*; discount firms acknowledge they offer for payments 30 days earlier than the agreed date, *disc*; a current profitability index, such as *ROA*[24]. The expected signs for *r* and *disc* are negative: in the first case, because of the opportunity cost of borrowing short term from banks in order to extend payment delays; in the second case, because a higher discount should incentive debtors to pay quicker. Note that entering directly *disc* implies to leave open the question on which interpretation to accept on the implied opportunity cost of foregoing a discount; as a consequence, it is not allowed to compare directly the estimated coefficients of *disc* and of an annual interest rate, such as *r*. The negative sign attached to *ROA* is motivated by the basic assumption that extending trade credit is, on purely financial grounds, a dominated investment choice, which can then be pursued, *ceteris paribus*, by less profitable firms gambling for better performances through higher sales.

2.   *Sales promoting determinants:* gross profit as a ratio to sales, *marg*; sales growth rate, *g*. The sales promoting role of TC can be caught under two dimensions: first, a structural implicit price discrimination policy (Schwartz-Whitcomb, 1979) can be better realized when (as suggested by Petersen-Rajan, 1997) a seller has a high margin to sales, generating the required resources and providing incentives for sales (hence positive sign for *marg*); second, as an anticyclical instrument to stabilize sales (negative sign for *g*). Empirically, in order to pick a structural feature of the firm policy *marg* is averaged over two years; in order to avoid simultaneity between *cre* and *g*, because of the annual frequency of data, *g* is lagged one year.

3.   *Transaction technology:* location by 4 macroregions (dummy variables *REG*); sector by 4 Pavitt macrosectors (dummy variables *SETT*); buyers' typology (*type*), by marketing channels and type of production[25]. Shorter credit periods abroad (see Table 1) suggest an expected negative sign for the export to sales ratio, *exp*.

4.   *Idiosyncratic characteristics:* being a member of a group, should enhance, c*eteris paribus*, a firm's credit standing and hence lower the opportunity cost of extending *TC* (positive sign for the dummy variable group). It must be remembered, however, that the data do not allow,

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[24] A better indicator of profitability, such as *ROE*, was discarded because of data problems in the income accounts for a large number of firms.

[25] Though firms provide in the MC database the proportion of sales for each category, the resulting regressors are similar to binary dummies, because of the low number of firms reporting positive values. More precisely, of the 1115 firms providing valid answers in the questionnaire, zero values are found at least up to the eighth, the seventh and the

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 localization of profits in order to minimize the overall tax burden.

The simpler suggested reduced form equation for the debt period (computed as a ratio of end-year to annual purchases, *deb*) takes into account, besides the transaction technology, three categories of determinants: opportunity cost, *r*, with expected positive sign; distress indicators, such as current profitabily, proxied by *ROA*, and sales growth rate, *g*, are expected to be negatively signed; bargaining power vis-à-vis suppliers, proxied by the amount of purchases per supplier (in log), *unitprch*:

$$
d\textit{eb} = f\left(\underset{+}{r}, \underbrace{\underset{-}{\text{profitability}}, \underset{-}{\text{sales growth}}}_{\text{distress indicators}}, \text{unitprch; transaction technology} \right) \qquad (2)
$$

The expected signs for the distress indicators are justified on the grounds that a less profitable firm with poor sales is likely to exploit the opportunity of postponing payment schedules to junior creditors (as is the case in Italy for suppliers compared to employees and banks)[26]. The expected sign of *unitprch* is *a priori* uncertain: a firm with more dependent suppliers could enjoy a monopsonistic power in setting longer debt periods; the same indicator, however, could instead proxy suppliers' greater contractual leverage, with an opposite effect on *deb*.

The following subsections present the results of the econometric exercise.

4.1 Trade credit

A basic linear specification for (1) is the following:

$$
\begin{aligned}
cre_t &= \varphi_0 + \varphi_1 r_t + \varphi_2 disc_t + \varphi_3 ROA_t + \varphi_4 marg_t + \varphi_5 g_{t-1} + \varphi_6 group + \varphi_7 exp + \sum_{i=1}^{3} \gamma_i type_i \\
&+ \sum_{j=1}^{3} \delta_j SETT_j + \varepsilon
\end{aligned} \qquad (3)
$$

In the econometric exercise it was chosen to distinguish between negative and positive *g*, in order to pick possible asymmetric effects; preliminary regressions showed that the macroregion dummies *REG* were poorly significant[27] as well as two types of marketing channels and consequently these regressors were excluded.

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sixth decile for the proportion of sales to the public sector, to detailers and to wholesalers or out of subcontracting, respectively (see also Table 9).

[26] Of course, it could be argued that the same sign could be motivated assuming that suppliers, in order to keep a customer, would be willing to let the debtor to stretch payment terms in order to help weathering temporary difficulties.

[27] The joint F-test of exclusion for the basic specification in column (1), Table 5, was $F(3,704)=0.6$.

The OLS estimates lend overall support to the *a priori* predictions (Table 5)[28]. Starting with the basic specification estimates at column (1), let us consider first the transaction technology: the influence of customary nationwide practices across sectors is signaled by the strong rejection of the joint zero restrictions on the *SETT* dummies; also rejected is the joint zero restriction for the *type* regressors[29]. Also *exp* is strongly significant: an additional percentage point implies a lower *cre* by more than one tenth of point. Sizable (almost 3 percentage points) is the positive effect on *cre* of the group dummy.

The sales promoting role for *cre* is buttressed under both dimensions: the statistical significance of only the non positive lagged *g* is easily rationalized on the grounds of stabilizing sales around the levels already attained: indeed, firms do not react to rising sales. An additional percentage point for *marg* translates into a *cre* higher by one sixth.

Examining finally the financial determinants, both *r* and *ROA* coefficients are negative and highly significant: an additional percentage point implies, respectively, a lower *cre* by 12 and 45 per cent. The more interesting feature is however the negative sign and the significance for the novel explanatory variable *disc*. It is true that this result must 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[30].

A first attempt at clarifying the role of *disc* is provided in columns (2) and (3), reporting estimates for firms who state they do(do not) offer discounts to Italian independent parties for quicker payments, a distinction that could help identifying more(less) financially expert firms. Interestingly, besides providing an overall robustness check for the estimated basic specification on samples reduced by roughly a half, a comparison of columns (1) and (2) shows that the *r* and *disc* coefficients rise in absolute value by at least a third, whereas the other coefficients are much more stable, except for the *group* dummy; comparing columns (2) and (3), instead, the reactivity to financial determinants – to *r* in the first place - is much lower for the second subset of firms. It is worth noticing that comparing columns (2) and (3) the coefficient (not reported in the Table) for the variable representing the incidence of sales to public sector counterparties, less likely to be

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[28] Besides the usual statistic of explained variability (adjusted R^2), the DW statistic is also reported, as a generic misspecification indicator.

[29] The pattern of the coefficient signs (estimates not reported here, available on request) is easily interpretable: the typology of sales markets reduces the credit period the higher the proportion of sales through own distributive channels to detailers or to wholesalers and the lower acting as a subcontractor or, in particular, for coefficient size and statistical significance, as a counterparty to the public sector.

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

responsive to discount offers, though always positive, is lower in size and statistical significance (0.11 with a $t = 1.3$ vs 0.37 with a $t = 5.4$).

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 sizably effect (an additional percentage point implies an increase of *cre* by more than a fourth of point) and, though highly significant, does not alter the main results reported in column (1).

4.2 Trade debt

A basic specification for (2) is the following:

$$deb_t = \beta_0 + \beta_1 r_t + \beta_2 ROA_t + \beta_3 g_t + \beta_4 unitprch + \sum_{i=1}^{4} \gamma_i type_i + \sum_{j=1}^{3} \delta_j SETT_j + \varepsilon \quad (4)$$

where, as before for *cre*, in order to pick possible asymmetric effects, the sales growth rate is entered separately for positive and negative values. The OLS estimates of the basic specification with a sample of almost 1100 firms fit overall the *a priori* predictions, with many highly significant regressors (Table 6, column (1)). The variables proxying the transaction technology – additive dummies for Pavitt macrosectors and share of sales by type of production and of marketing channels – are the same as in the *cre* equation. Also for *deb* the additive dummies for macroregions are jointly poorly significant (F(3, 1093)=1.5) and consequently dropped from the basic specification estimated. Another analogy is that the more relevant among the *type* regressors is the share of sales to public sector counterparties (an additional percentage point is associated with a higher *deb* by a sixth of a point), a result easily motivated if a firm transfers to its own suppliers the very large effective debt periods of these customers (see Marotta, 1995) [31].

The negatively signed *unitprch* suggests that the bargaining power of (large) suppliers more than offsets the monopsonistic leverage of their contracting party. *r* enters positively signed and with a non negligible effect: one additional percentage point translates into a 0.11 per cent higher *deb*.

The negatively signed current *ROA* and non positive *g*, whereas the positive *g* coefficient is comparatively small and insignificant, supporting the interpretation as distress indicators: firms finding themselves underperforming choose to delay the settlements of their obligations with junior creditors, such as suppliers. The quantitative effects are quite sizable: one additional percentage

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[31] The pattern of the other *type* coefficient estimates (not reported here, available on request) is easily interpretable: the debt period increases the higher the proportion of sales to non commercial firms or acting as a subcontractor, again because delays in payments received could be translated into own delays, and decreases the higher the proportion through own distributive channels to wholesalers.

point in *ROA* and (in absolute levels) non positive *g* are associated with a lower *deb* by 0.31 and 0.18 per cent, respectively.

Columns (2) and (3) in Table 6 report the estimates on two subsets of firms, chosen with the same criterion as in Table 5, namely according to the answer on whether they grant a discount to buyers (only Italian, not belonging to the same group, in order to get enough valid answers[32]) for quicker payments. The underlying rationale is that an active credit management is a clue to a firm is greater financial ability and, hence, to a greater reactivity to financial determinants. Comparing the estimates for *r* and *ROA* of columns (2) and (3), the former indeed show coefficients with larger absolute values and higher statistical significance; the *r* coefficient in column (3) is even not significant. A puzzling result, for the distress interpretation is, however, that the positive *g* coefficient in column (3), though in absolute terms lower by a half compared to the non positive one, is positive and highly significant.

Column (4) is symmetric to the same column in Table 5, adding to the basic specification the regressor *cre*: as before, the insertion of a highly significant regressor shows the robustness of the estimates in column (1).

4.3 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, column (5) in Tables 5-6 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, except for the *group* dummy, which becomes insignificant, dimension matters, because the joint zero restriction on the new dummies is soundly rejected; after having controlled for the other determinants, a negative correlation is evident between size and *cre* – *ceteris paribus*, firms in the extreme quintiles differ by almost 8 points in *cre* - ; the relation does not show instead any definite pattern for *deb*.

These results on the link between firm dimension and credit and debt periods are not robust, however, to the choice of a criterion for size. Considering the quintiles by sales levels, in fact, the joint zero restrictions on the dummies are easily accepted for *cre* (Table 5, column (6)); for *deb*, instead, they are rejected at a highly significant level, as before, but coefficients show a negative correlation pattern with size (Table 6, column (6)).

Using additive dummies could, however, fail to fully account for the effects of a different dimension in determining firms' reactivity to TC and TD determinants. For this reason, Table 7 reports the estimates of the basic specification for *cre* splitting the sample between firms with total

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[32] Out of the 1087 valid answers, almost a half have a value of zero.

assets in the lower two quintiles (column 1) and in the upper three quintiles (column 2) by asset size; similarly, Table 8 reports the estimates of the basic specification for *deb* splitting the sample between firms with sales in the lower three quintiles (column 1) and in the upper two quintiles (column 2). The splitting criterion chosen is a *P*-value of at most 5 per cent for the dummies, jointly significant and showing a clear pattern related to size (Table 5, column (5); Table 6, column (6)).

Table 7 suggests some interesting differences between larger and smaller firms in explaining *cre*. Overall, the estimates for the basic specification in Table 5 are replicated only for the subset of larger firms. More specifically, the coefficients for *r*, *disc* and *g* are poorly significant for the smaller ones (see column 1); for the larger firms, instead, with a likely superior financial expertise, they are even larger in absolute terms and highly significant (see column 2). An interpretation for the poor performance of the *disc* regressor in column 1 could be that buyers do not take seriously the two-part contract offered, because a smaller firm cannot credibly enforce it. Also the objective of sales stabilization turns out to be more relevant for larger firms; a counterintuitive finding is instead the poor performance for *marg*, which instead is highly significant for the smaller ones. A possible interpretation is that the pricing policy of larger firms, less financially constrained, is targeted prevalently at objective of smoothing their cycle[33], being the benefit of price discrimination presumably reduced by the transaction costs of dealing with many small customers.

On the whole, these results fit the first basic assumption of this paper, namely that even in reduced form equations, in explaining TC the supply determinants can be better caught for firms, like the larger ones, better able to implement their own policies; it is instead more difficult to disentangle own supply and counterparties' demand decisions for smaller firms.

Table 8 roughly replicates these main findings also for *deb*, though less sharply because, presumably, of the less definite size criterion – assets versus sales - for splitting the sample.

First of all, the fit of the basic specification for smaller firms is a half compared to larger ones. This finding is a further hint that the explanatory power of a firm's economic indicators is poor in reduced form specifications where the counterparties' supply policies predominate, as it is the case for smaller compared to larger firms. Second, only larger firms are affected significantly by *r* and translate comparatively more into a longer debt period current negative developments of sales. The stronger effect of current profitability in lengthening the debt period for smaller firms can be taken as a demand side distress effect. A puzzling result is instead the higher dependence from suppliers for larger compared to smaller firms.

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[33] Of course, the credit period lengthening is partly imputable, rather than to own choices, to the mechanical worsening of contracting parties' conditions.

4.4 Some tentative policy implications

The econometric exercise provides a reasonably sound basis for some tentative answers to the question of how sharper policies aimed at combating late payments will affect firms and their financing patterns, especially in EU Mediterranean countries characterized, like Italy, by long credit periods. *First*, the cost of bank lending has a stronger impact on recorded credit and debt periods for larger firms, able also to use the TC instrument to smooth their cycle presumably because less financially constrained; smaller firms seem to adapt more passively to counterparties' supply and demand TC policies. *Second*, firms offering discounts for quicker payments are able to reduce their credit period; these same firms show also a greater impact of the bank lending cost on their recorded credit and debt periods. *Third*, firms with higher export show a sizable shorter credit period.

On the grounds of this evidence, at least for Italy, mandatory shorter credit periods and default penalty rates for late payments, as set as a minimum reference standard in the EC Directive the EU countries have to comply with by August 2002, are bound to sharpen the divide between larger and smaller firms. Larger firms, facing higher TD opportunity costs, will have to rely, for short-term financing, more on banks – as already happens in Germany - and on short-term market instruments, such as the commercial paper. Smaller firms, more likely to be enforced rather than enforce the new rules, will face costs of adjusting to a better financial expertise, in order to manage likely mismatches in the length of credit and debt periods and higher opportunity costs of missing deadline payments. Finally, an additional spillover effect is likely to be generated by the reduction of the admitted credit periods in the other EU countries: a higher economic integration across the EU is bound to raise the rate of enforcement of the new rules towards a German-like pattern in interfirm credit. The adjustment to the new payment practices could prove too costly for many small firms, especially in Mediterranean countries; there is scope here for a role of local banks acting as financial consultants able to introduce small businesses to better financial practices, thus strengthening bank-firm customer relationships; a further implication of the latter development could be a shift from triangular lending – a bank providing funds to a firm extending TC to a buyer – to direct lending to the buyer, with a much improved ability to assess credit risk.

Besides the two key features of shorter normal credit periods and of a penalty rate for late payments, a third important aspect of the EC Directive, at least for Italy, is the extension of the new rules to any counterparty, be private or public. Given the very long credit periods currently obtained by the public sector, smaller suppliers should the ones to benefit more of quicker payments.

On the whole, complying with the EC directive is likely to change interfirm credit and firms' relationships with banks and financial markets in the EU Mediterranean countries towards the

German model; in order to ease the transition, however, a better efficiency of institutional arrangements in protecting creditors' claims in case of late payments is called for.

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 MC survey[34]. The empirical evidence supports the argument that the Italian case is different from the one usually considered as "normal" in the US and in the German experiences, with a cost hierarchy between commercial credit and cheaper bank credit. The main justifications are the low percentage of suppliers offering discounts for quicker payments, 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 "rationed" firms acknowledging to have been denied bank loans.

A puzzling, though not uncommon, result is the relatively large percentage (about a half) of firms acknowledging they offer discounts for quicker payments and, at the same time, the very low percentage (less than one tenth) of firms declaring they receive discount offers from 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 and German experiences.

A second contribution is a cross-section econometric analysis on a large set of Italian firms. Some findings are worth commenting. *First*, the cost of bank lending has a stronger impact on recorded credit and debt periods for larger firms, able also to use the TC instrument to smooth their cycle, presumably because less financially constrained; smaller firms seem to adapt more passively to counterparties' supply and demand TC policies. *Second*, firms offering discounts for quicker payments are able to reduce their credit period; these same firms show also a greater impact of the bank lending cost on their recorded credit and debt periods. *Third*, firms with higher export show a sizable shorter credit period. *Fourth*, regressions consistently show heterogeneity in credit and debt periods by macrosectors and by marketing channels and production typology, not by location.

The tentative implications of these results on how the EC directive aimed at combating late payments will affect interfirm credit and relationships between firms and banks in Italy and in other

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[34] It is worth stressing the "local" information provided by the paper. International comparisons of TC studies are severely hindered because of the impact of highly country-specific legal and institutional contexts and 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 (Marotta, 1997) and Spanish

EU Mediterranean countries, towards a German- and US-like model with a definite cost hierarchy between TC and cheaper bank lending. An objective for future research is to simulate, at least for Italy, the effects of the new TC rules on firms' accounts suitably using the information provided by the MC survey in order to realize the exercise at a high disaggregation level.

(Hernandez de Cos-Hernando, 1998) 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.

Appendix 1. The data

Trade debt and credit questionnaire

1.   What is 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 payments?

3.   What is the average monthly discount for quicker payments, i.e. the percent price reduction a firm can obtain on average anticipating the payment by one month (e.g. cash instead of paying thirty days later)?

4.   In 1994, what percentage of trade debt was paid by the firm beyond the agreed date and what was the average extra delay?

5.   During 1994, what percentage of commercial debt, paid beyond the agreed date, implied a penalty?

6.   What is the average penalty imposed by suppliers, as a percentage of price, for each month of delay?

7.   What is the average monthly discount for quicker payments, 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)?

All the above questions have to be answered distinguishing between three counterparties: firms belonging to the group, other Italian firms, other foreign firms.

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 MC 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 collected 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 annual accounting data) took implausible values and were accordingly recoded to the 99° percentile: implied borrowing

cost, 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:

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

- ratio of trade debt to purchases (*deb*);

- 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;

- 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 payment (*disc*): see question 7. in Appendix 1;

- proportion of exported sales (*exp*);

- firm belonging to a *group*: binary variable;

- ratio to total sales (*type*) of:

a)   direct sales to retailers (through own commercial organization);

b)   sales to public sector parties;

c)   sales to wholesalers;

d)   sales to other non commercial firms;

e)   production directly ordered by other firms;

f)   subcontracted production.

Other firms' characteristics:

- 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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Table 1

Trade credit in EU countries (1999)

	contractual credit period (days)	average delay (days)	payments within 15 days past
Belgium	45-90	17	53
France	60-90	16	58
Germany	30-60	11	79
Italy	60-120	17	62
Netherland	25-40	17	50
Portugal	60-90	n.a.	n.a.
Spain	60-90	n.a.	n.a.
U.K.	30-60	15	60

Source : Dun & Bradstreet (2000)

Table 2

Trade credit and debt of manufacturing firms (1994 data) with Italian and foreign contracting parties

quintiles (assets)	average debt period (days)		% of suppliers offering discounts		% discount for early payments 1		late payments (%)		days of delay		% of suppliers imposing penalties		% average penalty per month		discount for buyers' early payments 1	
	Italian	Foreign	Italian	Foreign	Italian	Foreign	Italian	Foreign	Italian	Foreign	Italian	Foreign	Italian	Foreign	Italian	Foreign
1^ (no of firms)	196	50	196	64	60	8	196	60	44	7	44	7	15		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		2.5	1	1.6	0.6
median	75	75	0	0	3	2.5	0	0	30	30	0	0	1.5		0	0
2^ (no of firms)	215	91	216	100	59	16	215	101	43	11	43	11	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		1.5	1	1.3	1.1
median	80	75	0	0	3	2	0	0	30	30	0	0	1.5		0	0
3^ (no of firms)	228	114	228	120	63	12	226	121	42	14	44	14	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		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
4^ (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^ (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
quintiles (sales)																
1^ (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		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^ (no of firms)	224	94	224	105	70	13	222	106	44	9	45	10	13		221	138
average	82.6	73.5	10.5	4.5	3.1	2.2	4.8	2.2	36.6	36	6.9		3.1	1	1.3	0.9
median	90	75	0	0	3	1.5	0	0	30	30	0	0	1.5		0	0
3^ (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^ (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^ (no of firms)	232	177	231	183	78	24	231	184	46	15	46	16	5		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
total (no of firms)	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^ 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^ quartile	**90**	**90**	**5**	**0**	**4**	**3**	**0**	**0**	**30**	**30**	**0**	**0**	**2**	**1**	**3**	**1.5**

Source: own calculations (see Appendix 1) from Mediocredito Centrale(1997); Italian ed Foreign indicate, respectively, Italian, non belonging to the same group, suppliers/customers, and foreign ones.
[1]Within 30 days earlier than the agreed credit period.

Table 3

Indicators for rationed and non-rationed manufacturing firms[1]

	rationed			non-rationed		
	no of firms	*average*	*median*	*no of firms*	*average*	*median*
from questionnaire						
average debt period (days)	61	82.7	90	876	80.9	90
discount offer received (%)	24	2.7	3	257	2.9	3
late payments (% of trade debt)	61	8.1	0	875	5.3	0
average delay (days)	19	36.9	30	174	30.3	30
penalty (%)	5	3.7	1.5	40	2.2	1.5
from 1994 accounts						
trade credit/sales (%)	61	34.6	34.9	881	33.9	32.7
trade debt/purchases (%)	61	37.5	38.6	881	38.1	35.8
net trade credit/sales (%)	61	8.8	6.7	881	9.0	8.3
trade debt/bank loans	61	1.23	0.9	881	0.9	0.7
leverage	61	2.8	2.0	881	2.3	1.2
implicit borrowing cost (%)	61	18.7	16.2	881	18.2	14.9
ROA (% points)	61	6.6	6.7	881	7.6	6.9
sales growth rate (%)	61	13.0	11.6	881	13.7	12.8
employees (average)	61	75	60	881	72	61
age (log)	61	3	3	881	2.9	3

Source: own calculations from Mediocredito Centrale (1997). See Table 4 and Appendix 2 for indicator definitions. [1]Firms are rationed according to the answer to question 2 on credit rationing (see Appendix 1). Non-rationed firms have at most 230 employees, upper limit for rationed firms.

Table 4

Economic and financial indicators of manufacturing firms (1994 data)

	credit period (days)	debt period (days)	net trade credit to sales (%)	trade debt/s.t. loans	financial leverage (% points)[1]	implied borrowing cost (%)[2]	ROA (% points)[3]	sales growth rate (%)	employees (yearly average)
quintiles (assets)									
1^ *(no of firms)*	*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^ *(no of firms)*	*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^ *(no of firms)*	*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^ *(no of firms)*	*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^ *(no of firms)*	*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
quintiles (sales)									
1^ *(no of firms)*	*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^ *(no of firms)*	*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^ *(no of firms)*	*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^ *(no of firms)*	*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^ *(no of firms)*	*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
total *(no of firms)*	*1549*	*1549*	*1549*	*1549*	*1549*	*1549*	*1549*	*1548*	*1121*
average	**123.8**	**136.3**	**9.5**	**1.0**	**222.3**	**18.6**	**7.4**	**13.6**	**76.9**
1^ quartile	**81.6**	**99.5**	**-1.0**	**0.3**	**45.5**	**11.2**	**4.1**	**-1.7**	**33.0**
median	**116.3**	**128.1**	**8.3**	**0.7**	**122.5**	**15.1**	**6.8**	**11.3**	**60.0**
3^ quartile	**154.0**	**159.0**	**19.0**	**1.3**	**264.4**	**21.7**	**10.4**	**24.6**	**97.5**

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

Table 5

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

OLS; P-value in brackets; coefficients of constant, additive dummies for Pavitt sectors and buyers' type regressors are not reported

Regressors	(1)	(2)	(3)	(4)	(5)	(6)
r: implied borrowing cost (%)	-0.11	-0.17	-0.06	-0.15	-0.09	-0.11
	(0.01)	(0.01)	(0.31)	(0.00)	(0.04)	(0.01)
*disc*ount for quicker payments (%)	-0.61	-1.01		-0.60	-0.53	-0.60
	(0.05)	(0.05)		(0.05)	(0.09)	(0.06)
ROA (%)	-0.55	-0.62	-0.50	-0.37	-0.51	-0.55
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
marg: average 1993 and 1994 profits to sales ratio (%)	0.15	0.14	0.15	0.08	0.12	0.15
	(0.00)	(0.04)	(0.03)	(0.07)	(0.01)	(0.00)
g_{t-1}: non positive sales growth rate in 1993 (%)	-0.21	-0.20	-0.20	-0.17	-0.22	-0.22
	(0.00)	(0.02)	(0.02)	(0.00)	(0.00)	(0.00)
g_{t-1}: positive sales growth rate in 1993 (%)	..	-0.03	0.02	-0.03	..	..
	(0.89)	(0.49)	(0.65)	(0.41)	(0.90)	(0.90)
exp: export to sales ratio (%)	-0.12	-0.10	-0.13	-0.12	-0.13	-0.12
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
firm belonging to a *group* (dummy)	2.83	2.15	3.84	3.22	1.73	2.88
	(0.02)	(0.22)	(0.02)	(0.01)	(0.16)	(0.02)
deb: trade debt as a ratio to purchases (%)				0.26		
				(0.00)		
1^ quintile (by size)					-7.86	-1.01
					(0.00)	(0.60)
2^ quintile (by size)					-4.75	-0.82
					(0.00)	(0.60)
3^ quintile (by size)					-2.46	1.50
					(0.10)	(0.32)
4^ quintile (by size)					-1.72	0.30
					(0.22)	(0.83)
no of observations	723	342	381	723	723	723
adjusted R^2	0.24	0.22	0.25	0.30	0.26	0.24
DW	1.95	1.73	1.84	1.97	1.95	2.05

Tests on joint zero restrictions
- Pavitt macrosectors $F_{(3,707)}=14.2$
- *type* [1]: a), b), c), f) $F_{(4,707)}=9.2$
- size $F_{(4,703)}=5.0$ $F_{(4,703)}=0.7$

(2) and (3): firms offering/non-offering discounts for payments 30 days or less earlier than the agreed date to Italian customers, non belonging to their group. (5) and (6): size defined as total assets and sales, respectively.[1]See Appendix 2.

Table 6

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

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

Regressors	(1)	(2)	(3)	(4)	(5)	(6)
r: implied borrowing cost (%)	0.11	0.19	0.04	0.16	0.13	0.10
	(0.01)	(0.00)	(0.45)	(0.00)	(0.00)	(0.01)
ROA (%)	-0.31	-0.36	-0.27	-0.24	-0.29	-0.31
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
g: non positive sales growth rate (%)	-0.18	-0.15	-0.19	-0.13	-0.20	-0.14
	(0.00)	(0.09)	(0.01)	(0.01)	(0.00)	(0.00)
g: positive sales growth rate (%)	0.04	-0.04	0.10	0.03	0.05	0.04
	(0.14)	(0.38)	(0.01)	(0.19)	(0.10)	(0.19)
unitprch: purchases per supplier (log)	-1.83	-2.10	-1.73	-1.71	-2.27	-1.12
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
cre				0.26		
				(0.00)		
1^ quintile (by size)					-3.73	5.79
					(0.02)	(0.00)
2^ quintile (by size)					-0.79	3.91
					(0.60)	(0.01)
3^ quintile (by size)					-0.46	4.50
					(0.75)	(0.00)
4^ quintile (by size)					2.54	1.97
					(0.08)	(0.17)
no of observations	1106	475	603	1106	1106	1106
adjusted R^2	0.17	0.19	0.16	0.23	0.18	0.18
DW	1.99	1.93	2.09	1.94	1.93	2.06

Tests on joint zero restrictions
  - Pavitt macrosectors $F(3,1093)=11.9$
  - *type* [1]: *b), c), d), e)* $F(4,1093)=14.7$
  - size dummies $F(4,1089)=4.1$ $F(4,1089)=3.8$

(2) and (3): firms offering/non-offering discounts for payments 30 days or less earlier than the agreed date to Italian

customers, non belonging to their group. (5) and (6): size defined as total assets and sales, respectively. [1]See Appendix 2.

Table 7

Dependent variable: trade credit as a per cent ratio of sales (*cre*)
Sample split by asset size

OLS; P-value in brackets; coefficients of constant, additive dummies for Pavitt
sectors and buyers' type regressors are not reported

Regressors	(1)	(2)
r: implied borrowing cost (%)	-0.05	-0.13
	(0.52)	(0.02)
*disc*ount for quicker payments (%)	-0.03	-0.73
	(0.95)	(0.07)
ROA (%)	-0.56	-0.49
	(0.00)	(0.00)
marg: average 1993 and 1994 profits to sales ratio (%)	0.23	0.08
	(0.00)	(0.21)
g_{t-1}: non positive sales growth rate in 1993 (%)	-0.13	-0.26
	(0.23)	(0.00)
g_{t-1}: positive sales growth rate in 1993 (%)	-0.05	-0.04
	(0.23)	(0.33)
exp: export to sales ratio (%)	-0.13	-0.13
	(0.00)	(0.00)
firm belonging to a *group* (dummy)	4.17	1.99
	(0.15)	(0.14)
no of observations	199	524
adjusted R^2	0.27	0.24
DW	2.16	1.97

(1): firms included in the lower two quintiles by total asset size; (2) firms included in
the upper three quintiles by total asset size.

Table 8

Dependent variable: trade debt as a per cent ratio of purchases (deb)
Sample split by sales size

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

Regressors	(1)	(2)
r: implied borrowing cost (%)	0.08	0.14
	(0.23)	(0.00)
ROA (%)	-0.36	-0.15
	(0.00)	(0.13)
g: non positive sales growth rate (%)	-0.14	-0.24
	(0.04)	(0.01)
g: positive sales growth rate (%)	0.04	-0.05
	(0.37)	(0.18)
unitprch: purchases per supplier (log)	-0.66	-2.26
	(0.32)	(0.00)
no of observations	641	465
adjusted R^2	0.12	0.25
DW	1.92	2.08

(1): firms included in the lower three quintiles by sales size; (2) firms included in the upper two quintiles by sales size.

Table 9

Regressors' summary statistics[1]

Regressors	no of firms	average	median	1^ percentile	99^ percentile	std. dev.
cre (%)	1549	34.00	32.1	0	97.07	17.08
deb (%)	1549	37.60	35.57	5.21	110.26	16.71
r (%)	1549	18.52	15.07	3.77	66.22	11.54
g (%)	1548	12.24	11.25	-49.84	102.12	25.31
g_{t-1} (%)	1302	5.29	2.96	-51.37	104.58	25.58
ROA (%)	1549	7.36	6.75	-18.32	31.01	8.52
marg(%)	1548	21.85	20.67	-24.36	66.69	16.13
unitprch (log)	1109	3.74	3.63	1.23	6.79	1.15
disc (%)	1087	1.25	0	0	5.00	1.69
exp (%)	843	39.68	35.00	0.50	100	29.73
group	1123	0.22	0	0	1	0.41
type (%):						
a)	1115	11.87	0	0	100	28.49
b)	1115	3.82	0	0	88.40	14.95
c)	1115	20.87	0	0	100	34.52
d)	1115	41.75	20.00	0	100	45.11
e)	1114	76.27	100	0	100	37.51
f)	1113	7.83	0	0	90.00	16.64
SETT:						
traditional	720					
scale	513					
specializzation	265					
high technology	41					
REG:						
North-West	610					
North-East	486					
Centre	287					
South	156					

Source: own calculations from Mediocredito Centrale (1997). See Appendix 2 for details. [1]The sample size in each regression depends on the availability of admissible values for the set of regressors.