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ABSTRACT

What You Sell is What You Lend? Explaining Trade Credit Contracts*

We use a broad range of contractual information to assess the empirical relevance of different financial theories of trade credit. The common feature of all financial theories is that suppliers have an advantage over other lenders in financing credit-constrained firms. While the reasons for the financing advantage differ across theories, they are usually related either to product characteristics or to market structure. We propose a novel identifying strategy that exploits this insight to analyse the trade credit volume and the contract terms. Our analysis suggests that the most important product characteristic for explaining trade credit volume and contract terms is the ease with which the seller's product can be diverted. Market power in input and output markets also contributes to explain trade credit patterns.

JEL Classification: G32
Keywords: collateral, contract theory, moral hazard and trade credits

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I Introduction

Trade credit is an important source of funds for most firms and is crucial for firms that are running out of bank credit.[1] Accordingly, most theories of trade credit assume that suppliers have some funding advantage over banks. However, these theories diverge greatly in their approach as well as in their predictions.[2] The influential empirical studies of Petersen and Rajan (1997) and Ng, Smith and Smith (1999) reveal several significant and suggestive patterns of trade credit use and practice, but do not strongly support or reject any particular theory.

In this paper, we propose a new approach to assess the empirical relevance of different financial trade credit theories. It comprises two main innovations. First, we make extensive use of variables that capture industry characteristics. Notably, we make a distinction between differentiated products, standardized products, and services. The classification scheme is motivated by the crucial role of industry characteristics in many trade credit theories. To illustrate how the product classification helps to discriminate among theories, compare the collateral liquidation theory (Frank and Maksimovic, 1998) to the diversion vulnerability theory (Burkart and Ellingsen, 2004). The collateral liquidation theory argues that suppliers have a comparative advantage in lending when they can recoup a larger liquidation value than banks following a default. Hence, only goods that can indeed be redeployed better by the original supplier should be sold on credit. By contrast, the diversion vulnerability theory argues that suppliers have a comparative advantage in lending when their products are difficult to divert for unintended purposes. Both differentiated goods and services are difficult to divert, but services have no collateral value. Hence, if suppliers of services were found to offer much trade credit, this would be evidence against the collateral liquidation theory and in support of the diversion vulnerability theory.

Second, we develop and test the implications of different theories not only for trade credit volume but also for a broad range of trade credit contract terms, including discounts, due dates, discount period, and late payment penalty. In our view, these contract characteristics are as important as the trade credit volume to understand which theories capture the salient features of trade credit. For instance, the determinants of the size and duration of early payment discounts may inform us whether the discounts are part of a price discrimination policy or are given in order to encourage

[1] For evidence on capital structure see Rajan and Zingales (1995) and Giannetti (2003); for the relation between bank credit rationing and trade credit, see Petersen and Rajan (1997).

[2] The two seminal contract theoretic contributions are Smith (1987) and Brennan, Maksimovic and Zechner (1988). Recent models include Biais and Gollier (1997), Frank and Maksimovic (1998), Jain (2001), Wilner (2000), and Burkart and Ellingsen (2004).

early repayment.

Specifically, we test how product characteristics and market structure affect patterns of trade credit contracts in a sample of small U.S. firms, surveyed in the National Survey of Small Businesses Finances (NSSBF). This data source contains detailed information on trade credit contracts, but is mute on the nature of the various inputs that firms use and on producer concentration in the input markets. As input characteristics and market structure are quintessential variables of our identification strategy, we complement the NSSBF dataset with information from input-output matrices, allowing us to proxy for the nature of the products firms employ in production.[3]

One of our major findings is that service suppliers offer as much trade credit as do suppliers of differentiated goods and significantly more than do suppliers of standardized products – after controlling for other determinants of debt capacity. Most importantly, service suppliers provide weaker incentives for early repayment than do suppliers of standardized and differentiated products: Service suppliers are less likely to offer early payment discounts, they concede longer discount periods, and they give smaller discounts. Thus, the customers of service firms face a relatively low cost of using trade credit. This finding supports the diversion vulnerability hypothesis of Burkart and Ellingsen (2004) and contradicts the collateral liquidation hypothesis of Frank and Maksimovic (1998).

A widespread notion in the trade credit literature is that trade credit substitutes for bank credit because suppliers have access to privileged information about their customers' creditworthiness (Biais and Gollier, 1997). Overall, our results provide little support for the informational advantage hypothesis. For example, firms buying relatively more inputs from firms in closely related business lines do not receive more trade credit.

Market structure is found to have a significant impact on trade credit terms. Suppliers in concentrated industries offer more discounts for early payment. The result supports the hypothesis that early payment discounts enable suppliers to price discriminate (Smith, 1987; Brennan, Maksimovic and Zechner, 1989). The prevalence of early payment discounts may explain in turn why the volume of receivables is not increasing in the degree of market concentration. Buyers' bargaining power seems to matter as well. Large firms, in particular those with many suppliers, receive more trade credit and generally better terms. Moreover, firms in concentrated sectors get better trade credit terms, possibly because suppliers have fewer alternative customers for their products.

[3]Similarly, Keller (2003) uses input-output tables to analyze the extent to which trade of intermediate products favors the transmission of knowledge.

Our work is related to several previous studies. Following Elliehausen and Wolken (1992) and Petersen and Rajan (1997), we use detailed firm–level survey data from the National Survey of Small Businesses Finances (NSSBF) to identify the determinants of firms' payables and receivables. We add to their work by exploiting industry variation in trade credit to discriminate among the different theories. In addition, we analyze both *how much* trade credit is offered - as they do - and *how* trade credit is offered. Using a different data set, Ng, Smith and Smith (1999) were first to systematically study variation in trade credit contracts, focussing on how various supplier characteristics affect the decision to offer early payment discounts. Bringing these two approaches together, our paper is the first attempt to analyze the complete trade credit contract. More importantly, we introduce theoretically justified measures of product characteristics and market structure to explain the broad set of contract characteristics, and thereby discriminate more strongly between theories.

Recently, several authors have tried to understand why the relative importance of trade credit varies not only in national cross–sections but also across countries and over time. Demirguc-Kunt and Maksimovic (2002) and Fisman and Love (2003) document that firms in countries with weak legal systems rely relatively more on trade credit. Like us, these authors suggest that trade credit mitigates agency problems, but they do not discriminate between different agency based theories. Similarly, the stronger reliance on trade credit during recession (e.g., Nilsen 2002) suggests that trade credit is less plagued by agency problems. The countercyclical pattern of trade credit also holds for Japanese trading companies, lenders that extend both cash loans and trade credit (Uesugi and Yamashiro, 2004). This finding seems to exclude informational differences between banks and suppliers as the explanation why suppliers lend relatively more during recessions, echoing our finding that firms do not obtain more trade credit from suppliers in the same sector.

Our work is also related to a growing literature that, following Kaplan and Strömberg (2003), studies the determinants of contract terms in different contexts. Besides studying the contract terms suppliers offer, the data also allow us to analyze how contract terms affect actual borrower behavior.

The remainder of the paper is organized as follows. Section II provides the theoretical background and derives the hypotheses. Section III presents the data sources. Sections IV, V and VI presents the results for receivables, contract terms offered to firms, and payables. Section VII concludes.

II Theories and Hypotheses

Among the various theories that have been proposed to explain trade credit, we focus almost exclusively on financial and contract theoretical explanations. This selection reflects in part data availability and in part our judgement of expected importance.[4] Following most theoretical papers, we discuss the trade credit decision from the supplier's perspective. To this end, we present a simple formal framework to explore why a supplier may be more willing than a bank to fund the input purchase of a customer. In so doing, we identify the supplier and customer characteristics that are predicted to explain variation in trade credit.

Consider a penniless entrepreneur who wants to purchase inputs with a market value (price) of L. For simplicity, suppose that the entrepreneur borrows either from the bank or the supplier, but not from both. Let $L_i(L)$ denote lender i's opportunity cost of extending the loan. The index denotes whether the lender is a bank (B) or a supplier (S). For a competitive bank with constant marginal cost of funds r the cost is $L_B = (1 + r)L$. Let D_i denote the repayment obligation associated with the loan. Since we are only interested in comparing the willingness of banks and suppliers to lend, and not in deriving equilibrium contracts, we set $D_B = D_S = D$. Let p_i denote the true probability that the borrower repays the loan, and let $A_i(p_i)$ denote lender i's assessment of the probability. In case the borrower defaults, the lender gets some collateral C_i. Hence, lender i's expected profitability of granting the entrepreneur the loan L can be written as

$$E[\pi_i] = A_i(p_i)D + (1 - A_i(p_i))C_i - L_i.$$

This expected profitability formula allows us to distinguish four reasons why suppliers may be more willing than banks to fund input purchases:

1. *Informational advantage; $A_S > A_B$.* Although banks gather information to assess the creditworthiness of potential borrowers, a supplier may sometimes have access to superior information (e.g., Biais and Gollier, 1997; Jain, 2001). For instance, an informational advantage may arise because the supplier and the entrepreneur operate in closely related lines of business. In such situations, banks are reluctant to be exclusive lenders, because they face a lemon problem and would end up with an adverse selection of borrowers. In extreme cases of informational advantage, $A_B(p)$ is never high enough to justify bank credit, whereas $A_S(p)$ is always large

[4] The most common explanations of trade credit that we neglect are taxes (Brick and Fung, 1984) and liquidity management (Ferris, 1981).

enough to justify trade credit for high levels of p (*information advantage hypothesis*).

2. *Moral hazard; $p_S > p_B$.* A supplier may be willing to extend (more) credit because the entrepreneur is more likely to repay him than to repay the bank. For example, if the supplier is essential for the entrepreneur's future business due to the lack of alternative producers, the entrepreneur has a stronger incentive to strategically default on the bank than on the supplier (Cunat, 2003). Such higher ability to enforce repayment is tantamount to the supplier having some market power, a common explanation for trade credit that we discuss below. Even in fully competitive markets, suppliers may be less susceptible to the risk of strategic default than banks. The reason is that banks lend cash while suppliers lend inputs that are typically less liquid and thus less easily diverted than cash (Burkart and Ellingsen, 2004). Accordingly, defaults related to diversion of corporate resources are less likely if the supplier grants the loan (*diversion hypothesis*).[5]

3. *Collateral liquidation; $C_S > C_B$.* In defaults, creditors are entitled to seize the firm's inputs and other assets. A repossessed input may be worth more to the supplier than to the bank precisely because the supplier is in the business of selling this good (Frank and Maksimovic, 1998). Because of this comparative advantage, the supplier is more willing to finance the input purchase in the first place (*collateral hypothesis*). Moreover, liquidation values may be important even when default does not actually occur, due to strategic renegotiation (hold–up).

4. *Imperfect competition; $L_S < L_B$.* The supplier's opportunity cost can sometimes be considerably smaller than those of the bank, or equivalently, the forgone profits from denying a loan can be substantially higher. When an entrepreneur has exhausted his bank credit limit, the supplier may find it profitable to make additional sales on credit, as pointed out by Nadiri (1969). Complete versions of this argument must also explain why the supplier does not simply selectively lower the price to credit-constrained customers. After all, it is the additional sale that generates the supplier's profit, not the credit transaction as such. Smith (1987) and Brennan, Maksimovic and Zechner (1989) both introduce asymmetric information about customer characteristics to explain why suppliers offer trade credit and early payment discounts

[5] Lender moral hazard can also provide a rationale for trade credit, unrelated to the financing motive. If the quality of the supplier's input directly affects the customer's commercial success, bundling input sale and credit increases the supplier's incentive to provide high quality, and thereby the customer's probability of success is higher than if the bank would be the creditor. Relatedly, offering trade credit is a way to guarantee product quality, as the buyer will be able to return inferior goods without paying (Smith, 1987; Lee and Stowe, 1993; Long, Malitz, and Ravid, 1993). We show below that the latter theory is not supported by the data.

instead of engaging in other forms of price discrimination (*price discrimination hypothesis*). Trade credit may also be the result of market power on the customer side. A supplier may use generous trade credit terms to prevent losing a large customer, particularly in concentrated customer markets (*buyer power hypothesis*). Furthermore, a dependent supplier may also help customers in temporary financial distress because his own prospects depend on the customers' survival (Wilner 2000).

Our central observation is that all these reasons why suppliers differ in their willingness to extend trade credit are closely related to either product characteristics, market structure, or both. In fact, these characteristics allow to discriminate between the hypotheses' empirical relevance because the hypotheses rely on different (combinations of) industry characteristics.

To test the hypotheses we classify goods into three categories; services, standardized goods, and differentiated goods. Services have no collateral value but are almost impossible to divert. Hence, if suppliers of services would be found to offer much trade credit, this would be evidence against the collateral hypothesis but in support of the diversion hypothesis. Standardized goods can by definition be used by many different customers and thus have a high re-sale value. These goods are, however, not worth more in the hands of the original supplier than in the hands of any other agent. Due to their widespread use, these goods command a market price and can be easily sold by any agent. Consequently, standardized goods are easy to divert. Thus, both the collateral and the diversion hypothesis suggest that suppliers of standardized goods ceteris paribus do not sell much on credit. In contrast, differentiated goods are more often tailored to the needs of particular customers. As there are fewer alternative users, these goods are worth more in the hands of the original supplier and are also more difficult to divert.

These arguments are summarized in our first two hypotheses linking credit volume and product characteristics:

H1A (*Diversion*): Firms in sectors producing differentiated goods and services offer more trade credit.

H1B (*Collateral*): Firms in sectors producing differentiated goods offer more trade credit.

Observe that the two hypotheses are partially competing, and that trade credit in the service sector discriminates between them.

An important industry characteristic for the different hypotheses is the degree of competition. Trade credit in competitive markets is at odds with both the price discrimination and the buyer

power hypothesis. Neither the diversion nor the collateral hypothesis rely on imperfect competition. Nonetheless, to the extent that more differentiated goods tend to be traded in less competitive markets, the diversion and collateral hypothesis also suggest that more inputs are sold on credit in less competitive industries.

As regards different industries, wholesale and retail seem special as they handle finished goods. Being traded in a market, these goods are highly liquid and relatively easy to divert. Accordingly, the diversion hypothesis predicts less trade credit in these sectors. In the case of wholesalers, the informational advantage hypothesis has the opposite implication. Since wholesalers typically interact frequently with their customers who operate in the same or a closely related line of business, their information advantage relative to the bank should be most pronounced. Similarly, providers of business and legal services are likely to gain access to valuable information about their customers' businesses. This is also likely to apply to suppliers outside these industries who sell a large fraction of their sales to firms in the same industry. Accordingly, the information advantage hypothesis implies that wholesalers, suppliers with a large fraction of intra-industry sales and providers of information-related services offer more trade credit. Obviously, the diversion hypothesis yields the same prediction for information-related services, as these services are also difficult to divert.

The following three additional hypotheses conclude our discussion of the determinants of trade credit volume:

H1C (*Information advantage*): Providers of information-related services offer more trade credit, as do firms to customers in closely related business lines.

H1D (*Price-discrimination*): Firms operating in concentrated industries offer more trade credit.

H1E (*Buyer power*): Large and old firms, firms operating in concentrated industries, and firms with a large number of suppliers obtain more trade credit.

So far the discussion has largely abstracted from the contract terms, an integral part of a supplier's trade credit decision. Clearly, a supplier's willingness to sell on credit is also reflected in the credit's due date, the size of the early payment discount, the discount period, and the late payment penalty. These terms determine the (opportunity) costs of the credit and its maturity, but they also reflect the reason(s) why the supplier is willing to sell on credit in the first place. Consequently, observed contract terms can help to discriminate between the different hypotheses. For instance, early payment discounts may be part of the suppliers' strategy to price discriminate

among customers. In this case, early payment discounts ought to be more common when suppliers operate in concentrated industries. Alternatively, discounts can be the result of the customer's strong bargaining position, and we would then expect larger and older firms to be granted discounts. In this case, discounts are part of the better terms that suppliers (have to) concede to their "important" customers, and should thus be correlated with longer maturity and smaller penalties for late payment. Another explanation for discounts is that suppliers fear strategic default and try to induce early repayment. If so, discounts, higher penalties and shorter maturity should be offered for easily diverted inputs sold on credit such as standardized or finished goods.

Smaller discounts reduce the customers' cost of trade credit. Similarly, smaller penalties reduce the cost of repaying after the due date. Subsequently, we shall use the term *effective price* when referring to both discounts and penalties in terms of the opportunity costs of trade credit.

The second set of hypotheses summarizes our discussion of the different theories and their implications for the trade credit contract terms:

H2A (*Diversion*): Firms in sectors producing differentiated goods and services offer trade credit at a lower effective price and with longer maturity.

H2B (*Collateral*): Firms in sectors producing differentiated goods offer trade credit at a lower effective price and with longer maturity.

H2C (*Information advantage*): Providers of information-related services offer trade credit at a lower effective price and with longer maturity, as do firms to customers in closely related business lines.

H2D: (*Price-discrimination*): Firms operating in concentrated industries offer more discounts.

H2E (*Buyer power*): Large and old firms, firms operating in concentrated industries, and firms with a large number of suppliers obtain trade credit at better terms (more discounts, lower penalties, and longer maturity).

Besides industry and product characteristics, a supplier's willingness to sell on credit also depends on his access to funds and his internal needs for funds. That is, severely credit-constrained suppliers and suppliers with considerable growth opportunities ought to be less likely to offer credit. Similarly, firm-specific characteristics of the customers affect the trade credit decision. In particular, a supplier offers ceteris paribus more trade credit to more creditworthy customers. As this is

equally true for banks, there is a priori no clear-cut relation between use of trade credit and the quality of the customers' creditworthiness.

Several empirical papers explore the impact of firm characteristics and document that credit-constrained firms use more and extend less trade credit. As this is consistent with (nearly) any financial theory of trade credit, this finding offers little help for our purpose of trying to discriminate among the various theories. Hence, we do not separately analyze the role of firm-specific characteristics but merely control for their influence when testing our hypotheses.

A final point that needs to be addressed is the relationship between trade and bank credit, in particular the fact that trade credit can facilitate bank lending. For instance, when strategic default due to input diversion is a major concern, the availability of trade credit increases the amount that the bank is willing to lend. Due to the relative illiquidity of inputs, a firm funded with bank and trade credit has higher opportunity costs of diverting than a firm with the same total loan in cash only. That is, trade credit constitutes a commitment device to undertake the investment and induces the bank to increase its credit limit (Burkart and Ellingsen, 2004). Similarly, when suppliers have different or superior information about firms than banks, the availability of trade conveys favorable information, and banks should be willing to lend more to firms that have access to (more) trade credit (Biais and Gollier, 1997). Thus, to the extent that trade credit mitigates moral hazard or adverse selection problems, bank and trade credit limits are complements. This gives raise to the possibility that the suppliers' willingness to sell on credit may not match their customers' actual need to purchase on credit. Indeed, suppliers who are willing to offer their customers high credit limits, say because their input is very illiquid, may find that their customers actually demand less trade credit due to their high bank credit limits. Conversely, firms with low trade credit limits may be unable to secure larger bank loans, precisely because suppliers of highly liquid inputs are unwilling to sell more on credit. These possibilities have to be kept in mind when interpreting the empirical results.

Since trade credit is the outcome of a bilateral relationship, we would ideally want to match suppliers with their customers when testing the different hypotheses. The data does not permit such a matching procedure, so we have to study the roles of supplier characteristics and customer characteristics separately. That is, we separately analyze to what extent the different hypotheses can account for the amount of trade credit on suppliers' books (receivables), for the total amount of trade credit customers are offered (purchases on account) and for the amount of trade credit that customers use (payables). As we have information on the contract terms from purchases but

not from sales, we can test our second set of hypotheses (H2A-H2E) only from the customers' perspective.

III Data Sources and Sample Description

Our main data source is the 1998 National Survey of Small Business Finances (NSSBF) which was conducted in 1999-2001 by the Board of Governors of the Federal Reserves System and the U.S. Small Business Administration. The NSSBF provides a nationally representative sample of small non-financial, non-farm U.S. businesses with less than 500 employees that were in operation as of December 1998. (Previous editions of the survey collected data from 1987 and 1993.)

This data source offers a unique opportunity to test trade credit theories because it contains detailed information that goes well beyond payables, receivables, and other balance sheet items. In particular, firms participating in the survey are asked questions concerning the terms at which their suppliers offer trade credit. The collected information includes the percentage of purchases offered on account, the percentage of suppliers offering cash discounts, and, for the most important supplier, the due date of the bill, the size of the early payment discount, the duration of the discount period, and the size of late payment penalty. Additionally, firms are asked to report whether they used cash discounts and whether they paid after the due date. Such detailed information on contract terms is highly relevant to assess the empirical relevance of the different trade credit theories, since a firm's ability to secure trade credit (willingness to extend trade credit) is reflected in both trade credit volume and contract terms.

In order to test our hypotheses, we match the NSSBF data with industry specific information. From the NSSBF we can identify industries at the two-digit level which is obviously a coarse measure. We are, however, not aware of any other data source that includes detailed information on contract terms and a finer sectoral disaggregation. Ultimately, if the sectoral classification were too coarse, our estimates should be biased against finding any results.

Market structure and the nature of the product are the two characteristics along which we classify each two-digit industry. As a measure of market concentration in a given industry, we use the market share of the eight largest firms, constructed by Pryor (2001). This variable is meant to capture the extent of competition in the market in which a given firm whether large or small operates.

As regards product classification, we follow Rauch (1999) who distinguishes between *standard-*

ized goods, that can be sold as easily by its producer as by any other agent, and *differentiated goods*, that are products of more advanced manufacturing sectors. These products are likely to be tailored to the need of a particular customer. We classify the remaining sectors as *services*. In the appendix we provide the complete list assigning each two-digit industry to one of the three product classes.[6]

With this classification we can easily identify the nature of the product that a firm produces, the competitive environment in which it operates and the amount of trade credit that it should *extend*. Clearly, the ability to *receive* trade credit also depends on product characteristics and market structure. Hence, to analyze the determinants of the trade credit offered to a given firm, we need to identify the nature of the various inputs that the firm purchases as well as the structure in these markets. We construct proxies for the input characteristics with the help of the input-output matrices from the U.S. Bureau of Economic Analysis. These matrices provide information on the amount of different inputs required to produce one dollar of industry output. Combining the input-output matrices with our product classification yields measures for the average use of inputs with different characteristics. In this way, we obtain proxies for the relative amount of standardized products, differentiated products, and services that a firm uses as inputs. By combining in a similar manner the input-output matrices with Pryor's (2001) concentration indices, we construct measures of market concentration in the input markets.

The input-output matrices are also useful in another respect as they include information on how much firms in a given industry sell (buy) to (from) other firms in the same industry. The intra-industry trade provides proxies for the sales to customers and purchases from suppliers in related business lines that we use to test the information advantage hypothesis.

The NSSBF data include information on the contract terms at which trade credit is offered to firms but not on the terms at which firms extend credit. For information on contract terms from the suppliers' viewpoint we rely on Ng, Smith and Smith (1999). They document the most common practices in different industries. In particular, we use information on the length of the payment period in different industries and on whether it is common to provide discounts.

The 1998 NSSBF covers 3561 firms. As the available information is not complete for all firms, our final sample includes 3447 firms. Additionally, we lose some observations when matching sample

[6] The nature of the product could be correlated with other features that affect the trade credit decision in a given sector, such as the frequency of interaction, the duration of seller-buyer relationship or the ease with which a buyer can assess the quality of the input. Since sectors are very diverse within each product category (e.g., food stores and legal services both belong to services), it seems unlikely that other relevant sectoral features vary systematically across our three product classes. Our analysis of various contract terms further reduces the possibility of an omitted factor bias.

firms with product classification and input information. For this reason, the number of observations in different regressions varies according to the chosen specifications.

Table 1 summarizes the main characteristics of our sample. Panel A shows that firms are relatively young and small. They are, on average, younger than 15 years and have less than four million in sales and less than two million in assets. Also, firms in services appear significantly smaller than firms providing standardized or differentiated products.

[Insert Table 1 here]

Panels B to D suggest that firms in sectors that produce different types of goods also differ in the extent to which they provide, use, and receive trade credit. Thus, it appears that our product classification in standardized, differentiated, and services captures relevant differences. For instance, service firms have a lower accounts receivable to sales ratio (Panel B). Provided that these differences persist after controlling for firm characteristics – which may not be the case as firms in the service sectors appear systematically smaller – this would indicate that the collateral value of the product matters for the firms' willingness to sell on credit. Interestingly though, service firms also appear to grant their customers an almost equally long payment period as do firms that produce differentiated goods. Moreover, service firms are less likely to offer discounts, and thus do not seem to provide their customers with strong incentives to repay early.

Describing the contract terms, Panel C reveals that the amount of trade credit offered to our sample firms differs across sectors. Service firms may not only have less access to bank credit due to their smaller size, but also seem to receive less trade credit as suggested by the lower fraction of inputs that they purchase on account. Panel D shows that more than half of our sample firms use trade credit. Among those firms, almost half paid at least one of their bills after the due date, and the fraction of input purchases paid late exceeds 10 percent.

Panel E presents the industry specific proxies that we have constructed. It suggests that firms producing standardized products operate in more concentrated sectors and also use inputs from relatively more concentrated sectors. Additionally, these firms seem to trade most with firms in related business lines. According to the information advantage hypothesis, these firms should ceteris paribus extend and use more trade credit.

Finally, Panel F shows that the correlations between the various contract terms offered are low and only a few are statistically significant at the 10 percent level. Rather intuitively, purchases made on account are positively related to the supply as measured by number of suppliers offering to

sell on account and by the percentage of suppliers offering a discount. Similarly, firms are offered to make more purchases on account when the effective cost of trade credit, such as the late payment penalty, is lower. Discount period and due date, the two measures of trade credit duration, are positively related as are the different measures of the effective price, such as the size of the discount and the late payment penalty. Furthermore, the maturity of trade credit is positively related to the effective price measures, reflecting the suppliers' higher opportunity cost of lending for longer periods.

IV The extension of trade credit

A supplier's willingness to extend credit corresponds to the amount of sales for which he does not ask immediate payment or payment before delivery. While we have information on the fraction of purchases that firms make on account, we do not observe how much each firm sells on account. Therefore, we use receivables as a proxy for how much suppliers are willing to lend. The shortcoming of this proxy is that receivables are simultaneously determined by the firms' willingness to sell on credit and by its customers' demand for trade credit. Relatively few receivables may be a manifestation of a low willingness to sell on credit or of a low demand for trade credit.

Due to this ambiguity, our findings may well underestimate the importance of industry characteristics for the willingness to extend trade credit. If firms in some industries are willing to lend their customers more, banks may also be willing to do so. Having access to more bank credit, these firms ought to rely less on trade credit financing, and their suppliers ought to have less receivables.

The demand for trade credit facing a firm is affected not only by product and industry characteristics, but also by a variety of customer characteristics. However, provided that customers with different characteristics are equally distributed across suppliers, each supplier's receivables are equally affected by the firm-specific component of trade credit demand. That is, receivables are an unbiased proxy for how much firms are willing to lend (although they may underestimate firms' supply of trade credit due to the demand effect mentioned above). This would not hold if (some) suppliers had a biased customer base, i.e., customers with systematic differences that are unrelated to either product characteristics or market structure. We see little reason why such a bias should exist.

Our main variables of interest are related to product characteristics and market structure. As mentioned above, products are classified into standardized goods, differentiated goods and

services, and industry competition is proxied by Pryor's (2001) concentration indices. Since a firm's willingness to extend trade credit also depends on its access to and need for funds, we control for the availability of funds. Following previous studies (Petersen and Rajan, 1997), we proxy access to funds with three firm–specific variables: assets, net profits normalized by sales and bank credit line normalized by sales.

Table 2 presents our results for the trade credit supply, measured by the ratio of accounts receivable to sales. As a benchmark, we regress the accounts receivable to sales ratio against the three firm-specific control variables and sectoral fixed effects (Column 1). As expected, having better access to external funds, larger firms offer more trade credit. While size remains statistically significant in all regressions, we cannot identify any effect of the bank credit line available to the firm or of its profitability.

[Insert Table 2 here]

Columns (2) and (3) show that the nature of the product matters for the decision to extend trade credit. Producers of services and differentiated products offer significantly more trade credit than do producers of standardized goods. In the descriptive statistics, this relationship was obscured by firm heterogeneity, i.e., by the fact that service firms are on average smaller and thus have smaller debt capacity.[7]

This finding is of interest because it allows to discriminate between the diversion hypothesis (H1A) and the collateral hypothesis (H1B). Differentiated goods are worth more in the hands of the original supplier, while services have little or no collateral value. Hence, the collateral hypothesis is supported by the documented high propensity to sell differentiated goods on credit, but is undermined by the service producers' high propensity to sell on credit.

Services and differentiated goods are both difficult to divert, contrary to standardized goods for which it is easy to find a suitable customer. Hence, the finding that service producers and producers of differentiated goods have more receivables than producers of standardized goods provides support for the diversion hypothesis (H1A). Moreover, the observed receivables are likely to *underestimate* the trade credit supply of service producers and producers of differentiated goods, as input illiquidity also increases the banks' willingness to lend.

For highly liquid inputs, the diversion hypothesis has a clear-cut implication: suppliers of such inputs do not offer trade credit, and hence there is no spillover effect on the bank's willingness

[7] Interestingly, this result obtains only if we control for firm assets. In our view, this is due to the fact that assets capture the firms' access to funds better than other proxies for firm size, such as the number of employees.

to increase its lending. The finding that the retail and the wholesale sector (dummy Trade) offer significantly less trade credit is another piece of evidence in support of the diversion hypothesis. These sectors trade very liquid final products.

There is further evidence in favor of the moral hazard interpretation. The diversion hypothesis argues that trade credit should be offered in connection to input transactions. Otherwise, the purchase does not raise the borrower's repayment ability. We therefore use the industry input–output matrix to compute for each industry the average share of output that enters into the production of other goods. As shown in Column (5), firms' receivables increase in the share of intermediate goods in the industry's output.[8]

We do not find evidence supporting the informational advantage hypothesis (H1C). We test this hypothesis in two specifications that we do not report in Table 2. First, we include the share of intra-industry sales in the regression. This variable is not significant, indicating that firms selling more to firms in related business lines do not extend more trade credit. Second, we include a dummy that equals one if the firm belongs to an information-related service sector, such as business services, legal services, commercial engineering, accounting and research. This dummy is not significant at conventional levels, suggesting that firms in information-related service industries do not offer more trade credit.

Interestingly, market structure is not related to receivables in any specification.[9] In principle, the inconclusive result could be due to a poor match between the two–digit industry concentration measure and actual market concentration, or even due to a weak link between actual concentration and gross margins. The two-digit industry concentration measure is, however, positively related to the industry's propensity to offer early payment discounts (the correlation coefficient is 35 percent). This may account for the weak link between concentration and receivables: Firms in concentrated industries may give more trade credit, but also encourage early repayment by offering discounts. Hence, the finding that concentration is not related to receivables is not necessarily evidence against the price discrimination hypothesis (H1D). In fact, firms in concentrated sectors offer more discounts. It merely implies that market structure does not explain trade credit volume. The weak link between concentration and receivables illustrates that tests of different trade credit theories should not only consider trade credit volumes but also make use of trade credit contract

[8] The significance of the product classification drops marginally, but the coefficient remains of similar magnitude.

[9] Unfortunately, we cannot further explore the price discrimination hypothesis (H1D) using gross profit margins as the 1998 NSSBF does not contain this information. Data on gross margins were included in the 1993 survey used by Petersen and Rajan (1997) who find that companies who have higher profit margins offer more trade credit.

terms.

In line with this reasoning, we also find that industry payment practices matter for receivables. Firms offering longer payment periods (variable Net-Terms) have higher receivables to sales ratios. Additionally, firms offering discounts (dummy Two-Parts) have lower receivables to sales ratios, although the coefficient is not significant at conventional levels.

When we include industry payment practices we can no longer identify the effect of product characteristics. This is due to the fact that these variables are highly correlated as they vary across sectors but not across firms within sectors. As is evident from the descriptive statistics (Table 1), firms that produce services, standardized and differentiated products offer different credit terms to their customers. In particular, firms that are more prone to extend trade credit – namely, firms in the services and differentiated good sectors – do so by offering longer payment periods and fewer discounts, thereby enabling their customers to use trade credit finance to a larger extent and at lower (opportunity) costs. This seems intuitive once the trade credit volume hypotheses are combined with the contract terms hypotheses.

It may also be interesting to note that the (non–financial) quality guarantee theory, which predicts that suppliers provide trade credit as a guarantee of high product quality, is difficult to reconcile with our findings. The key assumption of the quality guarantee theory is that trade credit makes it easier for the customer to return the product without paying. In principle, suppliers of differentiated products may offer more trade credit because it takes longer time to assess the quality of differentiated products than standardized products, and the option to return without paying is therefore more valuable. It is, however, hard to justify on the same ground why service suppliers should extend an equal amount of trade credit. Returning the service is never an option. Also, in case of a quality complaint it may be difficult to withhold payment after the due date as a means to request compensation. Another implication of the quality guarantee theory is that more reputable or established firms offer less trade credit, because their reputation vouches for the quality of their product (Long, Malitz and Ravid, 1993). Our estimates clearly contradict this notion: Large firms offer more trade credit as is consistent with financial theories of trade credit.

The impact of the firm-specific variables are similar in the benchmark regression including sectoral dummies and in the specifications including only the industry characteristics mentioned above. This gives us confidence that our estimates are unlikely to be biased by omitted variables and that product characteristics indeed capture salient sectoral differences. Furthermore, the reported results are robust to the inclusion of a number of firm-specific characteristics, such as location

(metropolitan or not), age, and creditworthiness indicators all not reported in Table 2.

To summarize, we document that product characteristics are an important determinant of trade credit supply. As regards our findings on accounts receivable it seems fair to conclude that there is most support for the diversion hypothesis among the different tested theories. Moreover, the results may well underestimate the relevance of product characteristics, since receivables include both supply and demand effects.

V The terms of trade credit

In this section we examine the determinants of trade credit from the customers' perspective. This is not only another self-contained test of the different hypotheses but also helps to interpret our previous findings.

Our analysis of trade credit from the customers' perspective covers the amount of trade credit offered to firms as well as the contract terms. As argued earlier, a suppliers' willingness to extend trade credit is reflected in both the amount and the contract terms. In the analysis we focus on the following contract terms: the existence of early payment discounts, their magnitude, the penalty for paying after the due date, and the maturity of trade credit, which is determined by the discount period (i.e., the period during which the customer can take advantage of early payment discounts), and the payment period (i.e., the number of days after which the bill is due).

Clearly, the various contract characteristics are determined simultaneously at the time the credit is offered to a firm. We lack, however, clear-cut theoretical predictions on how contract characteristics, such as volume and late payment penalty or maturity, are interrelated. Therefore, we simply consider reduced form equations in which contract terms and volume are posited to depend on firm and industry characteristics.

A Purchases on account

Like Petersen and Rajan (1997), we use the percentage of input purchases on account to identify the quantity of trade credit supplied to a firm. As there is usually some interest free period, a firm's purchases on account are indeed largely supply driven. Only when a discount is offered and the discount date is reached, do supply effects mingle with demand effects.

Note, however, that purchases on account is a flow variable and therefore not a clean measure of the supply of trade credit, unless it is linked with the purchasing frequency and the repayment

period. The NSSBF only contains information on the percentage of inputs that firms purchase on account during the entire year of 1998, but not on the purchasing or repayment patterns. To solve this problem at least in part, we use information on *how* trade credit is offered. We believe that the maturity and the cost of using trade credit affects the frequency of purchases and repayment, and therefore the extent to which purchases on account translates into actual trade credit supply.

As can be seen in Figure 1, the distribution of purchases on account has fat tails. More than 35 percent of all firms report that they never purchase on account, whereas almost 20 percent make all their purchases on account.

[INSERT FIGURE 1 HERE]

Based on our previous findings, we conjecture that product characteristics and concentration on both sides of the market affect purchases on account. We characterize the inputs that a firm employs in terms of the relative amount of services, standardized, and differentiated goods. As described in the Appendix, neither the service to total input ratio, nor the standardized products to total input, nor the differentiated product to total input ratio is observable at the firm level. Therefore, we use these three ratios at the industry level as a measure of the firms' relative use of different inputs. We use these three ratios in combination with Pryor's concentration indices to proxy for the extent of competition in the firms' input markets. We capture buyer power by the concentration indices of the firms' output market.

Purchases on account also depend on other firm characteristics, notably the firm's creditworthiness and financing needs. For this reason we include assets, age, credit risk and profitability measures. Like Petersen and Rajan (1997), we distinguish between firms with positive and negative profits to explore whether firms in financial need receive more trade credit.[10]

[INSERT TABLE 3 HERE]

Table 3 reports the estimates of the effects of firm and industry characteristics on the fraction of purchases made on account. In Column 1, we include only the firm-specific control variables and sectoral fixed effects as independent variables. Unsurprisingly, larger (more assets) and older firms purchase more on account, with size being more significant.[11] Similarly, firms with a better credit

[10] Purchases on account also depend on the suppliers' ability to do without immediate cash payment. Since we cannot match firms with their suppliers, we are unable to control for this effect. We see, however, no reason to believe that the financial conditions of suppliers vary systematically with industry characteristics. In particular, product characteristics are similar in disparate sectors that are unlikely to experience synchronous demand shocks.

[11] This is also consistent with Van Horen (2004) who documents that suppliers in developing countries extend more trade credit to larger firms and subsidiaries of multinationals.

score receive more trade credit, although this finding is not significant. The impact of profitability is more intricate. For firms with positive profits, an increase in profits to sales is associated with a significant decrease in purchases on account, whereas this relationship is insignificant for firms with negative profits. This suggests that suppliers use trade credit as a means to secure additional sales: they offer sales on account to firms with small positive profits, but not to profitable firms that can pay in cash or to unprofitable (overly risky) firms.[12]

The patterns found in the receivable data are reflected in the purchasing on account data. Firms that buy a large proportion of their inputs from industries with high receivables make more purchases on account than other firms. In particular, firms buying differentiated goods make significantly more purchases on account, while firms purchasing much services make significantly fewer purchases on account (Column 2). While these results are consistent with the collateral hypothesis (H1B), they do not necessarily reject the diversion hypothesis (H1A). Quite likely, firms using more services purchase less on account because service firms, being small on average, have less access to credit and are therefore unable to extend much trade credit. Indeed, we found their propensity to provide trade credit to be as high as that of producers of differentiated goods only after controlling for size.

Alternatively, one may argue that these findings are only compatible with the collateral hypothesis. Suppliers of differentiated goods are willing to sell on credit, because of their comparative advantage in liquidating these goods. By contrast, producers of standardized or service goods have no such advantage and are reluctant to let customers purchase on account. Since liquidation value matters most in firms that are likely to have to liquidate their assets, the effect should be most pronounced in firms encountering financial difficulties. We test whether the data supports this interpretation by including an interaction variable between the firms' relative use of differentiated goods and a dummy that is equal to one for firms encountering financial difficulties (as reported in the NSSBF). The coefficient of this interaction variable is negative and significant (Column 3). Contrary to the collateral hypothesis, producers of differentiated products offer firms in financial difficulties less trade credit. If the risk of non–strategic default does not entail more trade credit, the only way to rescue the collateral hypothesis is to argue that suppliers of differentiated inputs

[12] Of course, the argument presumes that high profitability is correlated with high ability to pay. A competing view is that firms end up with high profit to sales ratios precisely because they are credit rationed: Firms that face a strict trade credit limit are forced to have a suboptimally low activity level, and if marginal returns are decreasing, more constrained firms have higher average returns. When we investigate how the profit to sales ratio correlates with measures of credit rationing, we find, however, that high profits correlate with less credit rationing. This invalidates the competing interpretation.

have a relatively lower cost of strategic default. But how common is it that firms default strategically *and* that suppliers have their goods back? It seems more plausible that the lower resale value of differentiated products reduce the risk of strategic default and diversion.

Another possible interpretation is that the supply of trade credit does not depend on the nature of the input but is correlated with some omitted firm characteristic. A natural candidate for an omitted variable is the tangibility of assets, as firms buying more differentiated goods and fewer services are likely to have more tangible assets. To explore this interpretation, we include a regressor that controls for the tangibility of assets as measured by firms' fixed assets to total assets ratios (Column 4). The coefficient of this variable is not statistically significant, and more importantly, the sign and significance of the input characteristic variables remain unchanged.

According to the information advantage hypothesis (H1C), firms should be able to make more purchases on account when the supplier operates in a closely related business line. To explore this hypothesis we include as an explanatory variable the fraction of inputs purchased from firms in the same industry (Column 6). We see that firms buying more inputs from suppliers in their own industry do not purchase significantly more on account. On the other hand, the result that retail and wholesale firms obtain significantly more trade credit might offer some support for the information advantage hypothesis. At first sight, the latter finding seems in direct conflict with the diversion hypothesis and somewhat at odds with the pattern found in the receivable data. The latter observation leads us to suspect that the large fraction of purchases on account in wholesale and retail is driven by differences in payment frequencies and in the magnitudes of trades.[13] This suspicion is confirmed when we look at the trade credit contract terms in the subsections below.

As regards market structure, the customer's bargaining power appears to matter more than the degree of competition in input markets. Firms operating in concentrated industries make significantly more purchases on account (Column 5). Even small firms, as in our sample, may have some bargaining power in concentrated industries because the sellers have to compete more fiercely for customers.

As reported above, larger and older firms also purchase more on account. One interpretation of these two findings is that these firms are more creditworthy and therefore have better access

[13] We tried to control for the frequency of buyer-seller interaction by including the inventory to sales ratios in some regressions (not reported here). Consistent with our conjecture that frequent buyers can purchase more on account, this variable is inversely related to purchases on accounts, though not at statistically significant levels. The inventory to sales ratio is, however, an imperfect proxy for the interaction frequency because reported inventories of manufacturing firms include the stock of both not yet used inputs and of not yet sold outputs. The low precision of the proxy may also explain why the Trade Dummy remains positive and significant in these regressions.

to any form of financing, including trade credit. Alternatively, one may argue that these firms have more bargaining power vis-à-vis their suppliers, because being more creditworthy and better known they can switch more easily to another competing supplier. This interpretation receives some support in the data. When we include the number of suppliers offering to sell on account as an explanatory variable (Column 7), an increase in their number significantly increases the firms' purchases on account, and dramatically increases the explanatory power of our model. Interestingly, firm size becomes negative and age is no longer significant. The number of suppliers remains positive and significant even if we include the sectoral dummies to control for the possibility that some firms have many suppliers simply because they purchase inputs from many different industries. Thus, the results might offer support for the buyer power hypothesis (H1E). By contrast, the price discrimination hypothesis (H1D) does not receive any support as an explanation of trade credit offered to firms. Competition in firms' input markets has no significant effect on the fraction of purchase on account (estimates not reported).

We complement our analysis of the supply by examining which firms are denied trade credit. To this end, we explore the probability that a firm making purchases on account is denied further trade credit (not reported). In support of our previous interpretation of the results, firms buying more services are less likely to be denied trade credit. This does not hold for firms buying relatively more differentiated inputs. Less surprisingly, more creditworthy firms, as measured by size, age, and credit score, are also less likely to be denied trade credit.[14]

B Early payment discounts

The leading study on trade credit terms is Ng, Smith and Smith (1999). They report wide variations across industries in trade credit terms offered but little variations within industries. Firms in some industries tend not to offer early payment discounts, whereas firms in other industries offer a choice between net terms and discounts. Also the quoted discount terms vary little within industries but considerably across industries where discounts are common. Most discount terms, notably the rather common two percent discount for payment within ten days, imply a yearly interest rate exceeding forty percent (Petersen and Rajan 1995).

Figure 2 shows the distribution of the percentage of suppliers who offer discounts to a given firm in the 1998 NSSBF. While more than forty percent of the firms have suppliers who do not offer

[14] The number of suppliers has a positive but not statistically significant effect on the probability that a firm is denied trade credit. Hence, it seems unlikely that the number of suppliers is related to some other firm characteristic such as creditworthiness.

discounts, the percentage of suppliers who offer discounts to the remaining firms varies considerably. The variation may be caused by differences in the composition of inputs employed: Some firms may use more inputs from industries where discounts are standard practice, others may purchase more (exclusively) inputs that are only sold on net terms. Hence, Figure 2 may well be compatible with Ng, Smith and Smith (1998) who collected data from the seller side. Alternatively, the variations in the percentage of suppliers offering discounts may also be due to individual buyer characteristics. We investigate the latter hypothesis using assets, age, credit score and profitability measures as proxies for buyer characteristics.

[insert figure 2 here]

The NSSBF data set contains firm–level information on the percentage of suppliers offering discounts, and we may simply regress this percentage on a variety of firm and industry characteristics. An early payment discount is, however, (an optional) part of a trade credit agreement. Accordingly, firms asked to pay cash at delivery are excluded from a discount offer. To understand which firms receive early payment discounts, we need to consider that we observe the percentage of suppliers offering discounts only for the subset of firms that actually can buy inputs on credit. For this reason, we also use a two-step Heckman procedure that takes the sample selection into account. Table 4 documents our results for the probability of receiving discounts and the percentage of suppliers offering discounts and shows that the parameter estimates are not very sensitive to the selection problem.

[insert table 4 here]

Product characteristics affect early payment discounts in a manner that - consistent with our previous findings - favours the diversion hypothesis (H2A) relative to the collateral hypothesis (H2B). Firms buying relatively more services are less likely to receive discount offers. This result is statistically and economically significant. A one-standard-deviation increase in the proportion of services purchased reduces the fraction of suppliers offering discounts by 18 percent of its standard deviation. Although smaller and with an accordingly lower debt capacity, service firms have a comparative advantage in offering trade credit because the products they sell - services for the production process - are not easily diverted. Being less concerned about customers' strategic default, service firms provide trade credit at lower cost. By contrast, firms buying more differentiated goods

receive more discounts, suggesting that the collateral value of differentiated goods does not lower the cost of trade credit. Instead, producers of differentiated goods provide early repayment incentives by offering discounts. This seems in accordance with our early finding that producers of differentiated goods do not lend more to customers in financial difficulties when collateral value matters most. Suppliers offering standardized goods are also more prone than service firms to offer discounts. Our interpretation is once again that these sellers fear strategic default and therefore try to induce early repayment.

The results also show that wholesale and retail firms receive more discounts than firms in other industries.[15] Following the diversion hypothesis, we argue that discounts are used to induce early repayment due to product characteristics. Wholesale and retail firms purchase finished products that are highly liquid and easy to divert. To mitigate borrower moral hazard, suppliers offer discounts when selling on credit.

We continue to find no support for the information advantage hypothesis (H2C). Retail firms that tend to interact frequently with their suppliers (wholesalers) receive more discounts than other firms. Similarly, firms buying more inputs from firms in the same industry or from producers of information-sensitive services do not receive less discounts than other firms (not reported in Table 4).

As regards market structure, supplier concentration is positively related to the presence of early payment discounts, as suggested by the price discrimination hypothesis (H2D). The statistical significance is, however, weak. Once again, market power on the buyer side also seems to matter. Larger and older firms and firms with many suppliers receive more discounts. Since these firms typically have some financial slack or unused bank credit limits enabling them to take advantage of the discount offers, these discounts are essentially price reductions. Although concentration in the firm's own industry does not appear to matter (not reported in Table 4), the impact of firm-specific characteristics can be interpreted as evidence in support of the buyer power hypothesis (H2E). Important or large customers receive favorable treatment because of their bargaining power. Alternatively, this finding may simply reflect differences in the relative need for cash, or equivalently, in the relative availability of credit. Discounts encourage early payment only by those customers that have financial slack. Consequently, suppliers in need of cash target early payment discount offers at larger and older firms with better access to funds. Irrespective of whether one favours

[15] Ng, Smith and Smith (1999) find that firms whose most common customer types are wholesale or retail firms offer more discounts. It is comforting that our analysis of the buyer side replicates this finding.

the bargaining power or the credit constraint interpretation, the finding challenges the view that contract terms vary across industries but not within industries.

Surprisingly, riskier firms are offered less discounts as the coefficient of Credit Risk is consistently negative, though not always statistically significant. This indicates that discounts are not a good proxy for the risk premium suppliers charge to firms with low creditworthiness. Possibly, suppliers anticipate that inducing early repayment from firms in financial difficulties may be difficult or impossible. Hence, they do not offer discounts. The absence of a risk premium may be interpreted along the lines of Wilner (2000) who argues that suppliers subsidize their (important) customers in financial distress.

C The duration of trade credit

Trade credit duration has a straightforward interpretation when the seller offers net terms only, namely the time between the billing date and the due date. If the seller offers a discount, the discount period is a measure of trade credit duration as well. When the discount is sufficiently large to induce the firm to pay early, the discount period is in fact the most relevant duration measure. In the following subsections, we analyze the determinants of due dates and discount periods in turn.

C.1 Due dates

The NSSBF includes data on due dates only for the most important supplier of each firm. Moreover, this information is not reported in terms of number of days but in terms of 11 different intervals, ranging from immediate payment, payment between one and seven days, ..., up to payment more than 90 days after delivery. Accordingly, due dates in our analysis do not refer to the actual number of days but to the mean of each interval in which the bill of the most important supplier is due.

Figure 3 displays the distribution of due dates for deliveries by the most important supplier to firms in our sample. The observations are highly clustered with more than 70 percent of the firms reporting due dates in the interval including 30 days. This is consistent with earlier studies, e.g., Ng, Smith and Smith (1999), documenting the wide-spread use of a 30 days payment period. In fact, it seems reasonable to assume that most - if not all - of those 70 percent of firms in our sample have a due date of exactly 30 days. Among the remaining firms, shorter payment periods are prevalent, though periods of more than two months also occur.

[insert figure 3 here]

We conjecture that due dates depend on product characteristics and market structure. To control for the firms' creditworthiness and financing needs, we include assets, age, credit score and profitability measures in the regression. The dependent variable is the logarithm of 1 plus the mean due date of each interval. As we want to examine the due dates of firms that actually receive trade credit, we employ a two-stage Heckman procedure to account for the sample selection. Table 5 reports the results for the due dates.

[insert table 5 here]

While neither services nor differentiated goods are significant determinants of the payment period, our findings are not as discouraging for the diversion hypothesis (H2A) as for the collateral hypothesis (H2B). Firms buying more differentiated goods do not receive longer payment periods despite purchasing more on account. If anything, their credit periods are shorter. In contrast, the service input variable has a positive sign as predicted by the diversion hypothesis. But due to the low statistical significance this can hardly be considered supporting evidence. A more convincing piece of evidence is the result that wholesale firms get significantly shorter payment periods. Indeed, the diversion hypothesis argues that the maturity of trade credit should be closely tied to the time it takes to convert inputs into outputs. For wholesalers this time is considerable shorter than for other firms, since they typically do not process the inputs before selling them on. The shorter payment periods of wholesalers is also consistent with our conjecture that these firms interact more frequently with their suppliers. As argued in section V.A, this can explain why wholesalers can purchase more on account even though they buy highly liquid inputs.

Based on this reasoning, it may seem puzzling that retail firms do not receive equally short payments periods as wholesalers. A possible explanation is that retail firms require more time to empty their inventories because they sell to a variety of small customers. In contrast, wholesalers can liquidate their stocks much faster. That is, wholesale goods are particularly liquid, and the trade credit maturity should be accordingly shorter.

As in previous sections, the data provide no support for the information advantage hypothesis (H2C). Firms buying more from firms in related business lines or more information-related services do not appear to get longer payment periods. (These estimates are not reported in Table 5.)

Our findings on due dates provide further support for the buyer power hypothesis (H2E). Firms in concentrated industries get longer credit periods. This indicates that these firms may have more bargaining power vis-à-vis their suppliers, enabling them to successfully demand better terms. Similarly, firms with many suppliers get longer payment periods from their main supplier. Possibly, main suppliers concede longer credit periods because of the competitive pressure. By contrast, size and age do not prolong the payment period but, if anything, shorten it. In our view, this result should be interpreted as a reflection of differences in access to funds, rather than as evidence against the buyer power hypothesis. Suppliers, in particular credit-constrained suppliers, do not offer longer payment periods to firms that have better access to funds. Age and size are measures of both bargaining power and access to funds. Accordingly, there are no clear predictions regarding the sign of these variables.

Riskier firms also get longer payment periods from their suppliers, supporting the view that suppliers are willing to relax the due date when their customers are in financial distress. This is in accordance with our previous finding on early payment discounts, further supporting the notion that suppliers choose payment terms that favor firms in financial difficulties (Wilner 2000).

Finally, the result that firms buying more differentiated goods do not get longer payment periods also refutes the quality guarantee explanation of trade credit. As the quality of differentiated goods is difficult to assess, firms buying more standardized goods should get shorter payment periods. We find that firms buying more standardized goods receive equally long, if not longer, payment periods than firms buying more differentiated goods.

C.2 Discount periods

Ng, Smith and Smith (1999) report that most suppliers offering early payment discounts accept discounted payments during a ten day period. The NSSBF reports the length of the discount period offered by the most important supplier. As Figure 4 shows, this also holds for the discount period that the most important supplier offers to our sample firms. Though the length of the discount period is not an entirely rigid parameter. Among the firms whose most important supplier offers an early payment discount, a vast majority (80 percent) obtains a discount when paying within ten days. For the remaining firms, longer discount periods are more common than shorter.

[INSERT FIGURE 4 HERE]

Given the departures from the standard terms, we expect that the discount period depends to some extent on customer characteristics. Columns 1 and 2 of Table 6 report the regressions of the discount period length on product, market structure and firm characteristics. Since we observe discount periods only for firms that actually receive a discount, we also present estimates obtained from a two-step Heckman procedure (Column 2).

[Insert table 6 here]

The observed cross-sectional variation in discount periods provides evidence against the collateral hypothesis (H2B) and in support of the diversion hypothesis (H2A). Firms buying relatively more services obtain longer discount periods, whereas firms buying more differentiated inputs have to repay earlier if they want to take advantage of the discount offer. Firms buying one standard deviation more services (differentiated goods) are ceteris paribus offered a discount period that is approximately 12 percent of its standard deviation longer (shorter).

These results match well with the early findings on discounts and corroborate our interpretation that producers of differentiated goods appear significantly more concerned than service firms about early repayment. Or putting it differently, the collateral value of differentiated goods neither seems to lower the cost of trade credit nor to lengthen its maturity. The result that retail and wholesale firms are offered shorter discount periods is further evidence in favour of the diversion hypothesis (H2A). In case of retail firms, the information advantage hypothesis (H2C) has the opposite implication: Retail firms should receive longer discount periods, as they purchase inputs from suppliers (wholesalers) that typically operate in closely related business lines. Other specifications that are not included in Table 6 also fail to offer support for the information advantage hypothesis. In particular, buying more products from firms in related business lines or more information-related services does not affect the length of the discount period.

Firms that supposedly have bargaining power do not appear to obtain longer discount period. This does not necessarily refute the buyer power hypothesis (H2E). Indeed, there is anecdotal evidence that firms with bargaining power can get discounts even after the discount period has elapsed (Smith, 1987; Ng, Smith and Smith, 1999). Given that the discount period can be extended unilaterally, there is no reason to demand initially a longer discount period. Furthermore, the significant negative impact of size is readily accounted for when assets are interpreted as a proxy for access to credit rather than as a measure of bargaining power. If suppliers offer larger firms

(more) discounts to ease their own cash and credit constraints, we would expect larger firms to be offered shorter discount periods.

We also find that Credit Risk has no significant impact on the length of the discount period. Thus, while suppliers seem willing to extend the due date for firms in distress, they are typically not as generous as to further subsidize the distressed customers' loans. This finding is consistent with the previous result that distressed firms get fewer discounts.

Finally, our results provide once again no support for the quality guarantee theory. Differentiated products require longer inspection periods, and firms buying more differentiated products should thus get longer discount periods. We find, however, the opposite.

D The cost of trade credit

D.1 Discount size

Large discounts ought to be offered when the seller is particularly concerned about strategic default and wants to induce the buyer to pay early or when the buyer has strong bargaining power. Thus, we expect the same variables to affect the choice of discount size as affect the percentage of suppliers offering discounts.

Columns (3) and (4) of Table 6 link the size of discounts offered by the most important supplier to the main variables of interest, which include as before product, market structure and firm characteristics. Since we observe the size of discounts only for firms that actually receive a discount, we use a two-stage Heckman estimator also in this case.

Service firms appear to offer smaller discounts than other firms, even though they offer longer discount periods. This result is surprising since suppliers typically demand to be compensated for the opportunity cost of offering longer payment periods as documented by the positive correlation of discount size, discount period, and payment period. This piece of evidence is, however, consistent with our previous findings and lends further support to the diversion hypothesis (H2A). Since discounts correspond to the interest rate suppliers charge (when the credit is repaid after the discount period has elapsed), the result confirms that service firms provide credit at lower cost, notwithstanding that they are small and have more difficult access to external funds. Their only advantage is that services are difficult to divert. Hence, mitigating moral hazard problems appears to be an important rationale for trade credit. This interpretation is further supported by the result that wholesale and retail firms are given strong incentives to early repayment with larger discounts.

Firms buying more inputs from concentrated industries appear to receive smaller discounts. This may reflect the propensity of suppliers with market power to price-discriminate among their customers (as suggested by the price discrimination hypothesis (H2D) and the results in Table 4): Suppliers with more market power may exploit even small differences in the customers' willingness-to-pay. Relatedly, one may argue that suppliers with market power can afford to offer smaller discounts as there are few alternative suppliers.

Neither concentration in the own industry nor the number of suppliers appear to affect the size of the discount (not reported in Columns 3 and 4). These findings go against the buyer power hypothesis (H2E). The result that larger firms receive smaller discounts provides further evidence against the buyer power hypothesis if we expect large firms to take advantage of the discount offers. Conversely, if we do not expect large firms to pay within the discount period, smaller discounts are tantamount to lower costs of trade credit and consistent with the buyer power hypothesis. Alternatively, the impact of firm size may once again be interpreted in terms of differences in the relative availability of credit rather than in terms of bargaining power. If suppliers offer discounts to induce those customers that have more financial slack to repay early, larger firms should not receive larger discounts. Indeed, the common two percent discount for payments within ten days provides unconstrained customers with substantial incentives to repay early.

In accordance with our previous findings, suppliers do not charge risky borrowers more for trade credit. This is another indication that suppliers are willing to subsidize risky firms, as Wilner (2000) argues.

D.2 Penalties

In order to enforce their due dates, suppliers may impose a penalty for late payment. We would expect penalties to be larger when the seller is more concerned with timely payment and when the buyer's bargaining power is weak. Thus, we conjecture that the penalties depend on firm and industry characteristics in a similar manner as the discount size.

The results for the penalty imposed by the most important supplier are reported in Columns (5) and (6) of Table 6. As late payment penalties presuppose the extension of trade credit, we use a two-stage Heckman procedure to account for the sample selection.

Like payment periods, penalties for late payment do not seem to be affected by the nature of the product. Firms buying more differentiated goods or more services face the same penalties as those buying more standardized products. In contradiction to the diversion (H2A) and the

collateral hypothesis (H2B), suppliers of different products do not appear to use payment period or late penalty to give incentives to their customers.

The result that wholesale firm have larger late penalties is consistent with the earlier findings that these firms are offered more and larger discounts, and shorter payment and discount periods. In our view, the diversion hypothesis (H2A) provides a convincing explanation for this combination of contract terms. Wholesale goods are highly liquid and easily diverted. Consequently, suppliers provide strong incentives to repay when selling these goods on credit.

Larger firms face smaller late payment penalties, possibly because they have stronger bargaining power. Alternatively, suppliers may simply be less concerned by delayed payments from large firms as these firms are relatively safe and likely to pay the bill sometime. This latter interpretation is favoured by penalties not depending either on the concentration in the firms' own industry or on the number of suppliers, both measures of firm bargaining power.

Firms buying more inputs from concentrated industries have significantly smaller late penalties. This may reflect the higher ability of suppliers with market power to enforce repayment (Cunat 2003). When there are few (or no) alternative producers, the (implicit) threat of halting future input deliveries suffices to induce the firm to repay its trade credits. Another reason why suppliers may refrain from hefty penalties is that they have no impact on the customers' behavior. This provides an explanation why firms with negative profits are charged smaller penalties. This result is also consistent with the notion that suppliers choose contract terms that accommodate the needs of firms in financial difficulties.

VI The use of trade credit

A firm's debt to its suppliers depends on the extent to which suppliers are willing to sell on account and on the average effective payment period. The effective payment period depends in turn both on the terms of the suppliers' contract and on the firm's behavior. Contracts without early payment discounts and with long payment periods induce larger payables, but payables can also be large due to the firm's decisions to forego discounts and to pay after the due date.

To capture the fact that the firms' repayment behavior affects their outstanding trade debt we employ different measures for the use of trade credit in our regression analysis. In addition to the volume of trade credit that firms use - that is, their payables - we also examine their propensity to forgo discounts and to pay late. Obviously, payables as well as the repayment behavior depend on

firm characteristics that affect the demand for trade credit and on the contract terms offered by the suppliers. As before we proxy the firms' demand for trade credit with assets, age, the profit to sales ratio and the bank credit line normalized by sales. In accordance with the theoretical framework and our interpretation of the previous results, we assume that the contract terms are set by the suppliers. We thus treat the percentage of purchases on account and the contract terms as exogenous with respect to the firm's choice of trade credit use and repayment behavior.[16] In the regressions that we present in Table 7 we include those contract characteristics that we believe to be the most salient for understanding trade debt and the firms' propensity to forgo discounts or to pay late. In other specifications that we do not report, we included different and less judiciously chosen contract characteristics. Their coefficients are insignificant.

[Insert table 7 here]

As column (1) shows, the extent to which firms use trade credit depends on the purchases that they are able to make on account. Other contract characteristics, including the payment period and the discount size (estimates not reported), do not appear to have a significant impact on the payables to assets ratio. Firm characteristics are at least as important as the supply of trade credit in determining payables. Consistent with previous studies (Petersen and Rajan 1997), we find that smaller firms with less access to bank loans use more trade credit. Profitable firms have larger payables, possibly because they have more investment opportunities and need more external funds.

Firm repayment behavior reveals several noteworthy patterns. Firms with financial problems are more likely to pay after the due date (Columns 2 and 3). More surprisingly, large firms are also more likely to pay late. One possible explanation is that suppliers do not enforce late penalties for large firms. Although we are not aware of any direct evidence, such a size bias in the enforcement of penalties seems likely in view of the aforementioned evidence that many suppliers accept discounted payments after the discount period has elapsed (Smith, 1987; Ng, Smith and Smith, 1999). Weak contract enforcement may also explain why higher penalties do not significantly induce more timely repayment. In addition, it would be consistent with our previous finding that customers do not seem to use their bargaining power to reduce the penalty for late repayment. In addition, firms with a longer payment period are more likely to pay after the due date. This may reflect our previous findings that suppliers tend to be lenient with credit-constrained customers.

[16] In other not reported specifications we instrument the contract terms with all the variables that are used in Tables 3 to 6 to explain contract characteristics. The results remain qualitatively invariant although the significance levels are often lower.

Column 4 documents that firms respond to financial incentives. A larger discount increases the likelihood that the firm takes advantage of the discount offer. Firms are more likely to forgo discounts if they fear to be denied bank loans. This is again consistent with Petersen and Rajan (1994) who find that financially constrained firms with less access to bank loans are less likely to take advantage of early payment discounts. In addition to be more prone to pay late, large firms are also less likely to take advantage of early payment discounts. Given that large firms should have better access to other sources of credit, a plausible explanation is that suppliers grant discounts to large firms even after the discount period has elapsed (Smith, 1987; Ng, Smith and Smith, 1999).

To summarize, firms appear to respond to financial incentives implicit in the contract terms we analyzed in the previous section: They take cheap trade credit when they get it and utilize costly trade credit when they must. Furthermore, some firms appear to be able to take advantage of their suppliers beyond the contractual agreement by paying late or by unilaterally extending the discount period.

VII Conclusions

To assess the empirical relevance of different financial trade credit theories, we link various features of trade credit contracts to product and industry characteristics. Overall, our findings suggest that the scope for customer moral hazard is an important determinant of trade credit. Suppliers of standardized products offer less trade credit and firms buying relatively standardized goods receive less trade credit, probably because standardized inputs are more easily diverted. Consistent with this interpretation, firms buying less standardized inputs are offered more trade credit. Suppliers of services offer as much trade credit as suppliers of differentiated products once we take into account that being smaller they may have less access to external funds. In addition, service suppliers offer longer and cheaper trade credit than do other firms.

Customers' and suppliers' market power also has a significant impact on trade credit terms. Buyers appear to exercise their market power to obtain more trade credit at better terms. Additionally, in concentrated industries, suppliers offer more often early payment discounts. The result supports the hypothesis that early payment discounts provide a way for suppliers to price discriminate. The prevalence of early payment discounts may explain in turn why the volume of receivables is not increasing in the degree of market concentration.

We also examine to what extent theories based on information asymmetries can explain trade

credit. Our results provide little support for the notion that suppliers lend because they have access to privileged information about the customers' industry. Having a larger share of inputs provided by firms in related business lines does, for instance, not seem to increase a firm's ability to obtain trade credit.

A natural next step is to collect data that allows to link suppliers' product characteristics directly to their trade credit contract characteristics. Such data would admit an even more stringent test of the different trade credit explanations.

Our results also indicate path for future theoretical research. Suppliers appear to carefully choose contract terms to give incentives to firms. Presumably, all trade credit contract terms are jointly determined. Current theories, however, tend to emphasize only one or two. For example, the price discrimination theory deals only with early payment discounts, and the input diversion theory deals only with credit limits and contract duration. A natural ambition for future work is to develop models which relate suppliers' reasons for offering trade credit to the type of optimal contract they give. Such models would then have more stringent testable implications on the relation among contract terms, suppliers and buyer characteristics, which we have started to explore.

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Table 1: Descriptive Statistics
Panel A: Firm Characteristics

Assets and Sales are in million of dollars, and sales are yearly. Age is in years. Credit Line is the credit limit on the firm's overdraft facility divided by sales. Credit Risk is the firm's credit score and varies between 1 (low) and 5 (high). Fear of Denial is a dummy variable that takes the value 1 if the firm needed credit during the last three years but did not apply due to fear of denial and zero otherwise. Distress is a dummy variable that takes the value 1 if the firm reports that its most important problem is related to financing, interests rates or cash flow and zero otherwise. Unused Credit is the difference between the bank credit limit and the amount drawn as a fraction of assets.

	Means (Standard Deviations)			
Firm Characteristics	Whole Sample	Standardized Goods	Differentiated Goods	Services
Obs.	3,489	497	270	2722
Assets	1.48	2.46	3.91	1.06
	(5.374)	(7.97)	(9.50)	(3.95)
Age	14.46	16.30	16.70	13.87
	(12.15)	(12.68)	(13.36)	(11.86)
Sales	3.473	6.03	5.74	2.78
	(15.1)	(31.0)	(10.7)	(10.2)
Profit/Sales	-0.040	0.028	-0.069	-0.049
	(4.94)	(1.23)	(1.67)	(5.54)
Credit Line	0.14	0.09	0.14	0.15
	(1.66)	(0.22)	(0.55)	(1.87)
Fixed Assets/Total Assets	0.30	0.32	0.32	0.29
	(0.31)	(0.30)	(0.26)	(0.31)
Credit Risk	2.98	2.91	2.89	3.00
	(1.04)	(1.12)	(1.22)	(1.01)
Fear of Denial	0.22	0.23	0.20	0.23
	(0.42)	(0.42)	(0.40)	(0.42)
Distress	0.12	0.15	0.12	0.11
	(0.32)	(0.36)	(0.33)	(0.31)
Unused Credit	2.76	1.04	0.83	3.54
	(45.30)	(3.30)	(3.28)	(54.21)

TABLE 1: DESCRIPTIVE STATISTICS (CONT.)
Panel B: Extension of Trade Credit

Net Terms is the number of days in the typical industry payment period. Two–Part is a dummy variable equal to 1 if discounts are common in the industry, and zero otherwise. Both variables are defined at the two–digit industry level. The source for both variables is Ng, Smith and Smith (1999).

	Means (Standard Deviations)			
Receivables Characteristics	Whole Sample	Standardized Goods	Differentiated Goods	Services
Receivables/Sales	0.100	0.161	0.135	0.086
	(0.513)	(1.161)	(0.248)	(0.294)
Net Terms (ind.)	29.34	27.59	30	29.59
	(3.82)	(8.17)	(0)	(2.44)
Two–Part (ind.)	0.078	0.155	0.444	0.027
	(0.268)	(0.362)	(0)	(0.163)

TABLE 1: DESCRIPTIVE STATISTICS (CONT.)
Panel C: Terms of Trade Credit

Account Ratio is the percentage of purchases that are made on account rather than paid cash at or before delivery. Number of Suppliers is the number of suppliers offering to sell on account. SOD stands for Suppliers Offering Discounts and is the percentage of suppliers that offer discounts. Discount Size is the percentage price reduction associated with early payment offered by the main supplier. Discount Period is the number of days for which the main supplier's early payment offer is valid. Penalty Size is the monthly interest that the main supplier charges if bills are paid late. Due Date is the mean due date of each interval in which the bill of the most important supplier is due. The intervals range from immediate payment, payment between 1 and 7 days, ..., up to payment more than 90 days after delivery.

	Means (Standard Deviations)			
Credit Contracts	Whole Sample	Standardized Goods	Differentiated Goods	Services
Account Ratio	47.73	65.69	67.99	42.44
	(42.65)	(40.27)	(37.60)	(42.05)
Number of Suppliers	37.56	49.59	74.46	31.70
	(242.57)	(134.24)	(139.90)	(264.60)
SOD	21.27	30.62	28.11	18.86
	(31.99)	(36.37)	(31.90)	(30.37)
Discount Size	2.39	2.37	1.73	2.57
	(2.56)	(2.20)	(1.03)	(2.93)
Discount Period	14.16	13.19	13.59	14.76
	(16.04)	(6.67)	(11.12)	(19.78)
Penalty Size	1.18	1.39	0.81	1.19
	(2.24)	(2.57)	(1.50)	(2.23)
Due Date	24.98	27.24	24.87	24.7
	(12.28)	(12.27)	(11.37)	(12.46)

TABLE 1: DESCRIPTIVE STATISTICS (CONT.)
Panel D: Use of Trade Credit

Credit Usage is a dummy variable that takes the value 1 if the firm has used trade credit during the past year and 0 otherwise. Discount Usage is the fraction of discount offers that firms has taken advantage of. Late Dummy takes the value 1 if the firm has paid after the due date during the previous year and 0 otherwise. Late Fraction is the percentage of balances on account that were paid after the due date.

	Means (Standard Deviations)			
Credit Usage	Whole Sample	Standardized Goods	Differentiated Goods	Services
Payables/Assets	0.59	0.06	0.19	0.38
	(13.19)	(33.62)	(0.53)	(4.01)
Credit Usage	0.66	0.80	0.84	0.62
	(0.47)	(0.40)	(0.36)	(0.49)
Discount Usage	0.57	0.60	0.45	0.59
	(0.44)	(0.45)	(0.44)	(0.44)
Late Dummy	0.46	0.48	0.55	0.44
	(0.50)	(0.50)	(0.50)	(0.50)
Late Fraction	0.14	0.16	0.15	0.13
	(0.26)	(0.29)	(0.24)	(0.26)

Table 1: Descriptive Statistics (cont.)
Panel E: Industry Characteristics

Own Concentration is the market share of the eight largest firms in the firm's two-digit industry (Pryor's concentration index). Input Concentration is the weighted sum of Pryor's concentration indices in the suppliers' industries where the weights correspond to the input shares used by the firm as given by the input-output tables. Differentiated Inputs is the share of inputs that comes from sectors producing differentiated products. Service Inputs and Standardized Inputs are defined analogously. The sectoral classifications are provided in the Appendix. Own Industry Share is the fraction of products transacted with firms belonging to the same two-digit industry.

	Means (Standard Deviations)			
Sector Characteristics	Whole Sample	Standardized Goods	Differentiated Goods	Services
Own Concentration	19.87	46.61	42.13	16.07
	(13.42)	(14.50)	(11.11)	(8.92)
Input Concentration	0.16	0.36	0.27	0.13
	(0.08)	(0.11)	(0.08)	(0.04)
Differentiated Inputs	0.058	0.071	0.140	0.046
	(0.068)	(0.067)	(0.107)	(0.050)
Service Inputs	0.280	0.198	0.198	0.297
	(0.051)	(0.036)	(0.026)	(0.037)
Standardized Inputs	0.068	0.388	0.246	0.023
	(0.125)	(0.092)	(0.190)	(0.020)
Own Industry Share	0.102	0.235	0.130	0.089
	(0.053)	(0.072)	(0.085)	(0.027)

Table 1: Descriptive Statistics (cont.)
Panel F: Correlation Table for Contract Terms

All variables are defined in Panel C. Starred correlations are statistically significant at the 10 percent level.

	Account Ratio	SOD	Discount Size	Discount Period	Due Date	Penalty Size
Account Ratio	1					
SOD	0.1028*	1				
Discount Size	-0.0203	0.0309	1			
Discount Period	-0.0335	0.0127	0.1521*	1		
Due Date	0.0347*	0.0845*	0.2207*	0.0308	1	
Penalty Size	-0.0547*	0.0257	0.0024	0.1070*	0.0253	1

Table 2: Determinants of accounts receivable

The dependent variable is the ratio of account receivables to sales. All independent variables are defined in Table 1, except the following: Intermediate Share is the fraction of two-digit industry output that is sold as intermediate good (as opposed to final good); Trade is a dummy variable that takes the value 1 for retail and wholesale firms and zero otherwise. Constants are included in all regressions but are not reported. In Column (1) 59 two-digit SIC indicators were also included. Parameters have been estimated using Tobit regressions censored at zero. Numbers in parentheses denote t-values.

	Dependent variable: Receivables/Sales				
	(1)	(2)	(3)	(4)	(5)
Independent variables					
Log Assets	0.097	0.061	0.061	0.063	0.059
	(16.01)	(16.35)	(16.79)	(17.45)	(16.52)
Credit Line	0.0036	-0.0020	-0.0020	-0.0024	-0.0025
	(0.35)	(-0.33)	(-0.33)	(-0.41)	(-0.42)
Profit/Sales	0.0003	-0.0033	-0.0033	-0.0035	-0.0035
	(0.04)	(-0.95)	(-0.94)	(-0.99)	(-0.99)
Own Concentration		0.0007	0.0005		
		(0.82)	(0.80)		
Intermediate Share					0.0275
					(4.78)
Standardized Goods			-0.074		-0.059
			(-1.76)		(-1.54)
Differentiated Goods		0.069			
		(1.57)			
Services		0.080			
		(1.72)			
Trade		-0.119	-0.117	-0.128	-0.046
		(-6.44)	(-6.57)	(-7.11)	(-1.99)
Net Terms				0.0035	
				(1.65)	
Two-Part				-0.045	
				(-1.44)	
Pseudo–$\bar{R}^2$	0.08	0.11	0.11	0.12	0.12
Observations	3435	2747	2747	2747	2747

Table 3: Purchases on account

The dependent variable is the percentage of purchases made on account. All independent variables are defined in Table 1, except the following: Profit/sales(+) is equal to the ratio of profit to sales if the profit is positive and equal to zero otherwise; Profit/sales(-) is defined analogously for negative profits; (Diff Inp) x Distress interacts the Differentiated Inputs dummy with the Distress dummy; Trade is a dummy variable that takes the value 1 for retail and wholesale firms and zero otherwise. Constants are included in all regressions but are not reported. In Column (1) 59 two-digit SIC indicators were also included. Parameters have been estimated using Tobit models censored at 0 and 100. Numbers in parentheses denote t-values.

	Dependent variable: Account Ratio						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Independent variables							
Log Assets	10.17	10.63	10.65	10.66	10.35	10.29	-1.05
	(18.56)	(17.36)	(17.40)	(17.39)	(16.72)	(16.45)	(-2.11)
Log (1+Age)	4.00	4.31	3.84	4.28	4.41	4.37	-0.21
	(2.60)	(2.35)	(2.08)	(2.34)	(2.41)	(2.38)	(-0.16)
Profit/Sales (+)	-23.60	-24.32	-24.17	-24.43	-23.23	-22.93	-3.02
	(-5.86)	(-5.24)	(-5.21)	(-5.26)	(-5.00)	(-4.91)	(-0.91)
Profit/Sales (-)	-0.25	-0.23	-0.22	-0.23	-0.19	-0.20	0.21
	(-0.64)	(-0.44)	(-0.42)	(-0.44)	(-0.37)	(-0.39)	(0.57)
Credit Risk	-2.02	-1.60	-1.40	-1.56	-1.68	-1.67	-1.40
	(-1.85)	(-1.26)	(-1.10)	(-1.23)	(-1.33)	(-1.31)	(-1.56)
Fixed Asset Ratio				-4.30			
				(-0.90)			
Own Concentration					0.28		
					(2.50)		
Differentiated Inputs		72.58	85.26	72.91	54.42	65.09	37.05
		(3.22)	(3.61)	(3.23)	(2.30)	(2.85)	(2.31)
Distress			0.58				
			(0.10)				
(Diff Inp) x Distress			-112.79				
			(-1.88)				
Service Inputs		-111.99	-113.89	-111.74	-91.50	-99.67	-27.64
		(-3.92)	(-3.98)	(-3.91)	(-3.09))	(-3.35)	(-1.35)
Trade		16.71	15.47	14.99	15.79	17.40	6.88
		(5.11)	(5.10)	(4.84)	(5.21)	(5.17)	(3.17)
Own Industry Share						14.31	
						(1.47)	
Number of Suppliers							26.23
							(36.88)
Pseudo–$\bar{R}^2$	0.039	0.034	0.034	0.037	0.034	0.034	0.111
Observations	3447	2275	2275	2275	2275	2260	2275

Table 4: Purchases on Discount

The dependent variable in Columns (1) and (3) is the percentage of Suppliers Offering Discounts (SOD), as defined in Table 1. The dependent variable in Column (4) is Log (1+SOD). The dependent variable in Column (2) is a dummy variable that takes the value 1 if the main supplier offers early payment discounts and 0 otherwise. All independent variables are defined in Table 1, except the following: Profit/sales(+) is equal to the ratio of profit to sales if the profit is positive and equal to zero otherwise; Profit/sales(-) is defined analogously for negative profits; Retail is a dummy variable that takes the value 1 if the firm is a retail firm and zero otherwise; Wholesale is defined analogously for wholesalers. Constants are included in all regressions but are not reported. In Column (1) 59 two-digit SIC indicators were also included. The regression method is indicated in each column. In Column (3) we employ a Tobit model censored at 0 and 100. Column (2) reports the marginal effects of the probit model, calculated taking the mean of all independent variables, instead of the parameter estimates. Column (4) reports the second-stage estimates of a Heckman selection model. The regressors of the selection equation are Log (1+Assets), Log (1+Age), Profit/Sales, Credit Risk, Trade, Input Concentration, Differentiated Inputs, Service Inputs and a constant. The inverse Mills' ratio is included but the coefficient is not reported. Numbers in parentheses denote t-values.

	Dep. var.: Discounts Offered			
	(1)	(2)	(3)	(4)
Independent variables	OLS	Probit	Tobit	Heckman
Log Assets	0.95	0.026	1.99	0.023
	(2.99)	(6.94)	(2.73)	(3.51)
Log (1+Age)	1.31	0.029	2.24	0.056
	(1.41)	(2.56)	(1.27)	(1.89)
Profit/Sales (+)	0.368	-0.088	-2.06	-0.10
	(0.14)	(-2.89)	(-0.45)	(-0.68)
Profit/Sales (-)	0.098	-0.001	-0.28	-0.05
	(0.62)	(-0.24)	(-0.49)	(-0.33)
Credit Risk	-0.67	-0.02	-1.60	-0.08
	(-1.08)	(-2.41)	(-1.41)	(-2.28)
Retail		0.15	20.78	0.79
		(5.01)	(5.13)	(5.90)
Wholesale		0.18	21.47	0.70
		(7.42)	(6.42)	(6.61)
Input Concentration		0.14	27.96	0.89
		(1.22)	(1.63)	(1.62)
Service Inputs		-0.97	-111.74	-4.20
		(-4.99)	(-3.96)	(-4.68)
Differentiated Inputs		0.30	22.77	0.62
		(2.31)	(1.13)	(0.93)
Number of Suppliers			2.93	0.16
			(2.89)	(4.49)
(Pseudo-) $\bar{R}^2$	0.077	0.113	0.015	
Observations	2287	2260	1556	1536

Table 5: Due dates

The dependent variable is Log(1+Due Date). Due Date and all independent variables are defined in Table 1 except the following: Profit/sales(+) is equal to the ratio of profit to sales if the profit is positive and equal to zero otherwise; Profit/sales(-) is defined analogously for negative profits; Retail is a dummy variable that takes the value 1 if the firm is a retail firm and zero otherwise; Wholesale is defined analogously for wholesalers. Constants are included in all regressions but are not reported. In Column (1), 59 two-digit SIC indicators were also included. The regression method is indicated in each column. Column (4) reports the second-stage estimates of a Heckman selection model. The regressors of the selection equation are Log (1+Assets), Log (1+Age), Profit/Sales (+), Profit/Sales(-), Credit Risk, Retail, Wholesale, Input Concentration, Differentiated Inputs, Service Inputs and a constant. The inverse Mills' ratio is included but the coefficient is not reported. Numbers in parentheses denote t-values.

	Dependent variable: Log (1+Due Date)			
	(1)	(2)	(3)	(4)
Independent variables	OLS	OLS	OLS	Heckman
Log Assets	0.0075	-0.0058	-0.0060	-0.0048
	(2.47)	(-1.37)	(-1.42)	(-0.80)
Log (1+Age)	-0.0013	-0.0152	-0.0168	-0.0164
	(-0.15)	(-1.38)	(-1.52)	(-1.56)
Profit/Sales (+)	0.0010	0.0127	0.0136	0.0103
	(0.04)	(0.48)	(0.51)	(0.35)
Profit/Sales (-)	0.0003	-0.0019	-0.0019	-0.0019
	(0.14)	(-0.50)	(-0.49)	(-0.72)
Credit Risk	0.0163	0.0129	0.0123	0.0122
	(3.06)	(2.00)	(1.90)	(1.80)
Retail		0.0282	0.0285	0.0294
		(1.27)	(1.26)	(1.18)
Wholesale		-0.0687	-0.0687	-0.0666
		(-3.22)	(-3.12)	(-3.19)
Own Concentration		0.0013	0.0013	0.0013
		(1.96)	(1.48)	(1.71)
Input Concentration			0.0256	0.0276
			(0.23)	(0.22)
Differentiated Inputs		-0.0784	-0.0793	-0.0696
		(-0.68)	(-0.67)	(-0.53)
Service Inputs		0.098	0.0990	0.0881
		(0.57)	(0.57)	(0.51)
Number of Suppliers		0.0192	0.0192	0.0191
		(3.03)	(3.01)	(3.16)
$\bar{R}^2$	0.05	0.03	0.03	
Observations	2307	1547	1536	1536

Table 6: Discount Period, Discount Size, and Penalty

The dependent variables are Discount Period (Columns 1 and 2), Discount Size (Columns 3 and 4) and Penalty (Columns 5 and 6). The dependent and all independent variables are defined in Table 1, except the following: Profit/sales(+) is equal to the ratio of profit to sales if the profit is positive and equal to zero otherwise; Profit/sales(-) is defined analogously for negative profits; Retail is a dummy variable that takes the value 1 if the firm is a retail firm and zero otherwise; Wholesale is defined analogously for wholesalers; Suppliers equals Suppliers Offering Discounts (SOD) in Columns (2) and (4) and Number of Suppliers in Column (6). Constants are included in all regressions but are not reported. In Column (1) 59 two-digit SIC indicators were also included. The regression method is indicated in each column. In Column (1) we employ a Poisson model. Columns (2), (4) and (6) report the second-stages estimators of a Heckman selection model. The regressors of the selection equations are Log (1+Assets), Log (1+Age), Profit/Sales (+), Profit/Sales (-), Credit Risk, Trade, Input Concentration, Differentiated Inputs, Service Inputs and a constant. The inverse Mills' ratios are included but the coefficients are not reported. Numbers in parentheses denote t-values.

	Dependent variables					
	Discount Period		Discount Size		Penalty	
	(1)	(2)	(3)	(4)	(5)	(6)
Independent variables	Poisson	Heckman	OLS	Heckman	OLS	Heckman
Log Assets	0.0093	-0.0377	-0.15	-0.035	-0.023	-0.026
	(0.39)	(-2.20)	(-2.93)	(-2.43)	(-3.90)	(-3.08)
Log (1+Age)	0.0005	-0.0359	-0.18	0.002	0.019	0.018
	(0.01)	(-0.89)	(-1.39)	(0.06)	(1.14)	(0.87)
Profit/Sales (+)	-0.0142	0.1430	0.60	0.074	0.066	0.081
	(-0.07)	(1.25)	(1.50)	(0.84)	(1.44)	(1.48)
Profit/Sales (-)	0.0097	0.0104	0.02	-0.011	-0.006	-0.006
	(1.14)	(1.53)	(0.42)	(-0.69)	(-4.37)	(-3.06)
Credit Risk	-0.220	0.125	0.14	-0.006	0.004	-0.010
	(-0.71)	(0.46)	(1.69)	(-0.33)	(-0.37)	(-0.71)
Retail		-0.299		0.264		-0.026
		(-3.04)		(3.86)		(-0.55)
Wholesale		-0.200		0.188		0.085
		(-1.79)		(2.47)		(2.47)
Own Concentration		0.0013				
		(0.58)				
Input Concentration		-0.25		-0.634		-0.102
		(-0.58)		(-2.17)		(-2.10)
Differentiated Inputs		-1.02		0.146		0.097
		(-2.11)		(0.32)		(0.44)
Service Inputs		1.36		-1.476		0.019
		(1.85)		(-2.15)		(0.06)
Suppliers		-0.0090		-0.014		0.004
		(-0.45)		(-0.85)		(0.37)
(Pseudo–)$\bar{R}^2$	0.08		0.01		0.04	
Observations	715	461	719	461	2307	1536

Table 7: Payables and payment behavior

The dependent variables are Payables/Assets (P/A), Late Fraction, Late Dummy and Discount Usage. The dependent and all independent variables are defined in Table 1. Constants are included in all regressions but are not reported. In Column (1) 59 two-digit SIC indicators were also included. In Column (3) reports the marginal effects of the probit model, calculated taking the mean of all independent variables, instead of the parameter estimates. Numbers in parentheses denote t-values.

	Dependent variables			
	P/A	Late Fraction	Late Dummy	Discount Usage
	(1)	(2)	(3)	(4)
Independent variables	2SLS	2SLS	Probit	2SLS
Log Assets	-0.021	1.63	0.028	-5.58
	(-2.88)	(2.44)	(4.33)	(-2.82)
Log(1+Age)	-0.016			
	(-1.16)			
Profit/Sales	0.002	0.855	0.002	-0.72
	(2.94)	(0.85)	(0.01)	(-0.33)
Distress			0.08	
			(1.77)	
Account Ratio	0.017	2.52	0.014	-4.95
	(3.46)	(1.15)	(0.70)	(-0.80)
Due Date		14.894	0.159	
		(2.86)	(3.38)	
Credit Line	-0.0001			
	(-1.61)			
Penalty		-3.14	-0.01	
		(-1.26)	(-0.75)	
Fear of Denial		27.51	0.23	-54.85
		(7.52)	(6.46)	(-5.30)
SOD				-0.10
				(-0.95)
Discount Period				3.76
				(0.53)
Discount size				14.59
				(1.75)
$\bar{R}^2$	0.03	0.01	0.01	0.04
Observations	892	1444	1444	713

Figure 1. Purchases On Account

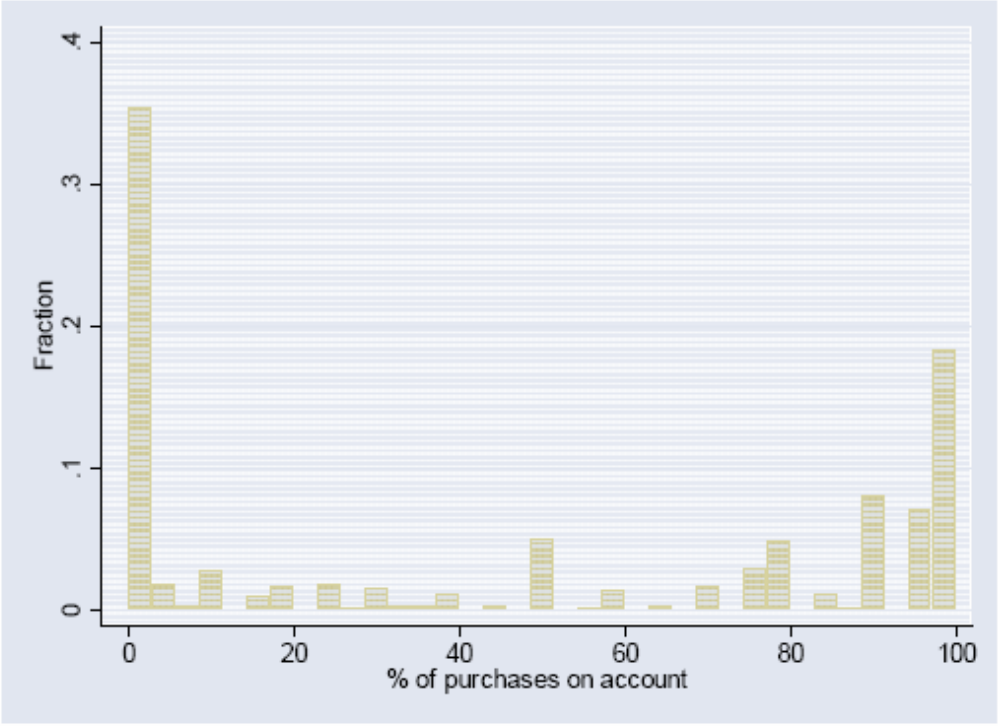


Figure 2. Percentage Of Suppliers Offering Cash Discounts

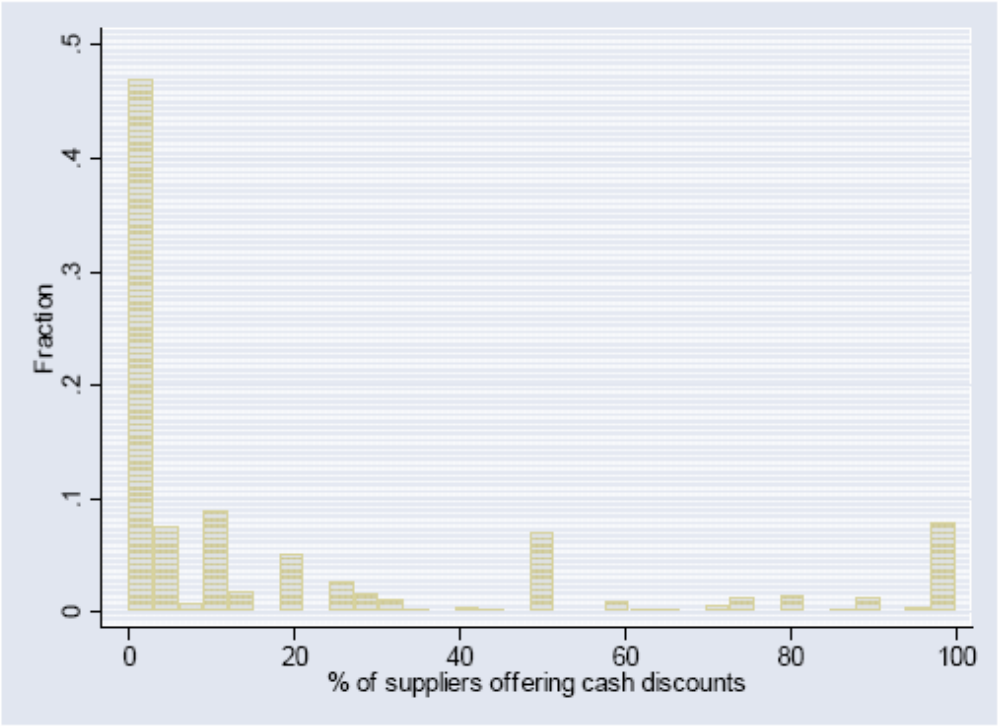


Figure 3. Due Dates

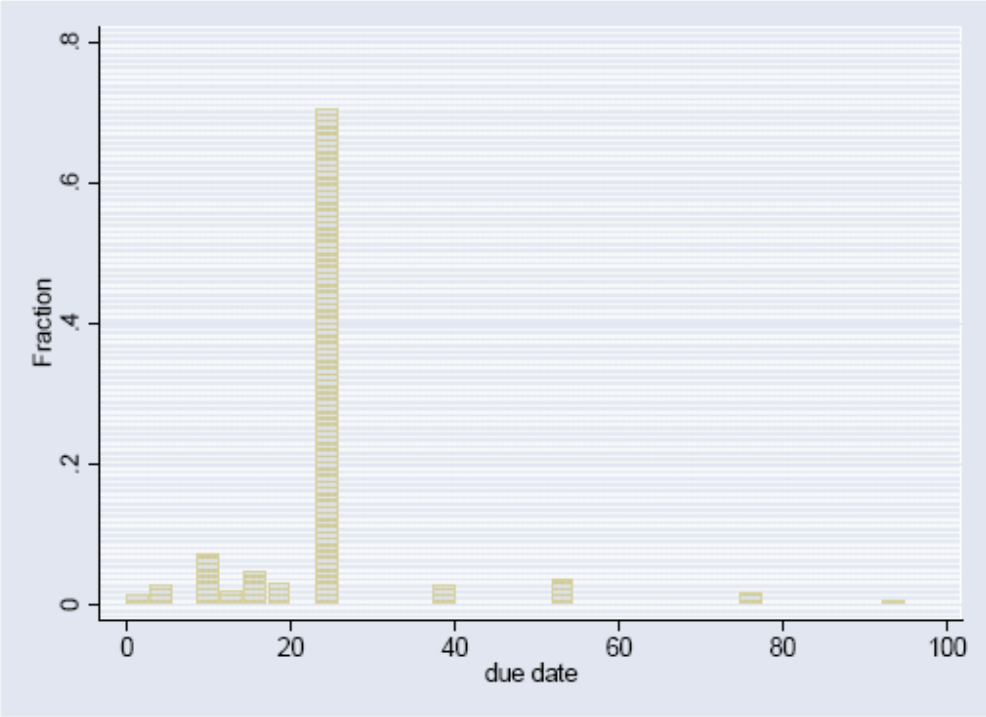
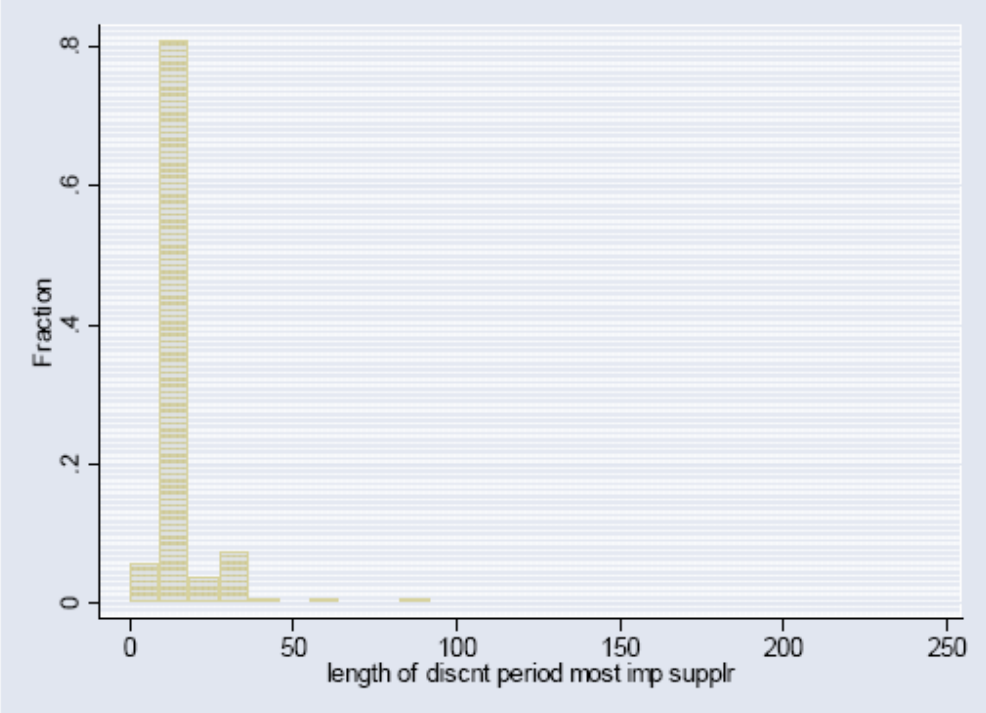


Figure 4. Length Of The Discount Period Of The Most Important Supplier



APPENDIX

The sectoral classification is based on Rauch (1999). Differentiated Inputs is the share of inputs that comes from sectors producing differentiated products. Service Inputs and Standardized Inputs are defined analogously. The sum of service inputs, standardized inputs, and differentiated inputs is 1.

Sector	SIC code	Services	Differentiated goods	Standardized goods	Service Inputs	Differentiated Inputs	Standardized Inputs
Manufacturing							
Coal mining	12	0	0	1	0.2473367	0.2351826	0.5174807
Non metallic minerals	14	0	0	1	0.2232384	0.2043024	0.5724592
Food, kindred products	20	0	0	1	0.2655311	0.1805582	0.5539107
Textile mill products	22	0	0	1	0.4500747	0.1452437	0.4046816
Apparel	23	0	0	1	0.3067605	0.2136476	0.4795919
Lumber, wood products	24	0	0	1	0.426057	0.1690576	0.4048854
Furniture, fixture	25	0	1	0	0.2765208	0.1736231	0.5498561
Paper, allied products	26	0	0	1	0.1945369	0.2103074	0.5951557
Printing publishing	27	0	1	0	0.0727125	0.2007091	0.7265784
Chemicals	28	0	0	1	0.4148054	0.2210059	0.3641887
Petroleum, coal products	29	0	0	1	0.204105	0.2041252	0.5917698
Rubber, plastic products	30	0	1	0	0.3116949	0.1837321	0.504573
Leather	31	0	0	1	0.1373474	0.1659468	0.6967058
Stone, glass, clay products	32	0	1	0	0.3002474	0.2219095	0.4778431
Primary metal industries	33	0	0	1	0.3781688	0.3018656	0.3199656
Fabricated metal products	34	0	1	0	0.4996643	0.2495302	0.2508055
Machinery	35	0	1	0	0.457209	0.1829322	0.3598588
Electrical, electronic equipment	36	0	1	0	0.3359066	0.1655259	0.4985675
Transportation, equipment	37	0	1	0	0.560825	0.2188412	0.2203338
Instruments	38	0	1	0	0.1862195	0.1596277	0.6541528
Miscellaneous products	39	0	1	0	0.2316546	0.1967686	0.5715768
Transportation, communication, public utilities							
Other surface passenger transportation	41	1	0	0	0.1202473	0.2571617	0.622591
Motor freight transportation, warehousing	42	1	0	0	0.0685221	0.419475	0.5120029
Water transportation	44	1	0	0	0.1005895	0.5277812	0.3716293
Air transportation	45	1	0	0	0.1525051	0.3030268	0.5444681
Transportation services	47	1	0	0	0.1202473	0.2571617	0.622591

Communications	48	1	0	0	0.0588434	0.3713913	0.5697653
Electric, gas, sanitary services	49	1	0	0	0.0287742	0.2277935	0.7434323
All wholesale trade							
Durable goods	50	1	0	0	0.0824163	0.2766676	0.6409161
Non-durable goods	51	1	0	0	0.0824163	0.2766676	0.6409161
All retail trade							
Building materials	52	1	0	0	0.0852815	0.2925651	0.6221534
Department stores	53	1	0	0	0.0852815	0.2925651	0.6221534
Food stores	54	1	0	0	0.0852815	0.2925651	0.6221534
Automotive	55	1	0	0	0.0852815	0.2925651	0.6221534
Apparel, accessory stores	56	1	0	0	0.0852815	0.2925651	0.6221534
Furniture	57	1	0	0	0.0852815	0.2925651	0.6221534
Miscellaneous retail stores	59	1	0	0	0.0852815	0.2925651	0.6221534
Drug and proprietary stores	61	1	0	0	0.0319826	0.3874533	0.5805641
Finance, insurance, real estate							
Insurance agents, brokers	64	1	0	0	0.0370015	0.5564879	0.4065106
Real Estate	65	1	0	0	0.07582	0.2320732	0.6921068
Other services							
Business services	73	1	0	0	0.1450169	0.3012476	0.5537355
Automobile repair, services, parking	75	1	0	0	0.2632619	0.2516201	0.485118
Legal services	78	1	0	0	0.0920972	0.3798817	0.5280211
Com. Engineering, accounting, research	79	1	0	0	0.0920972	0.3798817	0.5280211