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RESEARCH REPORT

ON THE DETERMINANTS AND DYNAMICS OF TRADE CREDIT USE EMPIRICAL EVIDENCE FROM BUSINESS START-UPS

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Empirical Evidence from Business Start-ups

by

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Abstract:
This paper empirically investigates the determinants and dynamics of trade credit use by newly established entrepreneurial ventures. At the time of start-up, default risk and financial constraints are typically large. Also, start-ups have no established relationships with banks and suppliers. As firms grow older, these characteristics become less pronounced. As a result, business start-ups provide an excellent case for testing various hypotheses on why firms use trade credit. We find that start-ups use more trade credit when financial constraints are large, when suppliers have a financing advantage over banks in financing high-risk firms, when entrepreneurs value private benefits of control and when transaction costs are important. Furthermore, the time series implications of these theories are supported.

Keywords:
start-ups, trade credit, financial constraints, relationship lending, private benefits of control

1. INTRODUCTION

Trade credit arises whenever a buyer defers payments to his suppliers.[1] Wilson and Summers (2002) report that more than 80% of commercial transactions in the U.K. are on credit terms. In Belgium, the country from which our sample is drawn, 95% of industrial firms have accounts payable outstanding. Even though payments to suppliers usually can be delayed for only a short period of time, firms are continuously involved in business transactions, which makes commercial debt de facto an important component of the balance sheet and, thus, a major source of financing for most firms. Ng *et al.* (1999), for instance, document that during the 1990s, trade credit represented approximately 2.5 times the combined value of all new public debt and primary equity issues in the U.S. In 2001, Belgian industrial firms on average deferred their payments for 84 days and accounts payable represented 18.10% of equity and total liabilities.

Several studies have examined the determinants of firm reliance on commercial debt. It turns out that a major purpose of using trade credit is to overcome financial constraints. Firms likely to be bank credit constrained tend to rely more on trade credit, as shown by Petersen and Rajan (1997), Danielson and Scott (2002), among others. Simultaneously, Petersen and Rajan (1994) find that longer banking relationships reduce the use of commercial debt. For linked firms, Deloof and Jegers (1996) conclude that a shortage of liquid funds lowers payment extension in intragroup trading. At the macro-economic level, Nilsen (2002) finds that during periods of tight (bank) credit, small firms react by borrowing more from their suppliers. Also, Breig (1994) demonstrates that in economies with well-developed financial markets, firms are financed less by suppliers.

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[1] Usually, suppliers consent to a period during which payments can be postponed; full payment then is required at the end of this net period (*one-part* or *net credit terms*). Alternatively, suppliers may offer *two-part credit terms*; they still delineate a net period, but also specify a shorter period, the discount period, during which payment will attract a discount. Generally, the credit terms are set such that trade credit is costly for buyers who forego the discount. For an excellent overview of possible payment terms, see Ng *et al.* (1999) and Wilson and Summers (2002).

Next, Petersen and Rajan (1997) report that firms with higher profit margins have higher levels of accounts receivable, which is interpreted as indirect support for the price discrimination motive for offering trade credit (e.g., Brennan *et al.*, 1988; Mian and Smith, 1992). Finally, there is some limited support for the transaction costs theories of trade credit. Wilson and Summers (2002), for example, find that firms whose buyers order more frequently offer longer credit periods, verifying the idea that trade credit can be used to reduce the transaction costs of paying bills. Also, models that explain trade credit as a means for customers to inspect product quality before paying and, thus, reducing the transaction costs of concluding sales deals, have been empirically validated. Long *et al.* (1993), for instance, find that smaller firms and firms fabricating products whose quality requires longer time to assess extend more credit relative to sales.

The above results stem from examining established –large or small[2] – firms. It is unclear to what extent these conclusions generalize to newly founded entrepreneurial ventures. For new firms in traditional industries, the external financing sources usually are limited and mainly consist of bank loans and commercial debt.[3] Furthermore, these papers investigate the cross-sectional determinants of the size of accounts payable (accounts receivable) relative to other financing sources. Not surprisingly, Petersen and Rajan (1997) claim that the single most important challenge for future research is to examine the determinants of trade credit use over time. Time series data on newly founded entrepreneurial ventures are very suitable to study the latter research question. Indeed, start-ups have some unique features at the moment of start-up, which fade away over time. These changing characteristics likely will be reflected in their use of commercial debt.

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[2] Small established firms are examined in Petersen and Rajan (1997) and Wilson and Summers (2002), for example. Long *et al.* (1993) and Deloof and Jegers (1996) analyse large established firms.

[3] Berger and Udell (1998) discuss the sources of financing firms can access according to their age. Typically, venture capital is only available for firms in specific industries, and in Continental Europe, venture capitalists largely finance firms in the growth rather than start-up stage (Ooghe *et al.*, 1991).

Most importantly, business start-ups face high failure rates in the early years of their life. Dun & Bradstreet (1994), for instance, document that approximately 50% of all firms that failed in 1993 did so in the first five years of their existence. Likewise, of all Belgian firms that went bankrupt in 2002, 41.04% was younger than five years. These high failure rates limit start-up access to bank loans, and firms may need to rely on trade credit. However, for firms that survive the start-up stage, banks may provide reasonably priced loans, resulting in a reduced use of trade credit as time goes by. High default risk may also imply that at start-up, entrepreneurs worry about the liquidation of their venture in the event of future financial distress, especially if they value control rights. If suppliers are more lenient than banks towards distressed firms, as argued by Wilner (2000) among others, entrepreneurs may prefer trade credit during the high-default risk years.

A second important feature of newly created firms is that they have no history and, thus, no established relationships with suppliers. During their first few years, start-ups could therefore use the credit period to inspect product quality before paying. As the supplier-buyer relationship gradually develops, firms may be more inclined to rely on supplier reputation and no longer need to verify the quality of supplies. The above discussion shows that many theories of trade credit financing have dynamic implications, which distinctly manifest in the case of business start-ups. An important issue in trade credit research therefore is to examine the determinants of commercial debt use over time. Our study is the first to examine these dynamics using unique panel data on 328 entrepreneurial ventures that are newly established in 1992 and followed during a period of ten years after start-up.

The results of our study show that financial constraints increase trade credit use. Specifically, start-ups with low internal cash generation rely more on commercial debt. Simultaneously, firms that pay a higher price for their bank debt borrow more from

suppliers, especially when the industry is growing. Next, the results suggest that suppliers may have an advantage in financing high-risk start-ups. On the one hand, when default risk is substantial and inventories are frequently replaced or mainly consist of raw materials, start-ups use more trade credit, ceteris paribus. Repeated ordering allows suppliers to collect more timely information on customer creditworthiness whereas slowly processed inventories increase the collateral value of delivered goods. Both features are valuable with high-risk buyers and our results indicate that they lead to a financing advantage for suppliers. Interestingly, the positive relation between the turnover of raw materials and accounts payable decreases when high-risk start-ups grow older, indicating that the information advantage of suppliers over banks decreases as start-ups mature. On the other hand, when the industry is highly concentrated and thus the supplier's opportunities to control buyers are limited, high-risk start-ups have lower accounts payable. Finally, when ownership is concentrated in the hands of the entrepreneur, firms borrow more from their suppliers. This finding is consistent with the argument that suppliers are relatively lenient towards firms in financial distress, which is treasured especially by entrepreneurs who value control rights. As firms age, the positive relation between ownership structure and accounts payable weakens, which presumably reflects the entrepreneur's increasing confidence in the firm's survival chances.

Also, the transaction costs theories of trade credit are supported empirically. On the one hand, in industries with high raw materials' turnover rates, start-ups use trade credit more extensively. This relation suggests that trade credit can be used to reduce the transaction costs of paying bills. On the other hand, in industries with high investments in intangible assets, where quality of input goods could be crucial, firms have higher accounts payable. Furthermore, the results indicate that the positive relation between product quality and accounts payable decreases as firms grow older. We interpret this result as evidence

that supplier reputation and relationships can substitute for trade credit as a signal of product quality.

The remainder of the article is organized as follows. In Section 2, we discuss the main theories of trade credit financing and argue how these may affect the funding of business start-ups, at the time of start-up and during the years thereafter. In Section 3, we describe the data. Section 4 empirically examines the determinants and dynamics of trade credit use by entrepreneurial start-ups. Section 5 offers our conclusions.

2. THEORY AND TESTABLE IMPLICATIONS

The early academic literature on commercial debt argues that trade credit is extended by unsophisticated market participants, who consider it as a means to secure sales. More recent theories stress that suppliers may have an advantage in financing high-risk buyers and that entrepreneurs with large private benefits of control may favor commercial debt financing. Simultaneously, others have argued that trade credit can help to reduce the transaction costs of the sales' cycle. Below, we briefly review these theories and investigate how their validity may be affected by firm age; the testable hypotheses are summarized in Table 1. In this discussion, we recognize that accounts payable are the result of both the supply and the demand for trade credit.

(i) Financial constraints and price discrimination theory of trade credit

The credit terms that are offered by suppliers affect the effective price of their goods and services.[4] For instance, when suppliers lengthen the net period, they essentially offer firms an interest-free loan, which reduces the present value of the price that customers pay. Likewise, a higher discount for early payment decreases the price of goods and services for

[4] Wilson and Summers (2002) point out that allowing buyers to pay late without penalty also influences the effective price that customers pay.

buyers that pay fast. Suppliers thus could use trade credit as a way to price discriminate, especially when direct discrimination through prices is impossible (e.g., Brennan *et al.*, 1988; Mian and Smith, 1992). Yet, while suppliers do have the option to decide whether or not to offer payment delay to their customers, price discrimination regulation usually forbids that credit terms be tuned to specific buyers. In Europe, the European Treaty allows firms whose competitive position is harmed by price discrimination, whether explicit or implicit, to file a lawsuit; similarly, in the U.S. the Robinson-Patman Act literally forbids price discrimination through credit terms. Suppliers thus are legally constrained in varying their credit terms across customers. This restriction may help to explain the limited variability of credit terms within industries as observed by Ng *et al.* (1999) among others.

Even with fixed credit terms, suppliers could still use commercial debt to boost sales, provided that it reduces the effective price of goods and services for price sensitive firms. The price elasticity of demand is likely to be high especially for financially constrained buyers. When suppliers now determine credit terms such that taking up trade credit is costly, financially constrained firms may still use it (as other sources of financing can be assumed to have an infinite implicit cost) whereas non-constrained firms will consider commercial debt to be too costly. Setting a relatively high price for trade credit, which is consistent with the empirical literature, thus may allow suppliers to price discriminate without violating the regulation. Brennan *et al.* (1988) claim that suppliers may have an incentive to price discriminate especially when competition in the input market is low.

The above arguments thus conjecture that suppliers may use trade credit terms to price discriminate and that buyers will use the extended credit only when they are financially constrained. Start-ups typically face significant financial constraints. Laitinen

(1994), for instance, confirms that the initial cash generation of start-ups is highly uncertain and often negative, such that their internal sources of financing are limited. Also, Huyghebaert and Van de Gucht (2002) find that banks finance a smaller portion of assets and operations for newly established firms in industries with high historical start-up failure rates. As a result, start-ups with limited internal cash production (EBITDA/ASSETS) and start-ups that pay a higher price for their bank debt (COST OF BANK DEBT = spread between the interest rate on bank loans and the risk-free rate) may rely more on trade credit. Based upon the price discrimination argument, we expect this relation between financial constraints and accounts payable to be stronger when competition in the input market is low. Following Symeonidis (2003), high-growth industries (IND SALES GROWTH = average sales growth rate over 1992-2002 in the corresponding four-digit NACE industry) are considered to be less competitive. Once firms grow older, they presumably will generate positive and more stable cash flows and obtain access to reasonably priced bank loans. These features will be reflected in the value of the variables EBITDA/ASSETS and COST OF BANK DEBT. However, firms may no longer use the (costly) trade credit extended by suppliers in order to price discriminate between cash and credit customers when financial constraints decrease over time.

(ii) Financing advantage theories of trade credit

Some theories of trade credit financing suggest that suppliers may be better able to evaluate and control the credit risk of their customers than specialized financial institutions, such as banks. As a result, it may be optimal for banks to indirectly finance firms with high credit risk by funding their suppliers (e.g., Schwartz, 1974; Emery, 1984). At least three sources for the financing advantage of suppliers regarding high-risk firms have been identified in the literature. This paper is the first to also empirically differentiate between them.

First, suppliers may have an advantage in information acquisition: they can observe the size and timing of orders, the ability of firms to take advantage of early payment discounts, etc. (e.g., Smith, 1987; Biais and Gollier, 1997). Even though banks can collect similar information via transactions accounts, Petersen and Rajan (1997) argue that suppliers are likely to obtain the information in a faster and cheaper way since it is obtained in the normal course of business. In addition, we argue that because of the very short-term nature of trade credit, suppliers have the ability to react faster when adverse information emerges whereas banks may have to await actual default. Overall, this information advantage of suppliers is likely to hold especially when high-risk customers regularly replace their inventories of raw materials, i.e. when raw materials have a high turnover rate (IND INVENTORY TURNOVER = average raw materials' turnover rate over 1992-2002 in the corresponding four-digit industry). Then, information on customer creditworthiness will be regularly updated, allowing suppliers to adjust their credit policy.

Second, suppliers may have an advantage in controlling high-risk buyers. If a buyer has few alternative sources other than the supplier, the latter could credibly threat to cut off future supplies once the buyer does not respect credit terms. Banks, in contrast, may be constrained by bankruptcy laws to withdraw financing (e.g., Petersen and Rajan, 1997). A supplier's power to control buyers will be larger for customers that are not vital to the supplier's survival. Business start-ups typically are small-scaled firms and therefore account only for a small portion of the supplier's sales.[5] However, in industries with just a few large buyers, suppliers are likely to welcome the start-up of a new firm as it may help them to become less dependent on a limited number of large customers. Wilner (2000), for example, documents that suppliers who desire to maintain an enduring product market relationship grant more concessions to distressed customers. Hence, in highly concentrated

[5] When the supplier has made a specific investment in the buyer, his power to control the buyer will be lower. Since the business start-ups in our sample are true entrepreneurial start-ups without history, these sunk costs are unlikely.

industries (IND CONCENTRATION = percentage of industry sales that are accounted for by the largest four firms in the corresponding four-digit industry in 1992), the supplier's willingness to restrain start-ups that do not respect credit terms could be lower, which is likely to result in a lower supplier financing advantage.

Third, it is often argued that in case of non-payment, suppliers can seize unpaid supplied goods. Since suppliers usually are able to resell these goods to other customers, they will place a higher value on them and, therefore, have an advantage in extending credit to high-risk firms compared to banks (e.g., Mian and Smith, 1992). The Belgian institutional framework, however, limits suppliers' rights to reclaim their unpaid goods. Only when goods have not been resold or transformed, the unpaid supplier of moveable property has a legal privilege to the goods delivered. As a result, when goods are only slowly consumed in the production process (IND INVENTORY MIX = average fraction of raw materials to total inventories over 1992-2002in the corresponding four-digit industry), they have more collateral value to the supplier and the higher the financing advantage of the supplier.

Overall, the financing advantage of suppliers is likely to hold especially when failure risk (FAILURE RATE = historical start-up failure rate in the corresponding four-digit NACE industry, measured over 1988-1991) is high. Under these circumstances, the possibility of collecting information on payment behavior, controlling the buyer and/or selling repossessed assets is most valuable. We therefore interact each of the three above-discussed variables with FAILURE RATE. Next, we expect suppliers to have an advantage in financing risky buyers especially at the time of start-up. As start-ups survive the initial stage, they will find it easier to obtain correctly priced bank loans, curbing the financing advantage of suppliers regarding high-risk firms.

(iii) Private benefits of control theory of trade credit

Wilner (2000) argues that trade creditors are likely to grant more concessions in debt renegotiations than credit market lenders. The reason is that suppliers are more dependent on their customers, particularly when these generate a large percentage of supplier profits. A similar point is made by Petersen and Rajan (1997), who argue that it is the prospect of future profits that makes suppliers tolerant towards firms that cannot repay their trade credit. Then, suppliers may be lenient even towards small-scale start-ups.

Huyghebaert *et al.* (2001) investigate the implications of these arguments for entrepreneurs who choose between bank debt and trade credit to finance their venture. Their model shows that compared to banks, suppliers adopt a more lenient liquidation policy for firms in financial distress but charge a higher price for their credit. As a result, entrepreneurs trade off the lower price of bank debt against the stricter bank liquidation policy. Especially entrepreneurs who value private benefits of control borrow more from their suppliers to prevent defaulting on their bank debt. These control rents are defined as the various non-pecuniary benefits associated with entrepreneurship. Following Demsetz and Lehn (1985), private benefits of control are proxied by the percentage of ownership in the hands of the entrepreneur at the time of start-up (OWNERSHIP CONCENTRATION). However, as the firm matures, entrepreneurs may become more confident in their firm's survival chances and reduce their use of costly commercial debt.

(iv) Transaction costs theories of trade credit

Trade credit may reduce the transaction costs of paying bills, as argued by Ferris (1981). Instead of paying bills every time goods are delivered, firms may centralize payments at the end of each month or quarter and use trade credit to bridge the period between purchase and payment. These transaction costs are likely to be important especially for firms with

high raw materials' turnover rates (IND INVENTORY TURNOVER). Firm age is unlikely to affect this theory of trade credit use as it is the frequency by which inventories are replaced that determines transaction costs.[6]

Next, suppliers may extend trade credit to provide a signal of their confidence in product quality (e.g., Smith, 1987; Maksimovic and Titman, 1991; Long *et al.*, 1993). Buyers can then inspect the delivered goods during the credit period to verify their quality before paying. In this manner, trade credit can help to reduce the transaction costs of concluding sales deals. Even though suppliers may have established a reputation for quality with their long-lasting customers, we argue that business start-ups may find it hard to rely on that reputation. Specifically, when suppliers anticipate that a lot of newly founded firms do not survive, they could use start-ups as an outlet for their lower quality products without affecting their reputation with established customers. By providing credit, suppliers can help to reduce start-up concerns about product quality. Start-ups then are likely to take up the offered trade credit when product quality is important but high-quality supplies cannot be easily identified in advance. Deloof and Jegers (1996) argue that firms investing more in intangible assets (IND INTANGIBLES/ASSETS = average of intangible assets to total assets over 1992-2002 in the corresponding four-digit NACE industry) can be expected to produce high-tech goods, for which quality is important but difficult to ascertain.

This possibility of inspecting delivered goods will be valued especially during the first years after start-up, when firms have not yet established a relationship with their suppliers. However, as supplier-customer relationships are being developed, suppliers may no longer need to provide trade credit and/or buyers may find it less necessary to raise it in

[6] Another version of this transaction costs argument is that with seasonalities in purchases and sales, firms may use trade credit to facilitate their cash management. By delaying payments when sales are low, firms may still be able to finance cash outlays with internally generated resources. In this way the transaction costs of contracting alternative (short-term) financing can be avoided. Again, this argument is unlikely to depend on firm age. Unfortunately, since our database only includes annual data, we are unable to test it.

order to examine product quality. The reason is that reputation and non-salvageable investments made by the supplier are likely to reduce start-ups' concerns about product quality. This argument builds on Diamond's (1989) conclusion that reputation engenders a threshold for opportunistic behavior. As a result, we expect the product quality argument to become less important as a determinant of trade credit use over the life cycle.

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3. SAMPLE SELECTION AND DESCRIPTION

We examine the theoretical predictions of the previous section using panel data on 328 business start-ups. Little research has been done on newly established entrepreneurial firms, simply because the data are not readily available. For the U.S., the Federal Reserve Board's National Survey of Small Business Finances (NSSBF) provides financial information on 4,637 privately held firms, but Ang *et al.* (2000) report that mean firm age in this database is 17.6 years. As a result, NSSBF is not representative for start-up firms. Furthermore, the database does not include panel data and, therefore, theories that pertain to the time series nature of trade credit cannot be tested (Petersen and Rajan, 1997).

In Belgium, all limited liability firms – except for financial institutions, insurance companies, exchange brokers and hospitals – are legally required to file annual accounts with the National Bank as of start-up. The accounting principles that are applicable in Belgium are comparable to those of the Anglo-Saxon world (see, for instance, Deloof and Jegers, 1999). In 2001, nearly 270,000 companies submitted their financial statements, covering more than 75% of GNP. In addition, these firms have to publish an abstract from their foundation charter in the Government Newspaper (*Staatsblad*) shortly after start-up. Each firm receives a unique and chronologically accorded Value Added Tax number the

first time it registers with the tax authorities. This VAT number allowed us to identify newly established firms and their financial statements as of start-up in the database of the National Bank, now also commercialized by Bureau Van Dijk Electronic Publishing.

We identified 652 limited liability firms that were founded in 1992 in manufacturing. This industry was selected because of its larger scale of operations, at least when compared to retailers, wholesalers or service firms. Entrepreneurs in this sector therefore are more likely to lack the personal financial resources to fully finance all assets and operations at start-up. To be included in the sample, firms had to report their industry code, i.e. the European NACE code, at the four-digit level. All firms in the sample are narrowly focused and report only one four-digit NACE code.

This sample was subsequently cleaned to remove all firms that were not entrepreneurial start-ups. Using the foundation charter, true business start-ups could be distinguished from newly established subsidiaries of existing firms, split-ups, spin-offs, etc. Firms arising from the incorporation of a previously self-employed activity, identified through follow-up phone calls, were also removed from the sample. Our sample thus only includes firms that are first-time start-ups, which have no history or relationships with banks and suppliers. These screening criteria reduced the sample to 328 true business start-ups, spread over 97 manufacturing industries based on their four-digit NACE code. Also, the first year of data in our database truly represents the firm's start-up year. Table 2 describes the industry distribution of the sample firms, based on their two-digit NACE code. The firms are highly represented in the paper, printing and publishing industry (98 firms); the food, drink and tobacco industry (51 firms); and the timber and wooden furniture industry (35 firms).

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The data include the financial statements from the first accounting year until 2002, resulting in 2,682 firm-year observations. Since a number of firms were discontinued before 2002, the panel is unbalanced.[7] We also have access to the annual accounts of all incumbent firms in each of the corresponding 97 four-digit NACE industries over the window 1992-2002. These data are used to calculate the industry level proxy variables.[8] Information on ownership structure at start-up is collected from the foundation charter. The start-up team on average involves 2.42 entrepreneurs. The average firm employs 2.82 persons in the start-up year and its total assets amount to € 244,175 (median of € 102,269). Table 3 reports some descriptive statistics on asset and financial structure, profitability and growth when observations are sorted out according to age. By the end of 2002, 77 firms (23.48%) have discontinued their operations: 48 because of bankruptcy, 26 were liquidated voluntarily and 3 firms were taken over.

The relation between the median liquid to total assets ratio and firm age essentially is U-shaped. Liquid assets are minimal at the age of four (median of 3.69%), but increase to 6.80% by the age of ten. A reverse pattern more or less holds for the median investment in inventories, which are maximal when firms age four (6.93%). As far as investments in tangible fixed assets are concerned, we find no clear pattern. However, ten years old firms have a significantly lower fraction of assets invested in property, plant and equipment than at start-up (30.14% versus 38.57%), which could be due to depreciation. These conclusions are not affected when the analyses are limited to firms that survive the sampling period.

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[7] Furthermore, at the time the data were most recently updated (October 2003), the DVD of Bureau Van Dijk contained the 2002 accounts of 201 firms, which may not be the entire sample of firms surviving in 2002. The reason is that financial statements can be filed up to seven months after the closing date (usually December, 31). Besides, the process of entering paper annual accounts into the electronic database also consumes time. However, since we have the 2002 accounts of more than 82% of the firms surviving in 2001, biases are unlikely.

[8] We decided to calculate some of the proxy variables at the four-digit industry level since firm level values may be affected by the firm's success/failure, which could result in spurious conclusions. For instance, firms that are highly successful are likely to have high inventory turnover rates and high financing needs.

At the time of start-up, debt on average represents 73.80% of total assets (median of 79.31%). The average debt ratio increases during the first years after start-up and reaches a maximum by the age of seven (129.70%). In contrast, the median debt ratio decreases over time albeit the pattern is not monotonic in firm age. The reason for this conflicting movement is due to a number of distressed firms that accumulate losses before they eventually are liquidated, which have a substantial influence on the average debt ratio. Accounts payable on average represent 21.79% of total assets in the start-up year (median of 17.12%). This percentage is high compared to earlier figures reported for established firms. Petersen and Rajan (1997), for instance, show a median ratio of accounts payable to total assets of 9.95% for industrial firms whereas Fisman and Love (2003) report 8.8%. For Belgian industrial firms older than ten years, by contrast, accounts payable on average represent 15.28% of total assets in 1993.[9] These numbers illustrate the importance of trade credit in Belgium, which is used even more extensively by start-ups compared to more established firms.[10] Table 3 also shows that there is a tendency for trade credit use to decrease as firms grow older, but this pattern again is not monotonic in firm age. By the age of ten, average accounts payable represent 18.91% of total assets (median of 14.58%).

Cash generation (EBITDA to total assets) is relatively low in the first year (median of 12.81%), but during the years thereafter the median fluctuates closely around 17%. Overall, mean and median growth in total assets vary significantly over time, which suggests that growth occurs in shocks. The low growth figures at the age of ten presumably are due to the bad economic conditions in 2002.

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[9] Deloof and Jegers (1999) report a much higher ratio of accounts payable to total assets in their sample of 661 large Belgian firms (average of 27.9%; median of 22.5%). However, more than one third of their sample are distribution firms, which typically have higher accounts payable than industrial firms. More importantly, they report that most of the firms they examine are affiliated with other companies, which is likely to boost interfirm credit (see for instance Deloof and Jegers, 1996).

[10] Fisman and Love (2003) document that trade credit financing is inversely related to financial market development, which could explain the high importance of accounts payable in Belgium. Jegers and Deloof (1999) report that in November 1995, Belgian total stock market capitalization amounted to 44% of GDP, compared to 93% for the U.S. and 130% for the U.K.

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4. THE USE OF TRADE CREDIT

(i) Variables

In this study we wish to examine why start-ups use trade credit and how trade credit use varies over the life cycle. Similarly to Petersen and Rajan (1997), Deloof and Jegers (1999), Fisman and Love (2003) and others, the dependent variable in our study is accounts payable over total assets.[11] However, as the level of accounts payable is the result of both the supply and the demand for trade credit, we recognize in the discussion of our results that we are only able to estimate reduced-form coefficients, which include both effects. Next, Ng *et al.* (1999) document that credit terms vary widely across industries, but have only limited variation within industries. These findings support the idea that a firm's industry is an important determinant of offered credit terms. To control for other than the above-discussed determinants of trade credit, we construct industry dummy variables at the two-digit NACE level.[12] Only when the industry contains five start-ups is the corresponding dummy variable included in the regressions (the parameter estimates for the 13 dummy variables are not reported).[13] Consistent with the discussion above, the explanatory variables are grouped into four categories: (1) financial constraints and price

[11] When the ratio of accounts payable to total liabilities is used as an alternative dependent variable, we find that the results – which can be obtained from the author upon request – are very similar, even tough the latter model has somewhat less power (lower adjusted R-square). The correlation between these two measures of trade credit use amounts to 0.7607.

[12] Petersen and Rajan (1997) also follow this approach, but construct industry dummy variables based on one-digit SIC codes. Simultaneously, they include purchases on account, calculated as the percentage of purchases made on account times the firm's costs of goods sold, to control for the supply of trade credit. Unfortunately, under Belgian accounting legislation firms are not required to report this information.

[13] Since firms in industries with less than five start-ups may differ significantly from one another, we have re-estimated the models after removing these firms from the sample (and including only 12 industry dummy variables). We find that our conclusions are robust; the results can be obtained upon request.

discrimination, (2) financing advantage, (3) private benefits of control and (4) transaction costs.

Following Petersen and Rajan (1997), we control for FIRM AGE under the form log(1+age) and FIRM SIZE, using the logarithm of total assets. In addition, we include the start-up's ratio of tangible fixed assets to total assets as these assets can easily serve as security for bank loans. Rajan and Zingales (1995), for instance, find that asset tangibility and debt ratios are significantly positively correlated for listed firms. Start-ups whose assets are highly tangible, therefore, are likely to have easier access to bank debt, which could reduce their demand for trade credit. For fast growing start-ups, the magnitude of operations may be difficult to predict. So, we include the firm's total assets growth rate (ASSET GROWTH) and expect it to positively affect accounts payable.[14] For the same reason, we control for business cycle effects, measured by last year's real GNP growth (GNP GROWTH). To eliminate outliers, all explanatory variables are winsorized at 5%-95% (see Tuckey, 1962).

(ii) Determinants of trade credit use

We start our discussion with the results from pooled ordinary least squares estimation. Table 4, column one shows that internal cash generation significantly negatively affects trade credit use during the first ten years after start-up. Also, start-ups that pay a higher price for their bank debt increase their reliance on commercial debt. Together, these results support the argument that trade credit is a costly source of financing that is used more extensively when firms are financially constrained, both internally (EBITDA/ASSETS) and externally (COST OF BANK DEBT). Next, we find that for buyers in high-growth

[14] We recognize that sales growth is a better measure, but only large firms are required to report sales under Belgian accounting legislation. To qualify as large, firms must satisfy two out of three of the following criteria: total assets of € 3,125,000, sales of € 6,255,000 and 50 employees. Firms employing more than 100 people are always deemed large under Belgian accounting legislation.

industries (IND SALES GROWTH), where input market competition likely is lower, the cost of bank debt even has a significantly greater impact on accounts payable. The latter finding is consistent with the price discrimination motive for offering trade credit; when buyers are financially constrained, as measured by the cost of their bank debt, they will use the extended trade credit. Nevertheless, we consider the latter conclusion as tentative since suppliers may also hold a larger implicit equity stake in firms with favorable growth prospects. Further research therefore is needed to investigate this relation in more detail.

Next, the financing advantage theories of suppliers regarding high-risk firms are widely supported by the data. First, in industries with a high start-up failure rate, firms borrow more from their suppliers when raw materials are frequently replaced. This result refines the conclusion of Wilson and Summers (2002) that suppliers are better placed to assess buyer risk and have lower collection costs than financial institutions; our findings suggest that suppliers have an information advantage particularly for buyers that place frequent orders. If this advantage results in a larger supply of commercial debt, high-risk start-ups, which have only limited access to bank debt, will gladly accept the offered trade credit. Second, we find that in highly concentrated industries, start-ups that are more likely to fail are financed less by their suppliers. In concentrated industries, suppliers may be more dependent on individual customers such that their ability to control/restrain high-risk buyers is reduced. Specifically, when a buyer could be an important source of future business, suppliers will be inclined to (continue to) provide credit to capture this business, even when the buyer does not respect credit terms. Suppliers may insure themselves against this risk by limiting their trade credit supply in advance, particularly in industries where start-ups face higher odds of becoming financially distressed. Third, in industries where inventories largely consist of raw materials, risky start-ups borrow more from their suppliers. When raw materials are only slowly consumed in the production process,

suppliers will consider the collateral value of their supplies to be higher. This could provide them with an advantage in financing high-risk firms, from which buyers that can hardly access bank debt may benefit. Finally, note that IND FAILURE RATE is significantly negatively related to accounts payable, ceteris paribus. This result seems hard to explain, knowing that high-risk start-ups are financed less by banks (e.g., Huyghebaert and Van de Gucht, 2002) and therefore may have a higher demand for trade credit. However, the negative relation likely reflects that suppliers too are less willing to provide credit to high-risk start-ups *unless* they can mitigate problems via information collection, controlling buyers and/or repossessing goods in the event of default.

When ownership is highly concentrated in the hands of the entrepreneur, start-ups use trade credit more extensively. This finding is consistent with the argument that suppliers are more lenient than banks towards financially distressed firms, which is valued especially by entrepreneurs with substantial private benefits of control as measured by their ownership in the firm.

We find evidence that transaction costs affect accounts payable outstanding. First, start-ups in industries with a higher turnover of raw materials (IND INVENTORY TURNOVER) borrow more from their suppliers. Since firms that frequently replace their inventories face higher transaction costs of paying bills, this finding suggests that buyers centralize payments and use the extended commercial debt to bridge the era between purchase and payment. Also, in industries where investments in intangible assets are important (IND INTANGIBLES/ASSETS), firms use trade credit more extensively. As industries with large investments in intangible assets can be expected to produce highly specialized, technical products, this relation supports the product quality motive behind extending and using trade credit.

The results further show that age reduces trade credit use; the coefficient for FIRM AGE (–0.0357) is statistically significant at the 1% level. Moreover, age is an economically significant determinant of accounts payable: when firms have reached the age of ten, their use of trade credit relative to total assets has decreased by an absolute 8.56%, ceteris paribus.[15] This negative relation, however, conflicts with the results found by Petersen and Rajan (1997), who examine small but established firms. For start-ups, it may reflect a decreasing need for external financing and/or increasing access to other financing sources as firms grow older and investments stabilize. Consistent with Petersen and Rajan (1997), FIRM SIZE is significantly positively related to the ratio of accounts payable to total assets. Tangible fixed assets significantly reduce the reliance on trade credit. A negative relation is as expected since firms with assets that can be easily pledged as collateral likely will find it easier to raise reasonably priced bank debt. Finally, and consistent with the literature, firms use trade credit more extensively during years of high growth, both when measured at the firm level (ASSET GROWTH) and captured economy-wide (GNP GROWTH).

In order to further investigate the relation between firm age and accounts payable, we construct age dummy variables. We use the start-up year as the reference age category in the ensuing regression analysis, whose results are reported in column two of Table 4. The analysis reveals that accounts payable are more or less monotonic decreasing in firm age. From the age of seven onwards, trade credit use is significantly lower than during the start-up year. Finally, the model has a somewhat lower adjusted R-square (31.38%) compared to that in column one (31.44%), which justifies our specification of the aging pattern in column one.

[15] This percentage is calculated as –0.0357 * [ln (1+10) – ln(1+0)].

In column three, we report pooled OLS regression results when the model is estimated solely on the subsample of non-failing firms, i.e. the firms that did not go bankrupt nor were liquidated voluntarily during the sampling period. Since financially distressed firms are likely to stretch their payments as long as possible, we expected these firms to introduce noise in the regressions. Indeed, the adjusted R-square of the model when solely estimated on the non-failing firms increases to 34.90% (compared to 31.44% in column one). Interestingly, all above-documented relations are robust, except for the interaction term FAILURE RATE * IND INVENTORY TURNOVER, which is no longer statistically significant in column three. Given that we control for industry effects in all regressions, this finding likely indicates that especially the firms that eventually failed have been able to benefit from the information advantage that suppliers have when raw materials are frequently replaced. As a result, suppliers have more extensively financed these firms.

OLS estimation may produce biased and inconsistent results owing to its failure to control for time-invariant firm-specific heterogeneity. This problem will occur when the disturbance term incorporates time-invariant omitted factors that are contemporaneously correlated with the model's explanatory variables. We therefore re-estimated our models using random effects panel estimation; the results are reported in columns four to six of Table 4. Baltagi (2001) argues that the random effects model is an appropriate specification if the cross-sectional observations (i.e., the 328 start-ups) are randomly drawn from a large population. Furthermore, since some of the explanatory variables in our models are time-invariant, we are unable to include firm-level dummy variables (fixed effects panel estimation). Nevertheless, the computed Hausman statistic rejects random effects in favor of fixed effects, but only when the impact of age is measured continuously ($m = 17.2170$ with a p-value of 0.0279), not when it is specified by means of dummy variables ($m = 20.2927$ with a p-value of 0.2595). Overall, the results in column four to six

show that for some variables, statistical significance is reduced but still exceeds the 10% level. The only exception occurs for the variable FAILURE RATE * IND INVENTORY TURNOVER, which we attribute to the fact that firms with only one year of data are not incorporated in the estimations. These firms basically are the ones that discontinue operations because of financial distress. Column three already showed that within the subsample of non-failing firms, this interaction term is no longer significant. Finally, note that the explanatory power of the models is lower under random effects panel estimation than under pooled OLS estimation (adjusted R-square of 19.13% in column four, for example).

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insert Table 4
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(iii) Dynamics of trade credit use

In this section, we investigate the dynamics of trade credit use in more detail using pooled OLS estimation. For this purpose, we interact the variables that represent the various determinants of accounts payable with FIRM AGE. To minimize the problem of multicollinearity, we separately test the impact of age for each of the four groups of explanatory variables. The results are presented in Table 5.

Table 5, column one shows that age does not affect the positive relation between the cost of bank debt and the industry sales growth rate on the one hand and the use of trade credit on the other hand. So, start-ups paying a relatively high price for their bank debt continue to use trade credit more extensively when the industry is growing, independent of their age.

The results in column two reveal that age has only a limited impact on the relation between trade credit use and the variables that represent the various sources of a supplier financing advantage. Indeed, only the impact of FAILURE RATE * IND INVENTORY TURNOVER becomes smaller when start-ups mature. From this result, we can conclude that the information advantage of suppliers resulting from repeated ordering is particularly important at the time of start-up, but decreases as firms grow older.[16] When more information can be accessed as firms age, suppliers may lose their information advantage. We have already explained that the firms in our sample make their annual accounts publicly available via the Belgian National Bank. Also, a special institute, called the *Risicocentrale*, collects directly from banks information on the firm's outstanding loans, such as the amount and types of credits with payment arrears; this information can be consulted by banks in new loan applications. The advantage of suppliers in controlling high-risk buyers and selling repossessed goods after default, however, are not significantly affected by firm age.

Column three in Table 5 shows that the positive relation between ownership concentration and accounts payable is significantly negatively affected by firm age.[17] This finding might reflect that entrepreneurs become more confident in their venture's survival chances and, therefore, reduce their reliance on costly trade credit financing over the firm's life cycle.

Finally, column four in Table 5 shows that inventory turnover as a determinant of accounts payable is not affected by firm age. This result is not surprising as it is the frequency by which orders are placed that determines the transaction costs of paying bills.

[16] An alternative explanation, that originates from the results in Table 4, might be that this negative relation is driven by the failing firms, on whom we only have data during a limited number of years after start-up. However, when we estimate the model of Table 5, column two on the subsample of non-failing firms, the variable FAILURE RATE * IND INVENTORY TURNOVER * FIRM AGE remains significantly negatively related to accounts payable.

[17] In column three, we had to remove the variable FIRM AGE from the regression model since it was too highly correlated with OWNERSHIP CONCENTRATION * FIRM AGE.

Conversely, start-ups in high-tech industries use less trade credit as they mature, which suggests that product quality becomes less important as a determinant of accounts payable over the life cycle. When buyers and suppliers invest in their relationship as it lasts longer, supplier reputation and non-salvageable investments are likely to substitute for trade credit as a signal of product quality.

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insert Table 5
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5. CONCLUSIONS

In this paper, we provide new evidence on why firms use trade credit from examining the determinants and dynamics of accounts payable using a sample of entrepreneurial business start-ups from 1992, which subsequently are followed during a period of ten years. At the time of start-up, these firms face high default risk and financial constraints are typically large. Also, they have no established relationships with banks and suppliers. We find that these distinct characteristics influence start-up commercial debt use. In addition, we find that trade credit practice reflects the changing features of maturing business start-ups.

Start-ups that are financially constrained, measured by their internal cash production and the price of their bank debt, use more trade credit. This effect is stronger when the industry is growing and suppliers may have an incentive to discriminate between cash and credit customers. Even if suppliers practicing price discrimination drive the latter result, it cannot be interpreted as suppliers are violating the law. Indeed, it may still be the case that suppliers offer equal terms to all customers while especially financially constrained firms actively use the offered credit.

Next, suppliers appear to have an advantage in financing high-risk customers, but only under particular conditions. First, high-risk start-ups use more trade credit when raw

materials are frequently replaced, which supports the idea that, because of repeated contracting, suppliers can regularly update their information on buyer creditworthiness. Second, commercial debt use by risky start-ups is higher when the industry has a low concentration ratio. As suppliers in such industries are unlikely to highly depend on a newly established firm, they may have more opportunities to control high-risk buyers. Third, high-risk start-ups borrow more from their suppliers when inventories largely consist of raw materials, which suggests that slowly processed inventories have a higher collateral value. Up till now, publicly policy dealing with start-up financial constraints has focused on how the equity base of these firms can be improved and on how banks can be spurred to provide credit more eagerly. Our results, however, show that in particular circumstances, suppliers may have an advantage in financing high-risk start-ups. Public policy therefore should be more fine-tuned to take the special role of suppliers in financing start-ups into account.

Private benefits of control also seem to influence trade credit use of entrepreneurial start-ups. In particular, when ownership is highly concentrated in the hands of the entrepreneur, firms borrow more from their suppliers. This result is consistent with the argument that suppliers are more lenient than credit market lenders towards firms in financial distress, a feature that is treasured especially by entrepreneurs who value private benefits of control. Over time, this relation becomes less important, which presumably reflects the entrepreneur's increasing confidence in the firm's survival chances.

Finally, the transaction costs theories of trade credit are supported by the data. On the one hand, start-ups have higher accounts payable when rapid turnover of raw materials is standard industry practice. This relation, which is not affected by firm age, is consistent with the idea that the transaction costs of paying bills can be reduced through payment centralization. On the other hand, in industries with highly specialized, technical products,

where quality of input goods is likely to be important, start-ups borrow more from their suppliers. Not surprisingly, the results indicate that product quality becomes less important as a determinant of trade credit use when firms grow older.

While our research makes a valuable contribution to the literature on trade credit and entrepreneurial financing, it also raises some new questions. Most importantly, the results indicate that not all dynamics are captured and that there may be other reasons why firms reduce their reliance on trade credit as they grow older. Indeed, we find that firm age has an independent negative effect on trade credit use after controlling for the currently available theories of trade credit use. Second, most relations are interpreted as resulting from both supply and demand side effects; more detailed data could help to disentangle these effects, which would allow to more directly test the theoretical arguments. Finally, our conclusions are obtained from pooled OLS and random effects panel estimation, but we find some indication that the model should be re-assessed using fixed effects panel estimation. Unfortunately, our dataset is not suited for these validation estimations.

Table 1: Summary of testable predictions

	Cross-sectional impact	**Time series impact**
Financial constraints and price discrimination		
EBITDA/ASSETS	–	No impact
COST OF BANK DEBT	+	No impact
COST OF BANK DEBT * IND SALES GROWTH	+	–
Financing advantage		
Information advantage of supplier (FAILURE RATE * IND INVENTORY TURNOVER)	+	–
Controlling advantage of suppliers (FAILURE RATE * IND CONCENTRATION)	–	+
Liquidation advantage of suppliers (FAILURE RATE * IND INVENTORY MIX)	+	–
Private benefits of control		
OWNERSHIP CONCENTRATION	+	–
Transaction costs		
Transaction costs of trade cycle (IND INVENTORY TURNOVER)	+	No impact
Quality motive (IND INTANGIBLES/ASSETS)	+	–

Table 2: Industry distribution of start-ups

NACE code	Description	Number of firms
22	Production and preliminary processing of metals	1 firm
23	Extraction of minerals other than metalliferous and energy-producing minerals; peat extraction	1 firm
24	Manufacture of non-metallic mineral products	7 firms
25	Chemical industry	5 firms
31	Manufacture of metal articles (except for mechanical, electrical and instrument engineering and vehicles)	16 firms
32	Mechanical engineering	8 firms
34	Electrical engineering	13 firms
36	Manufacture of other means of transport	4 firms
37	Instrument engineering	15 firms
41/42	Food, drink and tobacco industry	51 firms
43	Textile industry	20 firms
44	Leather and leather goods industry (except footwear and clothing)	4 firms
45	Footwear and clothing industry	26 firms
46	Timber and wooden furniture industries	35 firms
47	Manufacture of paper and paper products; printing and publishing	98 firms
48	Processing of rubber and plastics	6 firms
49	Other manufacturing industries	18 firms
TOTAL		**328 firms**

Table 3: Descriptive statistics on asset structure, financial structure, profitability and growth for the sample of 328 business start-ups, when observations are sorted out according to age

	Age=1	**Age=2**	**Age=3**	**Age=4**	**Age=5**	**Age=6**	**Age=7**	**Age=8**	**Age=9**	**Age=10**
CASH & MARKETABLE SEC./ASSETS										
Mean	0.1295	0.1103	0.1234	0.0914	0.1002	0.1143	0.1331	0.1344	0.1482	0.1558
Median	0.0648	0.0504	0.0399	0.0369	0.0397	0.0502	0.0704	0.0610	0.0634	0.0680
INVENTORIES/ASSETS										
Mean	0.1080	0.1125	0.1486	0.1351	0.1350	0.1260	0.1096	0.1119	0.1078	0.1109
Median	0.0501	0.0512	0.0633	0.0693	0.0679	0.0548	0.0438	0.0523	0.0508	0.0443
TANGIBLE FIXED ASSETS/ASSETS										
Mean	0.3851	0.3834	0.3912	0.3861	0.3715	0.3752	0.3790	0.3546	0.3551	0.3374
Median	0.3857	0.3691	0.3687	0.3712	0.3578	0.3750	0.3755	0.3466	0.3584	0.3014
DEBT/ASSETS										
Mean	0.7380	0.8038	0.8830	0.9138	1.2109	1.0440	1.2970	0.9631	0.7531	0.7262
Median	0.7931	0.8094	0.7939	0.7752	0.7859	0.7723	0.7550	0.7000	0.7115	0.6752
ACCOUNTS PAYABLE/ASSETS										
Mean	0.2179	0.2380	0.2211	0.2245	0.2164	0.2225	0.1988	0.2030	0.1983	0.1891
Median	0.1712	0.1982	0.1784	0.1795	0.1748	0.1801	0.1389	0.1508	0.1518	0.1458
EBITDA/ASSETS										
Mean	0.1140	0.1380	0.1755	0.1610	0.0912	0.1352	0.1849	0.1778	0.1633	0.1379
Median	0.1281	0.1776	0.1819	0.1718	0.1766	0.1802	0.1703	0.1670	0.1650	0.1658
ASSET GROWTH										
Mean	0.0400	0.2228	0.1835	0.1250	0.1423	0.1458	0.1425	0.1294	0.1648	0.1150
Median	0.0263	0.0869	0.1106	0.0590	0.0731	0.0694	0.0630	0.0525	0.0744	0.0017
Number of observations	328	297	294	284	272	265	251	246	244	201

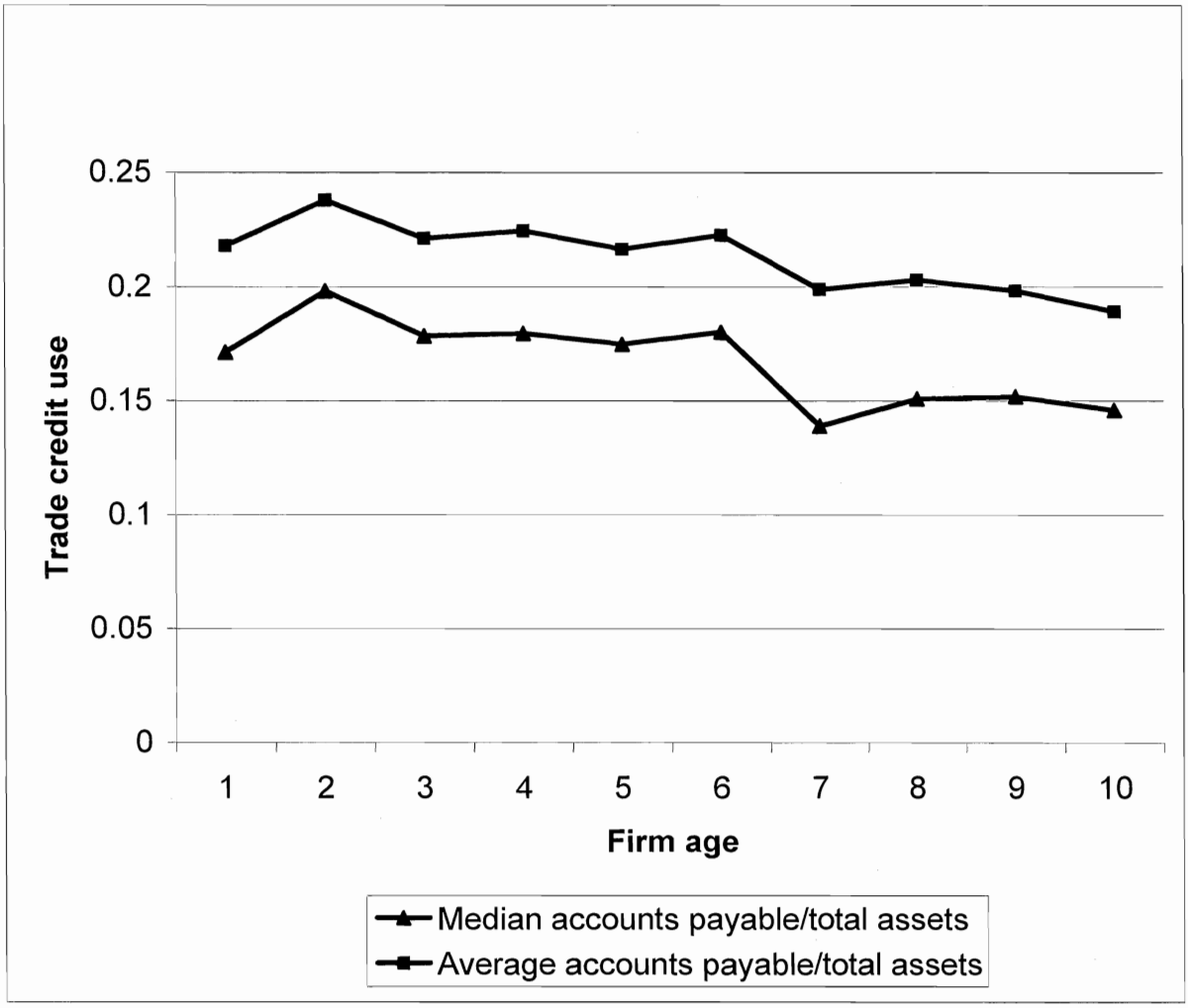
Table 4: Determinants of trade credit use based on panel data of 328 business start-ups over 1992-2002

	Pooled OLS estimation			Panel estimation (random effects)		
	Total sample	**Total sample**	**Non-failing sample**	**Total sample**	**Total sample**	**Non-failing sample**
Constant	−0.1349	−0.1689*	−0.1892**	−0.1188	−0.1430	−0.1293
Financial constraints and price discrimination						
EBITDA/ASSETS	−0.1279***	−0.1299***	−0.1471***	−0.0812***	−0.0846***	−0.1170***
COST OF BANK DEBT	0.4875***	0.4877***	0.4762***	0.4210***	0.4017***	0.3673***
COST OF BANK DEBT * IND SALES GROWTH	0.0139***	0.0140***	0.0128***	0.0142**	0.0149**	0.0158**
Financing advantage						
FAILURE RATE	−1.2310***	−1.2216***	−1.2987***	−1.6693**	−1.6559**	−1.1547*
FAILURE RATE * IND INVENTORY TURNOVER	0.0173***	0.0174***	0.0092	0.0090	0.0090	0.0114
FAILURE RATE * IND CONCENTRATION	−0.0782**	−0.0783**	−0.1447***	−0.1195*	−0.1165*	−0.1931***
FAILURE RATE * IND INVENTORY MIX	1.6644***	1.6430***	2.5532***	2.6268***	2.5849***	2.5113***
Private benefits of control						
OWNERSHIP CONCENTRATION	0.1618*	0.1642*	0.1922**	0.1699*	0.1713*	0.2113*
Transaction costs						
IND INVENTORY TURNOVER	0.0259***	0.0257***	0.0342***	0.0374***	0.0371***	0.0330***
IND INTANGIBLES/ASSETS	0.6494**	0.6272*	1.0794***	0.7569*	0.7380*	0.9547*
Control variables						
FIRM AGE	−0.0357***		−0.0332***	−0.0204***		−0.0170***
AGE=2 DUMMY		−0.0169			−0.0044	
AGE=3 DUMMY		−0.0299			−0.0107	
AGE=4 DUMMY		−0.0221			−0.0023	
AGE=5 DUMMY		−0.0307**			−0.0060	
AGE=6 DUMMY		−0.0259			−0.0108	
AGE=7 DUMMY		−0.0468***			−0.0229*	
AGE=8 DUMMY		−0.0491***			−0.0222*	
AGE=9 DUMMY		−0.0616***			−0.0308**	
AGE=10 DUMMY		−0.0719***			−0.0392***	
FIRM SIZE	0.0273***	0.0277***	0.0268***	0.0204***	0.0220***	0.0132***
TANGIBLE FIXED ASSETS/ASSETS	−0.2262***	−0.2265***	−0.2261***	−0.2010***	−0.2033***	−0.2014***
ASSET GROWTH	0.0743***	0.0741***	0.0691***	0.0662***	0.0640***	0.0687***
GNP GROWTH	0.5068*	0.5532*	0.4358	0.3405*	0.3750*	0.3187
Number of observations	1968	1968	1720	1927	1927	1685
Adjusted R-square	31.44%	31.38%	34.90%	19.13%	19.72%	19.47%

Table 5: Dynamics of trade credit use based on panel data of 328 business start-ups over 1992-2002

	Pooled OLS estimation (Total sample)			
Constant	–0.1367	–0.1575*	–0.1970**	–0.1708*
Financial constraints and price discrimination				
EBITDA/ASSETS	–0.1280***	–0.1273***	–0.1278***	–0.1274***
COST OF BANK DEBT	0.4885***	0.5017***	0.4892***	0.4921***
COST OF BANK DEBT * IND SALES GROWTH	0.0152*	0.0139***	0.0138***	0.0139***
COST OF BANK DEBT * IND SALES GROWTH* FIRM AGE	–0.0008			
Financing advantage				
FAILURE RATE	–1.2315***	–1.3708***	–1.2308***	–1.2248***
FAILURE RATE * IND INVENTORY TURNOVER	0.0173***	0.0511***	0.0173***	0.0176***
FAILURE RATE * IND CONCENTRATION	–0.0780**	–0.1555**	–0.0783**	–0.0786**
FAILURE RATE * IND INVENTORY MIX	1.6640***	2.3328***	1.9951***	1.6563***
FAILURE RATE * IND INVENTORY TURNOVER * FIRM AGE		–0.0214***		
FAILURE RATE * IND CONCENTRATION * FIRM AGE		0.0410		
FAILURE RATE * IND INVENTORY MIX * FIRM AGE		–0.2172		
Private benefits of control				
OWNERSHIP CONCENTRATION	0.1615*	0.1559*	0.2239*	0.1691**
OWNERSHIP CONCENTRATION * FIRM AGE			–0.0356***	
Transaction costs				
IND INVENTORY TURNOVER	0.0259***	0.0300***	0.0259***	0.0336***
IND INTANGIBLES/ASSETS	0.6388**	0.7113**	0.6430**	3.5992***
IND INVENTORY TURNOVER * FIRM AGE				–0.0044
IND INTANGIBLES/ASSETS * FIRM AGE				–1.7177***
Control variables				
FIRM AGE	–0.0345*	–0.0184*		–0.0201**
FIRM SIZE	0.0273***	0.0272***	0.0273***	0.0274***
TANGIBLE FIXED ASSETS/ASSETS	–0.2262***	–0.2258***	–0.2260***	–0.2276***
ASSET GROWTH	0.0741***	0.0743***	0.0744***	0.0746***
GNP GROWTH	0.5072*	0.4923*	0.5026*	0.5050*
Number of observations	1968	1968	1968	1968
Adjusted R-square	31.41%	31.97%	31.43%	31.71%

Figure 1: Trade credit use over the start-up life cycle



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