Zeitschrift für Wirtschafts- u. Sozialwissenschaften (ZWS) 116 (1996), S. 379 - 394
Duncker & Humblot, Berlin

Borrower Information and the Choice between Bank Debt and Trade Credit: The Case of France and Germany*

By Hildegard Breig and Patricia Furlong Wilson**

1. Introduction

Recently, several papers on firms' financing choices have emphasized the influence of asymmetric information between different providers of funds. It has been argued by MacKie-Mason (1990) and others that firms care about the financing source. Different providers of funds have different information and expectations about the firm's quality and thus provide funds at different costs. Most of the papers concentrate on the firms' choice between banks and capital markets as a source of funds (see e.g. Seward 1990, Diamond 1991, Rajan 1992, Besanko and Kanatas 1993, Wilson 1994). Although trade credit has been widely used in several major economies, there has been little analysis about it. Similarly, most international comparisons of corporate finance have focused on differences between bank-oriented and market-oriented financial systems (see e.g. Franks and Mayer 1990, Berglöf 1990, Frankel and Montgomery 1991, Allen 1993). In those studies, France and Germany look quite similar since in both countries banks provide more funds to firms than capital markets do. As has been described by Breig (1994), however, the financial systems of the two countries are quite heterogeneous. In particular, there is a stronger use of trade credit and a greater availability and transferability of borrower information in France. According to the BACH-statistics of the European Commission for the period from 1971 to 1992, trade credit accounted on average for 28.6% of French firms' total liabilities, whereas the corresponding share in Ger-

---

* Verantwortlicher Herausgeber / editor in charge: H. L.

** Earlier versions of the paper have been presented at the North American Summer Meeting of the Econometric Society (Québec City 1994), the European Finance Association Meeting (Brussels 1994), and the Annual Meeting of Gesellschaft für Wirtschafts- und Sozialwissenschaften (Jena 1994). We would like to thank several conference participants, Debra Aron, Michel Dietsch, Hans-Hermann Francke, Hellmuth Milde, Anjan Thakor and an anonymous referee of this journal for valuable comments. Any errors are our own. Financial support from the Deutsche Forschungsgemeinschaft (Breig) is gratefully acknowledged.

many was only 12.6%.[1] Banking regulation in France requires that a lending bank transfers data about its borrower to the central bank which then makes these data available to other banks. In Germany, however, less borrower information is transferred to outside banks (i.e. to banks which are not currently lending to the borrower).

The present paper develops a model to better understand the different proportions of trade credit in France and Germany. When banks obtain information about potential borrowers, they can keep this information and compete with other banks having the same information or they can transfer or 'sell' the information to their current customers. We show that if those customers are suppliers to the borrower, then they can combine this information with their own information and lend the funds. More borrowing is then done through trade credit with the supplier acting as an additional financial intermediary.

In the past, the different use of bank debt and trade credit in France and Germany may have been affected to a large extent by differences in monetary policy. Between 1972 and 1986 the French central bank used credit ceilings as a tool of monetary policy, whereas in Germany bank lending has been liberalized since the sixties. But in early 1987, when French monetary authorities finally abolished credit controls, the relative amount of trade credit in France did not decrease significantly. (In 1986, trade credit accounted for 24.6% of French firms' total liabilities, in 1987 and 1988 the corresponding share was 23.1% and 22.8%, respectively). Thus, it appears that the observed differences in the use of trade credit between the two countries are not totally government-imposed but also the outcome of different credit market environments.

The recent financial literature offers several views about trade credit. First, there is the argument that trade credit is generally costly. Hellwig (1991, p. 55) states "trade creditors do not usually have a comparative advantage in assessing creditworthiness and moreover, in the event of bankruptcy, the rivalry between trade creditors and banks seems to be particularly costly." Petersen and Rajan (1995, pp. 424-426) argue that borrowers use trade credit only as a last resort since the stated terms imply high interest rates.[2] The presumption that trade credit is costly gave rise to explain it

[1] See Commission des Communautés Européennes (1994). The OECD statistics on firms' net increase in liabilities exhibit an even greater difference between the relative use of trade credit in France and Germany (see OECD, 1992). Trade credit appears to be insignificant in Germany. This, however, is an underestimate, since the OECD data for Germany consider only trade credit which is related to exports.

[2] They refer to the 10-2-30 rule which implies an annualized interest rate of 44.6%. However, since most balance sheets have accounts receivable and accounts payable that exhibit substantially longer payment periods, the effective cost of trade credit is much lower.

as a screening or signalling device. Smith (1987) claims that the use of trade credit provides valuable information about default risk to suppliers which have made nonsalvageable investments in buyers. Biais, Gollier and Viala (1994) suggest that trade credit may be more costly for high risk buyers than for low risk buyers which enables the latter to use it as signal of their creditworthiness.

Second, there is the argument that trade credit reflects product market conditions or imperfections. If buyers have market power, sellers may not press for payment on delivery, although their financial condition would require an inflow of cash. Begg and Portes (1993) suggest that many firms give credit because they want to prevent the loss of a major customer. The supplier is not acting as a financial intermediary by choice. Wilner (1994) argues that less financially stable firms prefer trade credit because trade creditors are more lenient if default occurs. Alternatively, if sellers have market power they might offer different trade credit terms as a mechanism for price discrimination. This has been analyzed by Brennan, Maksimovic and Zechner (1988). Lee and Stowe (1993) argue that sellers without reputation may offer trade credit as a strong form of warranty if product quality is unknown to buyers.

Third, it has been argued that in many cases trade credit is an efficient financing source. Greenbaum and Thakor (1994, p. 72) consider trade credit as "a natural complement to trade in non-financial goods and services whenever traders have different degrees of access to capital markets". They suppose that trade credit flows from large and well-rated companies to smaller and less well-known companies. Emery (1987) claims that suppliers can make loans at lower transaction costs than banks since they obtain information about the buyer's creditworthiness in the course of their sales activity. However, it remains a puzzle why trade credit is also offered by small suppliers or why the discount for paying early is often not taken by large buyers.

The present paper combines the notion that borrower information is a by-product of sales activity with the notion that potential lenders combine their information. As has been argued by Sharpe (1990) and others, asymmetric information between a single inside bank and potential lenders enables the former to extract rents. This is because borrowers cannot credibly convey their financial condition to outsiders. We show that combining sufficiently useful but different information of suppliers and outside banks reduces the inside bank's scope for extracting rents and leads to more trade credit. If useful information is not available, then firms benefit from developing multiple bank relationships, since trade credit is too expensive. Thus, the relative use of trade credit versus bank debt may depend on the transfer-

ability of borrower information to outside banks. In our model we describe the interest rate structures and borrowing patterns of firms acting in two different institutional environments where bank lending is not hindered by government-imposed restrictions. The two environments differ only in the availability of borrower information to outside banks. We show that in an environment where borrower information is available to outside banks it can be the case that firms use more trade credit than in an environment where borrower information remains private. For an outside bank with borrower specific information it might be rational to transfer this information to a trade creditor instead of using it for making a loan by itself. By receiving additional information the trade creditor can improve the signal he has learned about his customer's creditworthiness, which allows him to make an 'attractive' loan offer. Thus the availability of borrower information to outside banks may cause these banks to act as brokers of that information and may result in an increase in non-bank lending.

The rest of the paper is organized as follows. Section 2 describes institutional differences between France and Germany, which affect the availability of borrower information to outside banks. Section 3 develops a two-period model and derives the equilibrium loan rate structure and the borrowing patterns. Section 4 discusses the underlying intuition. Finally, section 5 considers the empirical relevance of the results and concludes.

2. The Institutional Environment for Borrower Information in France and Germany

Our analysis is based on a comparison of the availability of borrower information in the two countries. In this section we describe the institutional differences which have implications for a firm's choice between bank debt and trade credit. We focus on the presence of a comprehensive information data base available to all banks in France and the lack of such information in Germany.

2.1 France[3]

The French central bank (Banque de France) maintains files which centralize information about the financial situation of individual firms. Originally, the information was collected in order to approve the quality of bills of exchange offered to the central bank for discount. The information was useful for the central bank's monetary policy in periods, where the rediscount of bills was a major monetary policy instrument. After rediscount opera-

[3] See for the following Banque de France (1989); see also KPMG (1990), p. 13.

tions had disappeared in 1971 the central bank justified the continuing collection of firm-specific data also with informational needs of lending banks. Since then those files have been opened more and more to the whole banking sector. In 1976 the central bank started with computerizing the files and created a data bank, called FIBEN (Fichier Bancaire des Entreprises), which since 1982 has been accessible to all banks via telex. FIBEN contains firm-specific information such as current balance sheets, outstanding bank debt, bank relationships, payment problems and risk ratings of firms. The information is provided by the 'centralisation des risques bancaires et des incidents de paiement', firms' managers and especially banks. A firm (or individual) is included in the data bank if it is of economic importance, has bank debt which has been declared to the 'service central des risques' and/or has substantial unpaid loans. Banks have access to the whole data bank. At the beginning of 1989 the set of firms covered by FIBEN included 96% of all joint-stock companies and 65% of all private limited (liability) companies. In addition, FIBEN included about half a million firm managers.

FIBEN affects the informational environment for bank lending since it changes the distribution of borrower information between inside and outside banks. In particular, it improves the signal which outside banks receive about a borrower's creditworthiness. Our analysis in the following sections provides a rationale why the transfer of information through FIBEN does not result in an increase of bank lending.

2.2 Germany[4]

The German Banking Act of 1961 and its amendment of 1984 regulate the transfer of borrower information as follows. Banks which lend an amount of three millions or more DM[5] to a single borrower have to notify the Deutsche Bundesbank four times a year. If the borrower has received loans of such size from more than one bank, the Bundesbank will inform each bank concerned. The information transferred may indicate only the total amount of bank debt the firm holds and the number of banks involved. Thus, the German Banking Act only ensures that some information is shared between those banks which actually lend to the same borrower. In contrast to France, neither the central bank nor other regulatory authorities make borrower information available to outside banks.[6] Next, we model the relationship between lending and the informational environment.

---

[4] See KPMG (1986), and Bundesgesetzblatt (1985), Teil I, p. 1480.

[5] Until 1992, the minimum amount was one million DM (see Bundesgesetzblatt, 1992, Teil I, p. 2218).

[6] Of course, there are private agencies specializing in gathering data about firms. However, in Germany, those agencies do not obtain useful information from

3. The Model

The formal model consists of two periods and three agents. The agents are the borrower, i.e., the firm, the inside bank(s), and other lenders. Other lenders may include banks or suppliers, i.e., trade creditors. All agents are assumed to be risk neutral. The firm's quality, α, is unknown to all at the beginning. Over the first period, both the inside bank(s) and the firm learn the firm's α. Outsiders learn only a noisy signal about α. They use an estimate, $\alpha_i^s = \alpha + e_i$ where $i = t, b, tb$, for trade creditor, bank, or combined signals respectively. We assume that e_i is distributed uniformly over $(-\bar{e}_i, \bar{e}_i)$ and $E(e_i) = 0$. Outside lenders know that each value in the range (α_i^L, α_i^H), where $\alpha_i^H = \alpha + \bar{e}_i$ and $\alpha_i^L = \alpha - \bar{e}_i$, has an equal probability of being the true α. The error for the combined signal $\bar{e}_{tb}$ is strictly less than the error for either the supplier or the bank. The parameter α is the probability that the firm will succeed in the second period. If the firm succeeds, it will have a positive value greater than $1/\alpha_{\min}$, where $\alpha_{\min}$ is the lowest possible quality level. If the firm fails its value will be zero. The discount rate is assumed to be zero. In the first period, the firm can only borrow from one or more banks; it has no access to other financing. In the second period, the firm can also go to suppliers for loans.

We first consider the loan offers made to a firm by its inside bank and by outside lenders. We then discuss the importance of the level of noise in outside lenders' signals. Specifically we analyze how it changes a firm's ex ante decisions about bank relationships. Finally, we relate this to our understanding of the informational environments in France and Germany.

3.1 Timing of Information and Actions

$t = 0$: There are many firms in the market. The quality of each firm is unknown to everyone, including the firm. Each firm develops a relationship with a single bank or with several banks at a fixed cost F for each bank and develops a relationship with suppliers at no cost.

$t = 1$: Each firm and its bank(s) learn the firm's success probability α. Suppliers learn a noisy signal, $\alpha_t^s \in (\alpha_t^L, \alpha_t^H)$, where $\alpha_t^s = \alpha + e_t$, and outside banks learn a different noisy signal, $\alpha_b^s \in (\alpha_b^L, \alpha_b^H)$, where $\alpha_b^s = \alpha + e_b$. Lenders can share information. The inside bank(s), sup-

---

banks. The German banking secrecy protects data about customers from being transferred to outsiders and thus limits information sharing among banks. In particular, the terms of business prevent banks from sharing data about their customers' balances and borrowings (see Bruchner and Stützle, 1986, p. 113-114).

pliers and outside banks offer loan rates which are a function of the signal, α or α_i^s, and an adjustment factor, δ or δ_i. A lender does not observe the actual loan rates of the other lenders, but does know their loan policies. Each firm borrows one currency unit from the lender giving the best rate. When the rates offered are equal, we assume that the firm borrows from the inside bank.

$t = 2$: Each firm succeeds with probability α and fails with probability $1 - \alpha$. If it succeeds it repays the loan; if it fails it repays nothing.

The timing can be thought of as a two-stage game. The firms move in the first period by choosing whether to borrow from one or more banks. The lenders move in the second stage by choosing the loan offer rates for second period loans. The borrower's move in the second stage is merely to choose the lowest rate.

3.2 Second Period

We first consider the second period problem facing the firm and the lenders because the solution to this problem will determine the actions taken in the first period. We consider the actions of a single borrower because the problem is the same for each borrower. We assume there is a single inside bank and all outside lenders have learned the noisy signal about the borrower's quality parameter, α. We first consider the general case where outside lenders all have the same noisy signal. In order to analyze the loan offers from different lenders, we can state the rates as functions of the quality parameter, α, the signal noise, e_i, and the adjustment factors for the inside bank and the outside lenders, δ and δ_i, so that $R = 1/(\alpha - \delta)$ and $R_i = 1/(\alpha + e_i - \delta_i)$. The borrower simply borrows from the lender offering the lowest rate. The borrower's choice implies that the inside lender makes the loan when the borrower is most undervalued ($e_i \leq \delta_i - \delta$) and the outside lender makes the loan when the borrower is most overvalued ($e_i > \delta_i - \delta$).

Before considering the interactions between lenders holding different information we present the second period rates in a competitive market with all lenders knowing α, and then in a competitive market with all lenders having only the noisy signal. If all lenders know α, then clearly all loan offers are $R = 1/\alpha$ since the loan amount is 1 and the borrower can repay with probability α. If all lenders have only the noisy signal, then they compete in loan rates until the adjustment factor is δ_i^* where δ_i^* satisfies

$$\int_{-\bar{e}_i}^{\bar{e}_i} \left(\frac{1}{\alpha_i^s - \delta_i^*} - \frac{1}{\alpha_i^s - e_i} \right) f(e_i) de_i = 0 \,. \tag{1}$$

Note that because outside lenders make the loans when $e_i > \delta_i - \delta$, then

$$\int_{-\bar{e}_i}^{\bar{e}_i} \left(\frac{1}{\alpha_i^s - \delta_i^*} - \frac{1}{\alpha_i^s - e_i} \right) f(e_i) de_i \geq \int_{\delta_i^* - \delta}^{\bar{e}_i} \left(\frac{1}{\alpha_i^s - \delta_i^*} - \frac{1}{\alpha_i^s - e_i} \right) f(e_i) de_i \,. \tag{2}$$

We can describe the rate set by the outside lenders, given the uniform distribution for e_i and the conjectured inside bank rate, as the solution to the following equation,

$$\int_{\delta_i^* - \delta_c}^{\bar{e}_i} \left(\frac{1}{\alpha_i^s - \delta_i} - \frac{1}{\alpha_i^s - e_i} \right) \frac{1}{2\bar{e}_i} de_i = 0 \,, \tag{3}$$

where δ_c is the conjectured adjustment factor of the inside bank. Note from (3) that the outside lenders' adjustment factor can be described further as it relates to the conjectured inside bank's adjustment factor; δ_i depends negatively on δ_c. This is intuitive because as the inside bank increases its adjustment factor, the probability that the loan is made by the inside bank decreases and the outside lenders face a less severe adverse selection bias. Since the outsiders are competitive, the price of the outside loans decreases, or the outside lenders' adjustment factor decreases. The first lemma characterizes the set of possible adjustment factors for the outside lenders.

Lemma 1 : $\delta_i \in [\delta_i^*, \bar{e}_i)$ where δ_i^* satisfies (1).

Proof: The best the outside lenders can do is to lend to a borrower with probability one. In this case δ_i^* gives the lenders zero expected profit. If there is any probability that the inside lender will make the loan, it is the higher quality borrowers that the inside bank lends to. Therefore, we know that δ_i^* does not satisfy (3). The δ_i that satisfies (3) is necessarily greater than δ_i^*. Thus, $\delta_i \geq \delta_i^*$. Now suppose that $\delta_i \geq \bar{e}_i$. Any loans that the outside lender makes will give positive profits. Competition among outside lenders precludes this. Thus, $\delta_i < \bar{e}_i$. QED

The inside bank maximizes the expected rent extraction by maximizing the amount extracted, $1/(\alpha - \delta) - 1/\alpha$, multiplied by the probability of making the loan, $P(R < R_i)$. This probability can be written as $P(\alpha - \delta > \alpha + e_i - \delta_i) = (\bar{e}_i + \delta_i - \delta)/2\bar{e}_i$.

The inside bank maximizes the following problem,

$$\max_{\delta} \left(\frac{\bar{e}_i + \delta_i - \delta}{2\bar{e}_i} \right) \left(\frac{1}{\alpha - \delta} - \frac{1}{\alpha} \right) . \tag{4}$$

The next lemma characterizes the set of possible adjustment factors for the inside bank.

Lemma 2 : $\delta \in [0, \bar{e}_i + \delta_i)$.

Proof: Suppose $\delta < 0$. The inside bank makes negative profits. Thus, $\delta \geq 0$. Now suppose $\delta \geq \bar{e}_i + \delta_i$. Since the inside bank makes the loan if and only if $\delta \leq -e_i + \delta_i$ and $e_i \in (-\bar{e}_i, \bar{e}_i)$, then the inside bank makes no loan. Thus, $\delta < \bar{e}_i + \delta_i$. QED

From solving (4) we note that the inside bank's adjustment factor, δ, increases with δ_i. This follows from the inside bank maximizing its profits. If the outside lenders' adjustment factors increase then there is room for the inside bank to raise the loan rate and make more profits without lowering the probability of making the loan. The following lemma further characterizes the inside bank's adjustment factor, by showing that the inside bank adjusts the loan rate more than the other lenders.

Lemma 3: The inside bank adjusts its loan rate more than the outside lenders; $\delta > \delta_i$.

Proof: The inside bank maximizes the expected profits (profit on each loan and the probability of making the loan) given by (4). The first order condition is

$$-\frac{1}{2\bar{e}_i}\left(\frac{1}{\alpha-\delta}-\frac{1}{\alpha}\right)+\frac{\bar{e}_i+\delta_i-\delta}{2\bar{e}_i}\,\frac{1}{(\alpha-\delta)^2}=0\,. \tag{5}$$

This implies

$$\frac{\delta}{\alpha}=\frac{\bar{e}_i+\delta_i-\delta}{\alpha-\delta}\,. \tag{6}$$

If $\delta_i \geq \delta$, then (6) implies $\delta_i > \bar{e}_i$ which violates lemma 1. Thus, $\delta_i < \delta$. QED

We can now describe the equilibrium loan offers by the inside bank and the outside lenders.

Proposition 1: The inside bank offers $R = 1/(\alpha - \delta)$, where $\delta \in (0, \bar{e}_i + \delta_i)$, and the outside lenders offer $R_i = 1/(\alpha_i^s - \delta_i)$, where $\delta_i \in (\delta_i^*, \bar{e}_i)$.

Proof: By lemma 1, $\delta_i \in [\delta_i^*, \bar{e}_i)$ and by lemma 2, $\delta \in [0, \bar{e}_i + \delta_i)$. What remains is to show that $\delta_i > \delta_i^*$ and that $\delta > 0$.

If $\delta_i = \delta_i^*$, then the outside lenders make nonnegative (zero) expected profits only if the loan is made by an outside lender with probability one. But by lemma 2, the inside bank sets $\delta < \bar{e}_i + \delta_i$ which implies that the inside bank makes the loan with positive probability. Thus, setting $\delta_i = \delta_i^*$ leaves the outside lenders with negative expected profits.

If $\delta = 0$, then the inside lender makes each loan with probability one, but makes zero profits on each. Increasing δ gives positive profits on each loan made and leaves the insider with positive probability of making the loan since $\delta_i > -\bar{e}_i$. Thus, $\delta_i > \delta_i^*$ and $\delta > 0$. QED

The inside bank earns positive profits and the outside lenders with the noisy signal earn zero expected profits. The level of the inside bank's rent extraction depends on the noise in the outside lenders' signal. The following proposition shows that the total expected rents extracted by the inside bank increase as the signal becomes less accurate. Additionally, the amount of rents extracted from a borrower who borrows from the inside bank increases.

Proposition 2: The expected profits for the inside bank increase with $\bar{e}_i$, and $\partial\delta/\partial\bar{e}_i > 0$.

Proof: To prove the proposition, we show that if the inside bank does not change its adjustment factor, the probability that the inside bank makes the loan increases and so do its expected profits. Then, any change in the inside bank's adjustment factor must necessarily give even higher expected profits. First, recall that the inside bank's probability of making the loan is

$$P(R \leq R_i) = \frac{\bar{e}_i + \delta_i - \delta}{2\bar{e}_i} \,. \tag{7}$$

Holding δ fixed we ask what $\bar{e}_i$ and δ_i would increase $P(R \leq R_i)$.

$$dP(R \leq R_i) = \frac{-(\delta_i - \delta)}{2\bar{e}_i^2} d\bar{e}_i + \frac{1}{2\bar{e}_i} d\delta_i > 0 \,. \tag{8}$$

Therefore, if $\frac{d\delta_i}{d\bar{e}_i} > \frac{\delta_i - \delta}{\bar{e}_i}$ then the probability that the inside bank makes the loan increases. A sufficient condition for $dP(R \leq R_i) > 0$ is $d\delta_i/d\bar{e}_i > 0$. We must therefore consider the outside lenders' problem. From (3) we obtain

$$\frac{d\delta_i}{d\bar{e}_i} = \frac{\dfrac{1}{\alpha_i^s - \delta_i} - \dfrac{1}{\alpha_i^s - \bar{e}_i}}{\dfrac{\alpha_i^s - \bar{e}_i - \delta}{(\alpha_i^s - \delta_i)^2} - \dfrac{1}{\alpha_i^s - (\delta_i - \delta)}} \,. \tag{9}$$

Because $\delta_i < \bar{e}_i$, the numerator of (9) is negative. Because $\delta > \delta_i$, the denominator of (9) is also negative implying that $d\delta_i/d\bar{e}_i > 0$. We now show that $\partial\delta/\partial\bar{e}_i > 0$. Recall that the inside bank's optimization problem is given by (4), and the first order condition is given by (5). These imply

$\alpha - \delta_i - \frac{(\alpha-\delta)^2}{\alpha} = \bar{e}_i$. Differentiating with respect to $\bar{e}_i$ yields $\partial\delta/\partial\bar{e}_i > 0$ for $\alpha > \delta$. QED

We now consider the lenders' decision about sharing information. First we can rule out any sharing by the inside bank. The inside bank's rents are only derived if it has superior information. Recall from proposition 2, the inside bank's expected rents increase with $\bar{e}_i$. The issue remains, whether the outside banks and the suppliers will choose to share information, and if so in which way the information will flow. Consider first the outside bank, call it B. Suppose B shares its signal with its customer, call it C, who is a supplier to the borrower, and C makes the loan through trade credit. Then B effectively makes the loan through C, since C's financing needs depend on the level of trade credit given. C's loan to the borrower in the form of trade credit is financed from B.[7] The outside bank is indifferent between giving its signal α_b^s to its customer and keeping the information. Now consider the supplier. Call this supplier C and its bank B as in the case described above. Trade credit is tied to sales. If C makes the loan, it also makes the sale. If C shares its information with B and B makes the loan, then the borrower may purchase the goods/services from one of the other suppliers. Thus, C prefers receiving information from B to giving information to B.

3.3 First Period

We can now consider how the firm behaves in the first period. The firm can anticipate the expected rents it will pay from having a single bank relationship. When these expected rents exceed the cost F of developing an additional bank relationship the firm will arrange a new relationship. Let $\bar{e}_i^*$ be defined as a critical error range, $\alpha_i^s \in (\alpha - \bar{e}_i^*, \alpha + \bar{e}_i^*)$, such that for $\bar{e}_i^*$ the expected rents are equal to the cost of developing multiple bank relationships. The next proposition states the result that firms with high error ranges prefer to develop multiple bank relationships.

Proposition 3: Firms whose signals contain more noise, $\bar{e}_i > \bar{e}_i^*$, will develop a second bank relationship, while firms whose signals contain less noise, $\bar{e}_i < \bar{e}_i^*$, will develop only one bank relationship, where $\bar{e}_i^*$ is an increasing function of F.

Proof: Let δ^* be the inside bank's adjustment factor for $\bar{e}_i^*$ so that $\left(\frac{\bar{e}_i^* + \delta_i - \delta}{2\bar{e}_i}\right)\left(\frac{1}{\alpha-\delta^*} - \frac{1}{\alpha}\right) = F$. From proposition 2 we know that as $\bar{e}_i$ increases, the

[7] We are implicitly assuming that the customer, C, has multiple bank relationships so its bank, B, does not extract rents. The analysis is more complicated, but the results are stronger if we assume that the customer has a single bank relationship with its bank.

total expected rents extracted by a single inside bank increases. Therefore, for $\bar{e}_i > \bar{e}_i^*$ ($\bar{e}_i < \bar{e}_i^*$) the expected rent extraction from the firm is greater (less) than the cost of multiple bank relationships. QED

Proposition 3 demonstrates the importance of the information accuracy in determining the number of banking relationships. If the quality of information among outside lenders improves the firm can save the cost of initiating additional bank relationships and will later bear some of that cost through possible rent extraction.

4. Discussion

Our analysis from the previous sections suggests that it is reasonable for French firms to use trade credit, and for German firms to develop multiple bank relationships. The intuition of this result is as follows. In France, where borrower information is available to outside banks, a supplier can improve the signal he has about his customer's creditworthiness. He benefits from obtaining the outside bank's signal and the bank does not lose anything when sharing the information. With a more accurate signal the supplier is able to make a more competitive credit offer. Therefore, the firm may decide to borrow from its supplier or from its single inside bank. In Germany, however, where outside lenders are less informed, a borrower with one single bank relationship might have to pay a high loan rate.[8] The inside bank is able to extract high informational rents from its borrower. A borrower expecting these rents to be high will avoid paying them in the future by initially building up relationships with additional banks, even if the cost of doing so is considerable. Having multiple inside banks implies more competitive interest rate offers.

More specifically, the model predicts that, other things equal, numerous French firms use trade credit as a substitute for bank debt. In Germany, however, numerous firms benefit from developing multiple bank relationships. In other words, the probability that a randomly chosen firm uses trade credit is higher in France than in Germany. Thus, the higher aggregate figures for trade credit in France compared to Germany should reflect a higher number of firms using trade credit. The model can be extended in order to discuss how firm size and trade credit may be related in the two countries. This is an interesting issue for future research.

The analysis can also be applied to explain differences in the use of bank debt versus securities financing. It seems reasonable that outside banks do

[8] If the inside bank cares about its reputation in the credit market it may charge a loan rate which is somewhat lower than the maximum rate (see Sharpe, 1990).

also transfer their signal to institutional investors, in particular if they have a stake in them. Since trade credit is a form of short-term financing, firms seeking long-term funds may choose rather between bank debt and publicly placed debt or equity. The transfer of information enables institutional investors to compete with the inside bank in providing long-term funds to firms. Thus, in France, other things equal, securities financing should be more important than in Germany.

5. Empirical Relevance and Conclusion

Our results are consistent with several recent observations concerning corporate finance and financial intermediation in France and Germany.

First, the relative cost of trade credit seems to be lower in France than in Germany. Dietsch (1990, p. 76) observes that French suppliers do not increase prices adequately when they give credit to their customers. He concludes that by using trade credit firms on average are able to reduce their cost of capital. Harm (1992, p. 29-30) finds, that German firms using trade credit have to pay for all risk-associated costs, in particular for their suppliers' liquidity risk. This makes trade credit relatively expensive.

Second, German firms do have multiple bank relationships. Fischer (1990, p. 21-22 and p. 102-104) who conducted interviews with numerous firms and banks in Germany finds that exclusive financing by one single bank is not typical any more. Not only all large firms, but also most of the medium-sized firms do have relations to several banks in order to satisfy their financial needs. According to Fischer's study multiple bank relationships are especially valuable for 'good' medium-sized firms. The fact that there is at least a second main bank ensures competitive loan rates and competitive prices for other financial services. It also prevents the influence of one single bank from becoming too big. Finally 'good' firms do not set a high value on the 'housebank's support in a situation of financial distress, since it is not very likely that such a situation will occur.

Third, French firms rely more on public sources of funds than German firms do. According to OECD statistics for the 1980s capital markets provided on average 33% of French firms' external funds, whereas in Germany the corresponding share was 13% (see OECD, 1992).

In sum, our model shows that the availability of borrower information to *all* outside banks does not necessarily increase the amount of bank lending. Since information is a public good (i.e. once the information is available nobody can be excluded from using it), an outside bank has no incentive to use that information provided by the central bank when there is a possibility to

'sell' it.[9] We would not expect that the French central bank intended to encourage non-bank lending when it decided to make borrower information available to outside banks.

References

Allen, F. (1993), Stock Markets and Resource Allocation, in: C. Mayer and X. Vives (eds.), Capital Markets and Financial Intermediation, Cambridge: Cambridge University Press, 81-108.

– (1990), The Market for Information and the Origin of Financial Intermediation, Journal of Financial Intermediation 1, 3-30.

Banque de France (1989), La banque de données d'entreprises FIBEN, Note d'information no. 85.

Begg, D. / *Portes,* R. (1993), Enterprise Debt and Economic Transformation: Financial Restructuring in Central and Eastern Europe, in: C. Mayer and X. Vives (eds.), Capital Markets and Financial Intermediation, Cambridge: Cambridge University Press, 230-255.

Berglöf, E. (1990), Capital Structure as a Mechanism of Control: A Comparison of Financial Systems, in: M. Aoki, B. Gustafson and O. E. Williamson (eds.), The Firm as a Nexus of Treaties, London: Sage Publications, 237-262.

Besanko, D. / *Kanatas,* G. (1993), Credit Market Equilibrium with Bank Monitoring and Moral Hazard, The Review of Financial Studies 6, 213-232.

Biais, B. / *Gollier,* Ch. / *Viala,* P. (1994), Why Do Firms Use Trade Credit? A Signalling Model. Paper presented at the Symposium on Financial Intermediation and Corporate Finance in Hilversum (NL), May 26-28.

Breig, H. (1994), Bank Lending and Corporate Finance in Major Industrial Countries: Are France and Germany Really Similar? Diskussionspapier 27/94, Institut für Finanzwissenschaft der Albert-Ludwigs-Universität Freiburg im Breisgau.

Brennan, M. J. / *Maksimovic,* V. / *Zechner,* J. (1988), Vendor Financing, Journal of Finance 43, 1127-1141.

Bruchner, H. / *Stützle,* R. (1986), Leitfaden zu Bankgeheimnis und Bankauskunft, Verlag Wertpapier-Mitteilungen, Frankfurt/Main.

Bundesgesetzblatt (1985), Teil I, herausgegeben vom Bundesministerium der Justiz, Bundesanzeiger Verlagsges.m.b.H., Bonn.

– (1992), Teil I, herausgegeben vom Bundesministerium der Justiz, Bundesanzeiger Verlagsges.m.b.H., Bonn.

Commission des Communautés Européennes (1994), B.A.C.H. La banque de données harmonisées sur les comptes d'entreprises, Bruxelles.

Diamond, D. W. (1991), Monitoring and Reputation: The Choice between Bank Loans and Directly Placed Debt, Journal of Political Economy 99, 689-721.

[9] Allen (1990) provides a theory of financial intermediation which relies on possibilities to buy and sell information in asset markets.

Dietsch, M. (1990), Le crédit interentreprises: coûts et avantages, Economie et Statistique, Oct., 65-79.

Emery, G. W. (1987), An Optimal Financial Response to Variable Demand, Journal of Financial and Quantitative Analysis 22, 209-225.

Fischer, K. (1990), Hausbankbeziehungen als Instrument der Bindung zwischen Banken und Unternehmen: Eine theoretische und empirische Analyse, Dissertation Universität Bonn.

Frankel, A. B. / *Montgomery,* J. D. (1991), Financial Structure – An International Perspective, Brookings Papers on Economic Activity, No.1, 257-310.

Franks, J. / *Mayer,* C. (1990), Capital Markets and Corporate Control: A Study of France, Germany and the UK, Economic Policy 5, No.1, April, 191-231.

Greenbaum, S. I. / *Thakor,* A. V. (1994), Contemporary Financial Intermediation, Orlando (Florida): Dryden Press.

Harm, Ch. (1992), The Financing of Small Firms in Germany, The World Bank, Policy Research Working Paper 899.

Hellwig, M. (1991), Banking, Financial Intermediation and Corporate Finance, in: A. Giovannini and C. Mayer (eds.), European Financial Integration, Cambridge: Cambridge University Press, 35-63.

KPMG Audit (1990), Banking and Finance in France, Paris.

KPMG Peat Marwick (1986) Banking in Germany, Frankfurt.

Lee, Y. W. / *Stowe,* J. D. (1993), Product Risk, Asymmetric Information, and Trade Credit, Journal of Financial and Quantitative Analysis 28, 285-300.

MacKie-Mason, J. K. (1990), Do Firms Care Who Provides Their Financing?, in: R. G. Hubbard (ed.), Asymmetric Information, Corporate Finance and Investment, Chicago: The University of Chicago Press, 63-103.

OECD (1992), Financial Accounts of OECD Countries, Financial Statistics Part 2, Paris.

Petersen, M. A. / *Rajan,* R. G. (1995), The Effect of Credit Market Competition on Lending Relationships, Quarterly Journal of Economics 110, 407-443.

Rajan, R. G. (1992), Insiders and Outsiders: The Choice between Informed and Arm's-Length Debt, Journal of Finance 47, 1367-1400.

Seward, J. K. (1990), Corporate Financial Policy and the Theory of Financial Intermediation, Journal of Finance 45, 351-377.

Sharpe, S. A. (1990), Asymmetric Information, Bank Lending and Implicit Contracts: A Stylized Model of Customer Relationships, Journal of Finance 45, 1069-1087.

Smith, J. K. (1987), Trade Credit and Informational Asymmetry, Journal of Finance 42, 863-872.

Wilner, B. S. (1994), Trade Credit versus Bank Credit, Northwestern University Working Paper.

Wilson, P. F. (1994), Public Ownership, Delegated Project Selection and the Firm's Source of Debt Financing, Indiana University Working Paper.

Zusammenfassung

In diesem Beitrag entwickeln wir ein Modell, um die unterschiedliche Bedeutung von Bank- und Lieferantenkrediten in Frankreich und Deutschland erklären zu können. Die stärkere Verwendung von Lieferanten- oder Handelskrediten in Frankreich im Vergleich zu Deutschland kann dadurch bedingt sein, daß die französische Zentralbank über die Datenbank FIBEN allen Banken Schuldnerinformationen zukommen läßt. Französische Banken können als Broker agieren und die Informationen an Lieferanten weiterleiten anstatt sie zu nutzen, um zusätzliche Kredite zu gewähren. Das Modell prognostiziert, daß es sich für viele französische Firmen lohnt, Lieferantenkredite zu verwenden, während es sich für viele deutsche Firmen lohnt, multiple Bankbeziehungen aufzubauen.

Abstract

This paper develops a model to better understand the different levels of trade credit and bank debt in France and Germany. The greater use of trade credit in France relative to Germany may be caused by the French central bank providing borrower information to all banks through the data bank FIBEN. The banks act as brokers and 'sell' the information to trade creditors rather than use the information to make additional loans. The model predicts that numerous French firms benefit from using trade credit, whereas numerous German firms benefit from developing multiple bank relationships.

JEL-Klassifikation: G32, G21, G28
Keywords: trade credit, asymmetric information, France, Germany