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EVIDENCE ON CORPORATE PRIVATE DEBT FINANCE AND  
THE TERM STRUCTURE OF INTEREST RATES

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## RÉSUMÉ

L'objet de ce texte est l'analyse empirique de l'endettement des entreprises. Nous testons un modèle dans lequel les firmes contractent des emprunts bancaires et analysons la structure à terme de ces prêts et des taux d'intérêt associés.

Pour tester ce modèle, nous utilisons l'enquête de trésorerie de l'INSEE auprès des entreprises industrielles françaises. Ces enquêtes sont bi-annuelles et couvrent environ deux mille firmes. Elles contiennent principalement des données qualitatives, de sorte que le modèle est un modèle tobit généralisé. Les méthodes d'estimation sont la méthode à deux étapes et la méthode du maximum de vraisemblance.

Mots clés : financement des firmes, structure des taux d'intérêt, prêts bancaires, tobit généralisé, maximum de vraisemblance.

## ABSTRACT

The purpose of this paper is the empirical analysis of corporate private debt finance. Specifically, we test a debt finance model in which the firm and the bank decide on a financial contract characterized by short- or long-term debt or both short- and long-term debt. This model is a priori consistent with the theoretical developments ranging from the pure expectations theory to the debt-looking contract theory, and consequently allows a posteriori for a discussion of their empirical relevance.

To test this model, we make use of the business surveys on the industrial firms' treasury statement conducted by the French National Institute of Statistics (INSEE). These surveys are biannual, cover around two thousand firms and contain mostly qualitative data. In particular, short- and long-term bank loans are qualitative data. In this data set, interest rates are individualized and display a large variability across firms. The methods of estimation are the two-stage tobit method and the maximum likelihood method.

Key words : corporate finance, term structure of interest rate, bank loans, generalized tobit, maximum likelihood.

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## INTRODUCTION

A recurrent problem, in corporate finance, is to explain the dynamic structure of the debt. In particular, a firm's choice between short-term and long-term bank loans is not well explained neither in itself, nor as a part of the previous problem. The purpose of this paper is to explain this choice on empirical grounds. More specifically, we will consider a sample of firms and their associated structure of bank loans (short-term loans, long-term ones, both of them, none of them) and shall try to explain the probability of their choice.

Even this more focused problem is still a partial converse of a more general one, namely the explanation of the term structure of interest rates. This means that the relevant literature, seen as the set of a priori explanations, runs from the pure expectations theory to the debt-looking contract theory. This stream can be divided in two periods: a) the traditional explanations and their blendings in the general framework of financial markets; b) the modern approaches in the particular framework of corporate finance and credit markets. Only their consequences for the problem at hand will be recalled here.

According to the pure expectations theory (which can be dated back to F.A. Lutz (1940), J.R. Hicks (1939), and I. Fisher (1930)), short-term loans and long-term loans are perfect substitutes. Consequently they should appear with an equal frequency and this frequency should be conditional on the same factors, that is, the explanatory variables associated to the probability of occurrence of any maturity should be the same and their coefficients should also be the same. In other words, the credit markets are so perfect that their term structure is not necessarily grounded on corresponding physical counterparts.

In the market segmentation hypothesis (which is usually associated to Culbertson (1957)), real needs or habits are the primitive concept: maturity preferences are such that they imply independent markets. Consequently either the explanatory variables associated to a short-term bank loan should be different from those associated to a long-term bank loan, or their associated coefficients should be different.

The previous polar hypotheses do not take into account the risk associated with the expectation of future interest rates. The risk premium model of Hicks (1939) assumes that lenders have a preference for certainty. Consequently, in principle, long-term interest rates should dominate shorter ones. Hence a risk-neutral firm should choose only short-term bank loans.

Blending these three traditional approaches, the works of Malkiel (1966) and Modigliani and Sutch (1966) lead to the preferred habitat theory where the prevailing risk aversion is not reduced to a single maturity. In other words,

this is a reformulation of the segmentation hypothesis allowing for some kind of substitution.

The modern period opens with the reexamination of these points by Cox, Ingersoll and Ross (1981). The purpose of these authors is to put under question the logical consistency of the previous constructions. They reduce the domain of the pure expectations theory, and they emphasize the degree of risk aversion in the preferred habitat theory. No new empirical implications are presented.

Until this point, what is maintained is that there exists a unique term structure of interest rates and that this structure can be used to explain at least partially a corresponding unique term structure of bank loans. The credit rationing hypothesis of Stiglitz and Weiss ((1981), (1983)) challenges this viewpoint. An *ex ante* excess demand can be transformed into an *ex post* equilibrium with credit rationing by the implementation of some rationing schemes; in turn, a rationing scheme can be implemented by individual contracts where the appearance of individualized interest rates and strong complementarity between short-term and long-term bank loans are natural.

At this point the credit rationing hypothesis can be encompassed within the debt-looking contract theory (see Diamond ((1991),(1993)), Chang (1990) or Innes (1990) for recent theoretical models, and Myers(1977), Townsend (1979), Diamond (1984) or Gale and Hellwig (1985) for pioneer-work). In this theory, each contract designs its own term structure of interest rates, but the configuration of these structures can be well defined; each market can be separated but two loans can be either substitute or complement. The choice of debt maturity by a firm is associated to a specific investment project and depends for instance on the private information of the firms about their future credit rating and on liquidity risks.

In order to explain the dynamic structure of short-term and long-term bank loans, we shall not choose a priori a specific model in the above list. We rather look at the empirically relevant ingredients and then discuss their theoretical significance. A very crude model will be sufficient. A priori the following points will be taken into account:

- a) a bank loan is observed when a firm's reservation interest rate is smaller than a bank's offered interest rate,
- b) these interest rates are specific to a particular firm and to a particular bank loan, that is, they can vary with the characteristics of each firm and each bank loan,
- c) they are determined by their associated risk, that is, the associated firm's financial situation.
- d) Consequently the probability of observing a bank loan can be related to the characteristics of the firm and the bank,

e) the classification of bank loans according to their term to maturity will reveal whether long-term bank loans can be seen as substitute or complement to short-term ones and consequently will allow for discussing the theoretical significance of empirical results.

The features of this model are those of a generalized tobit model and can be estimated by a two-stage or a maximum likelihood method. This kind of model was generally used to test labor supply models (for example, see Gronau (1974) and more recently Magnac (1991)). Our empirical model can be seen as a transposition of this literature to private debt finance models. Of course there are significant differences: in particular, segmentation between short-term and long-term credit markets is not exactly similar to segmentation in labor markets, since while a worker cannot work in two sectors at the same time, a firm can obtain simultaneously a long-term and a short-term loan.

The a priori "vagueness" of this kind of models is not only a consequence of the plurality of the theoretical a priori explanations, it is also a consequence of the wealth and nature of data to which we now turn.

To test this private debt finance model, we make use of the business surveys on the industrial firms' treasury statement from May 1979 to December 1988 conducted by the French National Institute of Statistics (INSEE). These surveys are biannual, cover around two thousand firms and contain mostly qualitative data. In particular, short-term and long-term bank loans are qualitative data: what is known is the fact that a firm has both short-term and long-term bank loans or only one of them or no bank loan at all. There are also qualitative data on the firm's treasury situation and on the other firm's characteristics.

In this data set, interest rates associated to each loan are known, and there is a large variability of interest rates across firms. Moreover, there is a significant difference between bank loans according to their term structure. Interest rates associated to long-term bank loans are systematically lower than those associated to short-term bank loans and there is a significant difference between firms having only a long-term bank loan and those having only a short-term bank loan, the first ones facing a much better short-run financial situation. The precise interpretation of these findings will be done in the empirical part.

We proceed as follows. In the first section, we present the model. The second section contains a preliminary statistical analysis of the data. The third section is devoted to parametrization and the stochastic hypotheses. Econometric results are gathered in the fourth section.

# 1 THE BASIC MODEL

We study a situation in which a firm may have to raise funds externally from outside investors through capital markets. We assume that these funds come through debt contracts between the firm and a bank, the bank having imperfect information on the revenue of the firm. There is also uncertainty on future prices and interest rates. Debt contracts are characterized by their maturity, typically we distinguish between short-term and long-term loans. Therefore, our model concerns the decision to design a debt contract and the choice between short-term and long-term loans. It follows that there are four possibilities for the firm, namely, not to borrow, to have only a short-term debt, to have only a long-term debt or to have both short-term and long-term debt.

Assuming a model for the interest rate offered by the bank and a model for the firm's reservation interest rate, the firm's choice model can be reduced to the comparison between the interest rates offered by the bank and its reservation interest rate. Let us note,  $r$ , the short-term interest rate,  $R$ , the long-term one and let  $r^*$  and  $R^*$  be the corresponding reservation rates. Then one can write the following model :

$$y_1 = \begin{cases} \log r & \text{when short-term debt is observed i.e. when } \log r < \log r^* \\ 0 & \text{when short-term debt is not observed i.e. when } \log r > \log r^* \end{cases}$$

$$y_2 = \begin{cases} \log R & \text{when long-term debt is observed i.e. when } \log R < \log R^* \\ 0 & \text{when long-term debt is not observed i.e. when } \log R > \log R^* \end{cases}$$

Let us specify the following relations for the offered and the reservation interest rates :

$$\log r = Z_1\gamma_1 + u_1 \quad (1)$$

$$\log R = Z_2\gamma_2 + u_2 \quad (2)$$

$$\log r^* = W_1\beta_1 + v_1 \quad (3)$$

$$\log R^* = W_2\beta_2 + v_2 \quad (4)$$

where  $Z_1$  and  $Z_2$  are the explanatory variables for the levels of interest rates offered by the bank. Typically, the expected firm's reimbursement capacity is in  $Z_1$  and  $Z_2$  while expected future interest rates and the firm's investments would be an element in  $Z_2$ .  $W_1$  and  $W_2$  are the explanatory variables for the reservation interest rates. Typically the firm's current treasury situation is in  $W_1$  while expected future interest rates and prices and its planned investment would be an element of  $W_2$ .

The decision models and the identification problem implies  $Z \neq W$ , that is, some variables in  $Z$  do not appear in  $W$ . If short-term debt contracts are perfect substitutes to long-term ones, one has  $Z_1 = Z_2$  and  $\gamma_1 = \gamma_2$  (respectively,



$W_1 = W_2$  and  $\beta_1 = \beta_2$ ). But if short-term debt contracts are not perfect substitutes to long-term debt contracts, either they do not have the same explanatory variables, that is, some variables in  $Z_2$  (respectively in  $W_2$ ) do not appear in  $Z_1$  (respectively in  $W_1$ ), or they may have the same explanatory variables but the associated coefficients are different, that is,  $Z_1 = Z_2$  (respectively  $W_1 = W_2$ ) but  $\gamma_1 \neq \gamma_2$  (respectively  $\beta_1 \neq \beta_2$ ).

This is the basic model. It allows to explain the probability of occurrence of short-term bank loans or long-term bank loans and to test whether they are substitutes or not. This model also allows for an explanation of the joint occurrence, for a given firm, of short-term and long-term loans; in fact, it allows to consider the following complete model with four possibilities:

$$y_1 = \log r \quad \text{and} \quad y_2 = \log R \text{ when } \log r < \log r^* \text{ and } \log R < \log R^* \quad (5)$$

$$y_1 = \log r \quad \text{and} \quad y_2 = 0 \text{ when } \log r < \log r^* \text{ and } \log R > \log R^* \quad (6)$$

$$y_1 = 0 \quad \text{and} \quad y_2 = \log R \text{ when } \log r > \log r^* \text{ and } \log R < \log R^* \quad (7)$$

$$y_1 = 0 \quad \text{and} \quad y_2 = 0 \text{ when } \log r > \log r^* \text{ and } \log R > \log R^* \quad (8)$$

This point will be exploited in the sequel.

## 2 PRELIMINARY STATISTICAL STUDY

### 2.1 DATA

To test the model, we make use of the business surveys on the industrial firms' treasury statement from May 1979 to December 1988 conducted by the French National Institute of Statistics ( INSEE ). This is a biannual survey covering around two thousands French industrial firms. It contains qualitative data on short-term and long-term bank loans, on the firm's treasury situation and on other firm's characteristics while it contains quantitative data on the interest rates associated to each bank loan and on the firm's sales. We will restrict ourselves to two types of bank loans, short-term and long-term bank loans. We gather firms in the following four groups :

1. group 1 :  
firms with both short-term and long-term bank loans.
2. group 2 :  
firms with only short-term bank loans.
3. group 3 :  
firms with only long-term bank loans.

4. group 4 :  
firms without any bank loan.

## 2.2 RESULTS

From this data set, the following structure is exhibited:

- a) short-term bank loans are much more frequently observed than long-term ones,
- b) there is a large variability of interest rates across firms and interest rates are much higher for short-term loans than for long-term ones,
- c) the riskiest firms are most likely to have the highest interest rates.

Considering the first feature, let us remark (see tables 1 and 2) that a large percentage of the firms (around 70%) have a short-term bank loan while only 20% have a long-term bank loan. Moreover, as can be checked in table 2, very few firms (around 2%) have only a long-term loan while many firms (more than 50%) have only a short-term bank loan, the others having either both a short-term and a long-term loan (around 20%) or no bank loan at all. This is clearly at variance with the pure expectations theory and, inversely, suggests the market segmentation hypothesis or the preferred habitat theory.

Then, considering data on interest rates (tables 3 - 6), the variability of interest rates is clearly revealed by standard deviations, minimum and maximum levels of interest rates in tables 3 and 4. On the other hand, from table 3, one can see that, on an average, short-term interest rates are higher than five-year interest rates computed on an annual basis, that is, except for 1982, the ex post cost in terms of interest rates of a five-year loan is always smaller than the cost of a short-term loan. Restricting our attention to mixed contracts (short-term and long-term together)-table 4-we still find this same result. In this table, we can remark a large variety of spreads (from 0.01 to -1.26), the largest ones being in may 1980 and in december 1984. Moreover, in table 5, comparing short-term interest rates in mixed contracts with short-term interest rates in short-term debt contracts, it appears that short-term interest rates are higher in short-term debt contracts than in mixed contracts. Finally, in table 6, we find the reverse result for long-term interest rates. These last results can be summarized as follows: data on interest rates are individualized but reveals a kind of structure. Both points are challenging: because individualized, the observed interest rates are in fact irreconcilable with any theory postulating a uniform term structure of interest rates; the inequality between the average long-term rate and the short-term rates is irreconcilable with any theory postulating perfect arbitrage. However, we still have a structure at hand both at the individual level and on an average. Anew, some elements of the market segmentation hypothesis and the preferred habitat theory are needed but they are not sufficient; furthermore the individualized nature of the debt-looking contract

theory is needed but is not sufficient given the persistency of some structure.

Finally, in tables 7 to 16, comparing firms with more advantageous debt contracts (group 3) i.e. long-term debt contracts, to firms with less advantageous contracts (groups 1 and 2) i.e. mixed contracts and short-term debt contracts, it appears that the firms having a more advantageous contract are the firms having a better short-term financial situation. Indeed, there are less firms in group 3 than in groups 1 and 2 declaring short-term financial difficulties (tables 7 to 10) and having postponed investment projects (table 11). More specifically, there are less firms in group 3 than in groups 1 and 2 assessing to have financial problems due to insufficient demand (table 12), or to previous debts (table 13). On the other hand, there are more firms in group 3 declaring to have problems due to their investments (table 14): in that case, the investment projects may compensate for the short-term financial problems. Finally, the few firms declaring to be rationed are mainly in group 2 (table 15) and sales do not reveal a specific pattern between groups (table 16). Linking this preliminary statistical analysis with the individualization of interest rates, we see that interest rates are correlated with individual risks (and not with the risk associated to terms). Consequently, risk premiums are important explanatory variables but neither as a consequence of the risk premium hypothesis, nor as a consequence of the preferred habitat theory. Their importance is better represented in the Cox, Ingersoll and Ross reformulation of these theories without reducing to it, since they consider uniform interest rates.

Summing up, firms and banks certainly do not live in a world uniquely characterized by traditional theories but if one wants to explain their actual behavior he has to retain the persistency of a structure as an explanatory variable (which was perhaps the main point of the pure expectations theory).

### 3 ESTIMATION STRATEGIES

First let us consider short-term debt contracts. The model is

$$y_1 = \begin{cases} \log r & \text{when short-term debt is observed i.e. when } \log r < \log r^* \\ 0 & \text{otherwise} \end{cases}$$

assuming

$$\begin{aligned} \log r &= Z_1 \gamma_1 + u_1 \\ \log r^* &= W_1 \beta_1 + v_1 \end{aligned}$$

with

$$(u_1, v_1) \sim N(0, \Sigma) \text{ where } \Sigma = \begin{pmatrix} \sigma_1^2 & \sigma_{12} \\ \sigma_{12} & \sigma_2^2 \end{pmatrix}$$

It is possible to use a two-stage tobit method (Heckman (1976), Lee, Madala and Trost (1980)) to calculate consistent estimators of  $\gamma_1$ ,  $\beta_1$  and their variances.

Namely, one has

$$\begin{aligned} E(\log r / \text{selection sample}) &= E(\log r / \log r < \log r^*) \\ &= E(Z_1 \gamma_1 + u_1 / \log r < \log r^*) \\ &= Z_1 \gamma_1 + E(u_1 / \log r < \log r^*) \end{aligned}$$

One can calculate  $E(u_1 / \log r < \log r^*)$  by using the relations :

$$\begin{aligned} E(u_1 / \log r < \log r^*) &= E(u_1 / v_1 - u_1 > Z_1 \gamma_1 - W_1 \beta_1) \\ &= \phi\left(\frac{Z_1 \gamma_1 - W_1 \beta_1}{\sigma_3}\right) \frac{1}{1 - \Phi\left(\frac{Z_1 \gamma_1 - W_1 \beta_1}{\sigma_3}\right)} \frac{\sigma_4}{\sigma_3} \\ &= \frac{\phi\left(\frac{W_1 \beta_1 - Z_1 \gamma_1}{\sigma_3}\right) \sigma_4}{\Phi\left(\frac{W_1 \beta_1 - Z_1 \gamma_1}{\sigma_3}\right) \sigma_3} \\ &= \lambda \frac{\sigma_4}{\sigma_3} \end{aligned}$$

where  $\Phi$  is the distribution function for the  $N(0, 1)$  and  $\phi$  its density, and:

$$\begin{aligned} \sigma_3^2 &= \sigma_1^2 - 2\sigma_{12} + \sigma_2^2 \\ \sigma_4 &= \sigma_{12} - \sigma_1^2 \\ \lambda &= \frac{\phi\left(\frac{W_1 \beta_1 - Z_1 \gamma_1}{\sigma_3}\right)}{\Phi\left(\frac{W_1 \beta_1 - Z_1 \gamma_1}{\sigma_3}\right)} \end{aligned}$$

Finally one has :

$$\log r = Z_1 \gamma_1 + \lambda \frac{\sigma_4}{\sigma_3} + \mu$$

where  $E(\mu / \text{selection sample}) = 0$  and  $\lambda$  is the inverse of the Mill's ratio.

The two-stage estimator is obtained in the following way:

First we will find  $\lambda$  from a probit estimate on the full sample of firms with the equation :

$$\bar{y}_1 = \begin{cases} 1 & \text{when short-term debt is observed i.e. when } \log r < \log r^* \\ 0 & \text{otherwise} \end{cases}$$

As we have :

$$\begin{aligned} P(\bar{y}_1 = 1) &= P(\log r < \log r^*) \\ &= P(Z_1 \gamma_1 + u_1 < W_1 \beta_1 + v_1) \\ &= P(v_1 - u_1 > Z_1 \gamma_1 - W_1 \beta_1) \\ &= \Phi\left(\frac{W_1 \beta_1 - Z_1 \gamma_1}{\sigma_3}\right) \end{aligned}$$

we get an estimator of  $\frac{W_1\beta_1 - Z_1\gamma_1}{\sigma_3}$ , so we have an estimator of  $\lambda$ .  
Next we estimate by ordinary least squares the following equation on the sample of firms with short-term debt contracts

$$\log r = Z_1\gamma_1 + \lambda \frac{\sigma_4}{\sigma_3} + \mu$$

There is no identification problem in this particular model:  $\frac{\gamma_1}{\sigma_3}$  and  $\frac{\beta_1}{\sigma_3}$ , estimated in the probit maximum likelihood, are combined to  $\gamma_1$ ,  $\sum \mu_i^2$  and  $\frac{\sigma_4}{\sigma_3}$ , estimated in the second stage to give estimates of  $\sigma_4$  and  $\sigma_3$ . An estimate of  $\sigma_2^2$  comes from:

$$\hat{\sigma}_2^2 = \frac{1}{n_1} \sum \mu_i^2 + \frac{\hat{\sigma}_4^2}{\sigma_3} \frac{1}{n_1} \sum (Z_{1i}\hat{\gamma}_1 + \hat{\lambda}_i)\hat{\lambda}_i$$

where  $n_1$  is the number of firms having a short-term bank loan. These two-stage estimates are used as initial values in the maximum likelihood estimation. The likelihood function can be written

$$L = \prod_{i \in \mathfrak{S}_0} \Phi\left(\frac{-W_1\beta_1 + Z_1\gamma_1}{\sigma_3}\right) \prod_{i \in \mathfrak{S}_1} \frac{1}{\sigma_1} \phi\left(\frac{\log r_i - Z_{1i}\gamma_1}{\sigma_1}\right) \prod_{i \in \mathfrak{S}_1} \Phi\left(\frac{W_{1i}\beta_1 - Z_{1i}\gamma_1 + \frac{\sigma_4}{\sigma_3}(\log r_i - Z_{1i}\gamma_1)}{\sqrt{\sigma_3^2 - \frac{\sigma_4^2}{\sigma_1^2}}}\right)$$

where  $\mathfrak{S}_1$  is the set of firms with a short-term bank loan,  $\mathfrak{S}_0$  being the set of firms without a short-term bank loan. One can also reparametrize this likelihood function as follows.

Let

$$w_1 = v_1 - u_1 \\ X_1\delta_1 = Z_1\gamma_1 - W_1\beta_1$$

and assume

$$(u_1, w_1) \sim N(0, \Omega) \text{ where } \Omega = \begin{pmatrix} \sigma_u^2 & \rho\sigma_u\sigma_w \\ \rho\sigma_u\sigma_w & \sigma_w^2 \end{pmatrix}$$

Then, let  $h = \frac{1}{\sigma_u}$ ,  $c_1 = \frac{\gamma_1}{\sigma_u}$ ,  $d_1 = \frac{\beta_1}{\sigma_w}$ , one has the following reparametrized likelihood function

$$L^* = \prod_{i \in \mathfrak{S}_0} \Phi(X_{1i}d_1) \prod_{i \in \mathfrak{S}_1} h\phi(h \log r_i - Z_{1i}c_1) \prod_{i \in \mathfrak{S}_1} \Phi\left(\frac{1}{\sqrt{1 - \rho^2}}(-X_{1i}d_1 + \rho(h \log r_i - Z_{1i}c_1))\right)$$

which can be estimated by performing a grid search on the permissible range of  $\rho$  values. Of course, the same can be done for long-term debt contracts.

In order to consider the whole problem at the same time, one should estimate the complete model presented at the end of the preceding section (eqs(5)-(8)). This is a generalized tobit model for which the likelihood function is just a generalization of the preceding ones.

## 4 ECONOMETRIC RESULTS

From the econometric tests, it appears that the level of sales has generally a significant negative effect on the level of interest rates, this effect being stronger on short-term rates than on long-term ones. Short-term financial difficulties have a significant positive effect on the probability of observing a short-term loan while they have either null or negative effects on the probability of observing a long-term loan. Finally, as a demand for a long-term (respectively short-term) loan is positively related to the possibility of observing only a long-term (respectively short-term) loan and negatively related to the probability of observing only a short-term (respectively long-term) loan, it seems that both the bank and the firm think that these two kinds of loans have different objects and are not substitute. Let us look at the details of these results.

First we consider a classification with the following two models: a firm has a short-term bank loan or not; a firm has a long-term bank loan or not. The two-stage estimates of these models are presented in tables 17 to 20. In the first stage, the probit estimates for the short-term debt were obtained by a stepwise technic. The most significant variables are the logarithm of the firms' sales, their evaluation of a difficult current treasury situation, their demand for long-term and short-term financial funds in order to finance their investment projects, their demand for a short-term loan and their difficulties with the current payments on previous debt.

Looking at the results reported in table 17, one can check that sales have a positive effect on the probability of observing a short-term debt contract. As expected, a bad current treasury situation has a positive effect on the firm's reservation interest rate. Therefore it has a positive effect on the probability of observing a short-term debt contract. The firm's demand for short-term or long-term financial funds is surely a measure of its need for outside finance. It has a positive effect on the firm's reservation interest rate and on the probability of observing a debt contract.

Using the same explanatory variables for long-term debts leads to very different estimates (see table 18) except for the firm's demand of long-term financial funds which has still a positive effect on the probability of observing a debt contract. The effect of firm's sales is rarely significant. A bad current treasury situation has the reverse effect and the other variables have no significant effect.

Therefore, these first-stage estimates already lead to conclude that debt markets are segmented as parameters in short-term debt contracts are different from parameters in long-term debt contracts. But this segmentation is not pure. As seen in the introduction, this result means that our starting point for an explanation is the preferred habitat theory.

In the second stage, one can verify (in tables 19 and 20) that the level of sales has a significant effect on the short-term interest rate offered by the bank while its effect on long-term interest rates is rarely significant. The coefficient associated to  $\lambda$  (the inverse of the Mill's ratio) is generally significant in the short-term interest rate regressions while it is generally not significant in the long-term ones. Therefore these second-stage results are another illustration that the debt market is segmented and that the model is not well adapted for long-term interest rates as, except for december 1982, may 1985 and december 1986, either sales or the Mill's ratio is not significant.

The appearance of the level of sales as an explanatory variable is in accordance with the usual but incomplete assertion that banks consider a higher level of sales as a signal that a firm is less risky. As a matter of fact, a higher level of sales signals not only that a firm is well established but also that the bank is already well documented on such a firm. In this sense, the firm is less risky. This link with risk aversion is also in favor of the preferred habitat theory particularly in its reformulation by Cox, Ingersoll and Ross. The appearance of the Mill's ratio as an explanatory variable is very important here. It is an indirect measure of the marginal willingness to pay of a firm. Consequently the level of observed interest rates is expected to depend on this ratio.

Let us now concentrate on short-term loans and turn to maximum likelihood estimates. In table 21, one can verify that with the reparametrized likelihood function, the estimates are very similar to the two-stage estimates: the signs do not change and the coefficients associated to sales are almost identical. The variances of the residuals in the interest rate equation are around 0.01 for the entire period while those in the discrete part of the model are much larger at the end of the period. The correlations between these errors are always negative and they are rather small. Estimating by maximum likelihood with the initial likelihood function, we checked that, except for the correlations between the residuals, all these coefficients are always significant at a 5% level. As for the correlations between the residuals, they are not significant at a 5% level in december 1985 and from december 1986 to december 1988.

The results on the correlation between the errors in the interest rate equation and in the discrete part of the model as well as the results on the significance of the coefficient associated to the Mill's ratio are very interesting as they may suggest that the selectivity bias in an ordinary least squares regression would not be serious. Having realized such an ordinary least squares regression (see table 22), we can indeed remark that the coefficient of the firm's sales in the short-term equation is similar to previous estimates (identical up to the third decimal).

Until now, in this subsection, we classified firms as in table 1, that is, we distinguish firms according to the fact that they have a short-term (respectively long-term) loan or not. With this classification, we have many observations in each category but our classes are not exhaustive as a firm can have both a short-term and a long-term bank loan. We will now consider the classification used in table 2 and distinguish between the following three models: a firm has only a short-term bank loan or not, a firm has only a long-term bank loan or not, a firm has both a short-term and a long-term bank loan or not. With this classification, we sometimes have very few data so that we only use the two-stage method. One can check in tables 23, 24 and 25 that the estimates are very similar to previous ones. One interesting new result is that the demand for long-term financial funds has a positive effect on the probability of observing only a long-term loan and a negative effect on the probability of observing only a short-term loan. As the reverse is found for the demand for short-term financial funds, this could mean that there is no rationing and that both the banks and the firms consider that short-term and long-term loans are not substitute. All these points are still in accordance with the preferred habitat theory. Moreover table 25 reveals an interesting phenomenon: the probability of observing a mixed debt contract is generally related with the firm's demand for both short-term and long-term financial funds, the coefficient associated to long-term demand being much higher than the one associated to short-term demand. Because the short-term rates in mixed contracts are smaller than the short-term rates in short-term contracts (as seen in the statistical analysis) this means that, to accept such a lesser yield, the bank is compensated by a lesser risk. In other words, the degree of risk aversion is an important explanatory variable as asserted by Cox, Ingersoll and Ross in their reformulation of preferred habitat theory.

Of course, these previous numerous points in favor of the preferred habitat theory must be severely relativised: we are not dealing with markets in the usual sense but, at the limit, with individualized markets. Moreover, this individualization corresponds largely to contracts designed according to the involved risk, this one including moral hazard. Consequently, we cannot escape the debt-looking contract theory. On the other hand, even if this last theory can in principle explain the fact that there is a specific pattern in the bank rates and consequently in the bank loans, it cannot be used to identify the really observed pattern because its emphasis is on the financing of a specific investment project instead of being on the general financing of the firm. A reconciliation is called for and our empirical results assess that this reconciliation could take the form of a synthesis between the debt-looking contract theory and the preferred habitat theory.



## CONCLUSION

So, having used well established theories to interpret our empirical results and conversely, having used our empirical results to discuss the relevance of these theories, we are somewhat confronted with a problem of consistency. In current practice, such a problem is not new. For instance, it was already remarked that Cost-Benefit Analysis should be seen as an element of a Planning Procedure (Hammond (1978)). A similar reconciliation is possible here. Let us consider a contract as a step in a non-tatonnement process and suppose that, when observed, this process is near an equilibrium, namely the one of the preferred habitat theory. We can then easily reconcile the individualized design of each contract with the persistency of a given term structure of interest rates across these contracts. Our results suggest such a formulation.

From an empirical point of view, the present work could in principle be extended by mixing this data set with other surveys and with firms' balance sheets. This extension would allow to have a better understanding of long-term bank loans and to analyse private debt in a more general setting where public debt, share issues and investment would also be taken into account.

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Table 1: Data from May 1979 to December 1988

	<i>CT</i> = 1	<i>CT</i> = 0	<i>CT</i> = 2	<i>LT</i> = 1	<i>LT</i> = 0	<i>LT</i> = 2
79-05	1667	476	283	497	1458	471
79-12	1639	443	170	522	1303	427
80-05	1802	337	210	507	1372	470
80-12	1775	359	182	540	1302	474
81-05	1715	305	194	519	1246	449
81-12	1544	267	152	477	1112	374
82-05	1638	254	148	524	1144	372
82-12	1617	277	206	556	1093	451
83-05	1643	250	167	554	1125	381
83-12	1525	264	182	606	1004	361
84-05	1542	249	260	592	988	471
84-12	1349	305	292	565	914	467
85-05	1394	252	323	514	931	524
85-12	1275	354	283	507	897	508
86-05	1387	384	348	505	998	619
86-12	1320	428	297	470	1033	542
87-05	1425	479	303	479	1208	520
87-12	1328	538	248	425	1218	471
88-05	1230	448	332	403	1061	546
88-12	1077	498	404	387	990	602

(*CT*=1) Number of firms with a short-term bank loan.

(*CT*=0) Number of firms without a short-term bank loan.

(*CT*=2) Number of firms which do not answer this question.

(*LT*=1) Number of firms with a long-term bank loan.

(*LT*=0) Number of firms without a long-term bank loan.

(*LT*=2) Number of firms which do not answer this question.

Table 2: Data from May 1979 to December 1988

	$X = 1$	$X = 2$	$X = 3$	$X = 4$
79-05	405	1055	57	314
79-12	454	966	61	304
80-05	451	1111	42	232
80-12	483	1071	46	221
81-05	461	1030	47	194
81-12	434	927	39	170
82-05	474	973	33	158
82-12	498	918	44	166
83-05	502	956	43	157
83-12	545	842	47	152
84-05	547	827	37	150
84-12	486	710	68	189
85-05	452	766	46	150
85-12	430	688	69	198
86-05	440	747	51	240
86-12	386	754	76	272
87-05	390	859	78	334
87-12	347	817	72	387
88-05	333	726	65	318
88-12	297	635	82	343

( $X=1$ ) Number of firms with both short-term and long-term bank loans.

( $X=2$ ) Number of firms with only short-term bank loans.

( $X=3$ ) Number of firms with only long-term bank loans.

( $X=4$ ) Number of firms without any bank loan.

Table 3: Data on interest rates from May 1979 to December 1988

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
79-05	256	10.45	1.43	4.25	18.00	1763	10.56	1.35	2.45	30.00
79-12	259	11.76	1.59	4.25	18.00	1569	12.79	1.05	2.25	19.00
80-05	215	13.03	1.83	4.50	16.05	1683	14.48	1.15	4.00	30.00
80-12	228	13.33	1.64	5.25	18.30	1634	13.94	1.23	4.00	25.20
81-05	210	13.73	1.83	8.95	22.00	1608	14.59	1.30	6.00	25.00
81-12	188	14.64	1.96	2.50	22.00	1433	15.65	1.13	10.10	23.00
82-05	187	14.92	1.58	7.23	23.00	1535	15.60	1.21	2.00	24.40
82-12	206	14.09	1.51	7.23	20.00	1465	14.46	1.13	9.44	21.00
83-05	194	13.56	1.37	8.50	18.00	1439	13.93	1.10	10.50	25.00
83-12	171	13.31	1.64	4.70	19.50	1363	13.90	1.12	4.00	20.00
84-05	178	12.90	1.44	8.00	19.00	1394	13.88	1.14	4.00	25.00
84-12	173	12.06	1.81	8.50	17.85	1268	13.58	1.17	2.50	26.00
85-05	146	11.98	1.61	8.90	16.10	1316	13.16	1.21	4.20	20.48
85-12	170	11.09	1.77	6.00	17.02	1205	12.29	1.20	9.00	20.48
86-05	186	10.76	1.82	2.00	17.00	1291	11.78	1.36	2.00	20.48
86-12	196	9.60	1.44	6.00	14.50	1261	10.96	1.58	3.00	20.48
87-05	228	9.57	1.54	6.00	17.85	1351	10.82	1.36	5.00	20.48
87-12	225	9.49	1.34	5.00	14.10	1241	10.70	1.35	7.36	20.00
88-05	206	9.29	1.36	4.25	15.00	1134	10.46	1.52	5.00	20.00
88-12	211	9.20	1.34	4.27	14.10	1040	10.08	1.44	2.00	16.50

(1) Number of firms declaring five-years interest rate.

(2) Five-years interest rate : mean; (3) standard deviation.

(4) Five-years interest rate : minimum value; (5) maximum value.

(6) Number of firms declaring their short-term interest rate.

(7) Short-term interest rate : mean; (8) standard deviation.

(9) Short term interest rate : minimum value; (10) maximum value.

Table 4: Data on interest rates differentials

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
79-05	225	10.34	1.31	10.36	1.09	-0.01	1.14	-5.65	3.30
79-12	218	11.83	1.51	12.68	0.84	-0.85	1.59	-8.35	5.05
80-05	187	13.07	1.84	14.33	0.77	-1.26	1.81	-9.60	2.00
80-12	201	13.31	1.65	13.80	1.14	-0.49	1.90	-11.75	3.50
81-05	179	13.87	1.75	14.50	1.29	-0.62	1.57	-6.00	3.08
81-12	160	14.63	1.92	15.40	0.91	-0.76	1.94	-12.65	5.00
82-05	168	14.91	1.56	15.42	1.21	-0.51	1.94	-8.62	13.25
82-12	183	14.08	1.54	14.23	0.76	-0.15	1.56	-7.50	4.40
83-05	171	13.51	1.36	13.79	0.77	-0.28	1.43	-6.00	4.00
83-12	156	13.38	1.59	13.76	1.03	-0.38	1.65	-8.90	4.50
84-05	166	12.96	1.42	13.61	0.63	-0.65	1.34	-5.35	3.65
84-12	155	12.12	1.80	13.38	0.85	-1.26	1.99	-9.75	4.75
85-05	134	11.99	1.57	12.96	0.90	-0.96	1.56	-6.85	3.35
85-12	134	11.26	1.74	12.06	0.91	-0.80	1.80	-6.25	4.92
86-05	148	10.90	1.68	11.61	1.10	-0.71	1.61	-5.95	5.00
86-12	162	9.69	1.45	10.74	1.56	-1.05	1.72	-10.85	3.05
87-05	178	9.66	1.64	10.69	1.26	-1.03	1.50	-4.85	5.10
87-12	179	9.56	1.34	10.61	1.17	-1.05	1.42	-6.75	3.30
88-5	155	9.37	1.50	10.29	1.37	-0.91	1.59	-6.30	3.30
88-12	167	9.26	1.36	9.89	1.45	-0.64	1.50	-5.26	4.37

(1) Number of firms declaring both short-term and five-years interest rates.

(2) Five-years interest rates : mean ; (3) standard deviation.

(4) Short-term interest rates : mean ; (5) standard deviation.

(6) Interest rate differential : mean; (7) standard deviation.

(8) Interest rate differential : minimum value; (9) maximum value.

Table 5: Short-term interest rate from May 1979 to December 1988

	$X = 1$	$X = 2$
79-05	10.36	10.49
79-12	12.69	12.78
80-05	14.39	14.50
80-12	13.97	13.91
81-05	14.51	14.58
81-12	15.44	15.66
82-05	15.56	15.64
82-12	14.28	14.47
83-05	13.84	13.91
83-12	13.73	13.91
84-05	13.69	13.89
84-12	13.47	13.63
85-05	12.95	13.23
85-12	12.06	12.31
86-05	11.67	11.84
86-12	10.73	10.91
87-05	10.66	10.83
87-12	10.56	10.74
88-05	10.38	10.49
88-12	10.03	10.18

( $X=1$ ) Group of firms with both short-term and long-term bank loans.

( $X=2$ ) Group of firms with only a short-term bank loan.



Table 6: Long-term interest rate from May 1979 to December 1988

	$X = 1$	$X = 3$
79-05	10.34	10.76
79-12	11.99	11.29
80-05	13.23	12.60
80-12	13.27	13.35
81-05	13.81	13.26
81-12	14.67	13.91
82-05	14.82	14.81
82-12	14.08	14.60
83-05	13.48	13.10
83-12	12.93	12.79
84-05	12.63	12.03
84-12	11.82	11.57
85-05	11.80	11.32
85-12	11.11	10.37
86-05	11.00	10.43
86-12	9.87	9.18
87-05	9.60	9.29
87-12	9.62	9.17
88-05	9.71	9.43
88-12	9.33	9.19

(X=1) Group of firms with both short-term and long-term bank loans.

(X=3) Group of firms with only a long-term bank loan.

Table 7: Percentage of firms with a bad current treasury situation from May 1979 to December 1988

	$X = 1$	$X = 2$	$X = 3$	$X = 4$
79-05	32	38	19	17
79-12	30	36	11	15
80-05	36	40	17	14
80-12	44	46	19	18
81-05	50	50	25	22
81-12	46	47	15	27
82-05	47	47	21	20
82-12	48	51	25	26
83-05	45	51	32	22
83-12	43	49	21	22
84-05	44	53	21	16
84-12	37	46	25	22
85-05	38	47	13	17
85-12	32	36	8	19
86-05	27	38	9	15
86-12	26	30	9	12
87-05	26	28	5	13
87-12	23	28	11	9
88-05	26	25	5	8
88-12	30	29	10	7

( $X=1$ ) Group of firms with both short-term and long-term bank loans.

( $X=2$ ) Group of firms with only a short-term bank loan.

( $X=3$ ) Group of firms with only a long-term bank loan.

( $X=4$ ) Group of firms without any bank loan.

Table 8: Percentage of firms with bad past treasury situation from May 1979 to December 1988

	$X = 1$	$X = 2$	$X = 3$	$X = 4$
79-05	29	33	24	16
79-12	27	31	11	14
80-05	37	35	21	19
80-12	45	43	17	21
81-05	51	45	28	27
81-12	43	43	18	29
82-05	39	43	30	19
82-12	49	46	27	29
83-05	49	46	37	25
83-12	44	44	27	23
84-05	42	47	21	23
84-12	35	40	26	26
85-05	38	44	24	22
85-12	30	30	20	17
86-05	25	34	18	17
86-12	23	24	7	12
87-05	22	25	6	13
87-12	19	27	12	13
88-05	25	23	11	9
88-12	27	28	12	9

( $X=1$ ) Group of firms with both short-term and long-term bank loans.

( $X=2$ ) Group of firms with only a short-term bank loan.

( $X=3$ ) Group of firms with only a long-term bank loan.

( $X=4$ ) Group of firms without any bank loan.

Table 9: Percentage of firms with bad expected exploitation results from May 1979 to December 1988

	$X = 1$	$X = 2$	$X = 3$	$X = 4$
79-05	27	33	26	24
79-12	30	29	23	25
80-05	29	33	14	20
80-12	44	47	30	38
81-05	47	47	38	41
81-12	43	50	31	40
82-05	40	45	24	27
82-12	52	53	25	44
83-05	48	51	46	41
83-12	52	52	36	47
84-05	43	47	30	39
84-12	43	42	38	43
85-05	34	39	22	26
85-12	32	37	13	28
86-05	26	29	25	26
86-12	24	28	16	28
87-05	21	26	14	18
87-12	22	26	15	22
88-05	14	19	8	12
88-12	21	17	15	11

( $X=1$ ) Group of firms with both short-term and long-term bank loans.

( $X=2$ ) Group of firms with only a short-term bank loan.

( $X=3$ ) Group of firms with only a long-term bank loan.

( $X=4$ ) Group of firms without any bank loan.

Table 10: Percentage of firms with bad past exploitation results from May 1979 to December 1988

	$X = 1$	$X = 2$	$X = 3$	$X = 4$
79-05	35	44	33	27
79-12	29	37	23	22
80-05	31	39	24	24
80-12	43	47	26	29
81-05	57	54	42	36
81-12	52	53	20	35
82-05	49	52	30	36
82-12	53	58	29	40
83-05	52	55	42	39
83-12	50	53	34	35
84-05	49	55	27	37
84-12	46	52	31	35
85-05	44	52	28	33
85-12	40	45	14	30
86-05	38	46	23	32
86-12	30	35	17	20
87-05	32	38	22	28
87-12	28	33	21	21
88-05	24	30	17	16
88-12	29	27	16	12

( $X=1$ ) Group of firms with both short-term and long-term bank loans.

( $X=2$ ) Group of firms with only a short-term bank loan.

( $X=3$ ) Group of firms with only a long-term bank loan.

( $X=4$ ) Group of firms without any bank loan.

Table 11: Percentage of firms having postponed investment projects from May 1979 to December 1988

	$X = 1$	$X = 2$	$X = 3$	$X = 4$
79-05	19	28	14	15
79-12	18	29	11	13
80-05	21	27	12	13
80-12	23	29	11	15
81-05	29	32	17	18
81-12	29	34	13	21
82-05	32	34	18	20
82-12	30	35	14	20
83-05	29	33	21	20
83-12	27	36	19	28
84-05	22	35	11	17
84-12	23	35	18	19
85-05	25	33	9	21
85-12	21	27	9	27
86-05	19	27	10	15
86-12	18	24	8	11
87-05	16	20	6	12
87-12	14	20	10	10
88-05	13	16	11	8
88-12	14	15	8	6

(X=1) Group of firms with both short-term and long-term bank loans.

(X=2) Group of firms with only a short-term bank loan.

(X=3) Group of firms with only a long-term bank loan.

(X=4) Group of firms without any bank loan.

Table 12: Percentage of firms having problems of outlets from May 1979 to December 1988

	$X = 1$	$X = 2$	$X = 3$	$X = 4$
79-05	27	34	19	25
79-12	22	26	16	15
80-05	25	28	24	17
80-12	41	43	24	23
81-05	49	48	36	34
81-12	40	38	23	29
82-05	36	38	24	24
82-12	35	39	25	24
83-05	39	42	42	34
83-12	36	40	19	25
84-05	37	40	32	26
84-12	32	38	21	28
85-05	36	37	22	25
85-12	31	31	14	25
86-05	32	35	20	25
86-12	29	32	20	21
87-05	28	31	28	23
87-12	24	26	21	18
88-05	22	23	18	17
88-12	20	17	17	11

(X=1) Group of firms with both short-term and long-term bank loans.

(X=2) Group of firms with only a short-term bank loan.

(X=3) Group of firms with only a long-term bank loan.

(X=4) Group of firms without any bank loan.

Table 13: Percentage of firms having problems with previous debts from May 1979 to December 1988

	$X = 1$	$X = 2$	$X = 3$	$X = 4$
79-05	21	19	16	9
79-12	24	19	9	10
80-05	22	18	14	7
80-12	22	18	9	4
81-05	27	16	13	6
81-12	24	18	10	6
82-05	20	20	15	6
82-12	24	19	9	3
83-05	20	17	12	8
83-12	20	14	13	8
84-05	20	16	3	8
84-12	20	18	10	9
85-05	22	15	15	9
85-12	19	19	12	11
86-05	24	20	14	7
86-12	20	19	18	11
87-05	21	18	11	11
87-12	22	20	12	10
88-05	23	18	18	8
88-12	20	19	11	10

(X=1) Group of firms with both short-term and long-term bank loans.

(X=2) Group of firms with only a short-term bank loan.

(X=3) Group of firms with only a long-term bank loan.

(X=4) Group of firms without any bank loan.



Table 14: Percentage of firms having financial difficulties due to their investment from May 1979 to December 1988

	$X = 1$	$X = 2$	$X = 3$	$X = 4$
79-05	32	20	23	15
79-12	34	19	33	13
80-05	37	20	36	14
80-12	36	18	28	13
81-05	29	16	15	14
81-12	29	14	20	18
82-05	30	15	21	13
82-12	29	17	29	15
83-05	29	17	28	15
83-12	31	15	25	10
84-05	30	17	13	17
84-12	36	21	26	15
85-05	42	20	26	15
85-12	42	20	29	17
86-05	38	23	37	17
86-12	36	23	33	14
87-05	38	23	40	16
87-12	40	26	33	18
88-05	41	27	37	19
88-12	46	27	39	21

(X=1) Group of firms with both short-term and long-term bank loans.

(X=2) Group of firms with only a short-term bank loan.

(X=3) Group of firms with only a long-term bank loan.

(X=4) Group of firms without any bank loan.

Table 15: Percentage of firms declaring to be rationed by their bank from May 1979 to December 1988

	$X = 1$	$X = 2$	$X = 3$	$X = 4$
79-05	5	8	3	1
79-12	6	8	0	3
80-05	11	11	2	2
80-12	10	14	4	3
81-05	11	14	2	3
81-12	13	14	5	4
82-05	10	13	6	2
82-12	13	14	2	3
83-05	15	17	2	3
83-12	11	14	2	5
84-05	9	14	5	1
84-12	9	11	6	5
85-05	9	10	2	4
85-12	5	10	0	2
86-05	4	7	0	0
86-12	4	5	0	3
87-05	2	5	0	1
87-12	1	4	1	2
88-05	3	4	0	0
88-12	4	4	0	0

( $X=1$ ) Group of firms with both short-term and long-term bank loans.

( $X=2$ ) Group of firms with only a short-term bank loan.

( $X=3$ ) Group of firms with only a long-term bank loan.

( $X=4$ ) Group of firms without any bank loan.

Table 16: Average sales (millions of francs) from May 1979 to December 1988

	$X = 1$	$X = 2$	$X = 3$	$X = 4$
79-05	267	247	53	139
79-12	380	261	216	123
80-05	376	251	107	183
80-12	326	262	132	193
81-05	469	279	53	260
81-12	465	303	94	171
82-05	517	399	77	240
82-12	523	388	60	249
83-05	463	533	282	304
83-12	539	476	214	267
84-05	595	445	84	373
84-12	763	553	147	108
85-05	746	517	156	380
85-12	661	462	160	543
86-05	557	440	906	319
86-12	576	507	261	321
87-05	483	391	169	812
87-12	434	506	191	566
88-05	346	570	1440	490
88-12	269	625	204	621

( $X=1$ ) Group of firms with both short-term and long-term loans.

( $X=2$ ) Group of firms with only a short-term bank loan.

( $X=3$ ) Group of firms with only a long-term bank loan.

( $X=4$ ) Group of firms without any bank loan.

Table 17: Probit estimates of short-term bank loans

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	$\chi^2$	(8)
79-05	0.20**	0.31**	0.53**	0.64**	0.83**	0.35**	-1.78**	380	78%
79-12	0.20**	0.39**	0.47**	0.58**	0.88**	0.32**	-1.85**	361	78%
80-05	0.20**	0.53**	0.27**	0.47**	0.66**	0.43**	-1.64**	305	78%
80-12	0.21**	0.43**	0.42**	0.45**	0.61**	0.52**	-1.84**	336	79%
81-05	0.17**	0.39**	0.29**	0.46**	0.72**	0.47**	-1.28**	279	78%
81-12	0.22**	0.32**	0.40**	0.37**	0.80**	0.49**	-1.82**	265	79%
82-05	0.21**	0.46**	0.26**	0.63**	0.63**	0.41**	-1.69**	260	79%
82-12	0.22**	0.34**	0.36**	0.34**	0.82**	0.65**	-1.91**	297	80%
83-05	0.20**	0.33**	0.34**	0.53**	0.76**	0.24**	-1.67**	253	79%
83-12	0.19**	0.33**	0.54**	0.54**	0.61**	0.12**	-1.61**	259	80%
84-05	0.20**	0.59**	0.37**	0.73**	0.52**	0.33**	-1.74**	273	81%
84-12	0.23**	0.30**	0.28**	0.59**	0.66**	0.30**	-2.17**	268	79%
85-05	0.16**	0.58**	0.42**	0.31**	0.58**	0.17**	-1.35**	201	76%
85-12	0.17**	0.27**	0.34**	0.40**	0.60**	0.34**	-1.53**	206	74%
86-05	0.16**	0.40**	0.45**	0.48**	0.56**	0.34**	-1.54**	249	75%
86-12	0.20**	0.39**	0.24**	0.90**	0.74**	0.19**	-1.99**	292	76%
87-05	0.17**	0.46**	0.48**	0.74**	0.62**	0.21**	-1.75**	281	74%
87-12	0.16**	0.42**	0.59**	0.65**	0.16**	0.62**	-1.74**	298	75%
88-05	0.15**	0.49**	0.76**	0.89**	1.18**	0.19**	-1.64**	344	77%
88-12	0.14**	0.47**	0.54**	0.92**	0.90**	0.33**	-1.69**	335	76%

(1) Logarithm of the firm's sales, (2) Evaluation of the current treasury situation, (3) Demand for long-term financial funds, (4) Demand for short-term financial funds, (5) Demand for short-term loans, (6) Current payments on previous debt, (7) Intercept, (8) Percent correctly predicted probability.

\*\* means a p-value < 0.05.

Table 18: Probit estimates of five-years bank loans

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	$\chi^2$	(8)
79-05	0.03**	-0.15**	1.20**	-0.02	0.06	0.14**	-1.37**	324	73%
79-12	0.07**	-0.18**	1.34**	-0.05	0.00	0.09**	-1.77**	403	76%
80-05	0.06**	-0.16**	1.14**	0.04	0.11**	0.12**	-1.68**	313	74%
80-12	0.00	-0.19**	1.21**	0.11**	0.07	0.11**	-1.01**	351	70%
81-05	0.00	-0.12**	1.18**	0.06	-0.06	0.30**	-0.96**	328	73%
81-12	0.02*	-0.19**	1.16**	0.06	-0.01	0.16**	-1.20**	286	74%
82-05	0.04**	-0.10**	1.28**	0.02	0.11**	-0.04	-1.44**	367	76%
82-12	-0.02	-0.16**	1.23**	0.01	0.09	0.11*	-0.69**	344	75%
83-05	-0.02	-0.15**	1.21**	-0.04	0.06	0.05	-0.69**	335	74%
83-12	0.00	-0.17**	1.32**	-0.05	0.08	0.10*	-0.92**	392	75%
84-05	0.01	-0.21**	1.12**	-0.05	0.27**	0.11	-0.91**	309	73%
84-12	0.02*	-0.11**	1.31**	-0.16**	-0.01	0.06	-1.13**	354	76%
85-05	0.02	-0.30**	1.20**	0.11*	0.10	0.21**	-1.15**	315	76%
85-12	0.04**	-0.21**	1.37**	0.06	0.02	-0.12*	-1.32**	357	77%
86-05	0.02	-0.29**	1.28**	-0.01	0.05	0.01	-1.02**	326	74%
86-12	0.04**	-0.10	1.28**	0.06	-0.02	0.05	-1.37**	302	73%
87-05	0.00	-0.20**	1.43**	0.04	0.12*	0.00	-1.11**	403	74%
87-12	-0.02	-0.10	1.52**	0.09	-0.02	-0.12	-0.94**	409	76%
88-05	0.00	-0.14	1.55**	-0.06	0.19*	0.14	-1.17**	407	75%
88-12	-0.04	-0.12	1.54**	0.09	0.12	-0.09	-0.63*	375	78%

(1) Logarithm of the firm's sales, (2) Evaluation of the current treasury situation, (3) Demand for long-term financial funds, (4) Demand for short-term financial funds, (5) Demand for short-term loans, (6) Current payments on previous debt, (7) Intercept, (8) Percent correctly predicted probability.

\*\* means a p-value < 0.05, \* means a p-value < 0.10.

Table 19: Short-term interest rate offered by banks

	(1)	(2)	(3)	(4)	(5)
79-05	-0.030**	-0.045**	7.238**	0.06	1131
79-12	-0.009**	-0.039**	7.217**	0.02	1402
80-05	-0.013**	-0.016**	7.411**	0.00	1558
80-12	-0.021**	-0.010	7.467**	0.01	1527
81-05	-0.013**	-0.011	7.424**	0.01	1497
81-12	-0.018**	-0.021**	7.537**	0.01	1337
82-05	-0.019**	-0.029**	7.543**	0.01	1402
82-12	-0.021**	-0.004	7.507**	0.00	1346
83-05	-0.021**	-0.001	7.471**	0.00	1338
83-12	-0.021**	-0.049**	7.448**	0.00	1254
84-05	-0.020**	-0.031**	7.448**	0.00	1291
84-12	-0.022**	-0.028**	7.444**	0.01	1146
85-05	-0.025**	-0.053**	7.442**	0.01	1189
85-12	-0.030**	-0.053**	7.417**	0.03	1059
86-05	-0.035**	-0.020*	7.462**	0.01	1115
86-12	-0.048**	-0.040**	7.517**	0.01	1067
87-05	-0.044**	-0.047**	7.470**	0.01	1097
87-12	-0.044**	-0.038**	7.458**	0.01	954
88-05	-0.054**	-0.027**	7.564**	0.01	881
88-12	-0.056**	-0.016*	7.562**	0.12	746

(1) Logarithm of the firm's sales, (2) Inverse of the Mill's ratio, (3) Intercept,  
 (4) Estimate of the residual variance, (5) Number of observations.

\* means a p-value < 0.10, \*\* means a p-value < 0.05.

Table 20: Long-term interest rate offered by banks

	(1)	(2)	(3)	(4)	(5)
79-05	-0.029**	-0.010	7.265**	0.03	323
79-12	-0.014*	0.000	7.199**	0.11	337
80-05	-0.019*	0.015	7.329**	0.14	348
80-12	-0.006	-0.056*	7.292**	0.09	358
81-05	-0.013**	-0.017	7.372**	0.04	325
81-12	-0.003	-0.021	7.328**	0.04	294
82-05	0.000	-0.063**	7.363**	0.02	316
82-12	-0.016**	-0.037**	7.463**	0.01	339
83-05	-0.012**	-0.007	7.337**	0.04	343
83-12	-0.006	0.002	7.220**	0.04	347
84-05	0.005	0.048**	7.027**	0.02	353
84-12	0.004	0.045**	6.963**	0.03	320
85-05	-0.011**	0.052**	7.135**	0.04	300
85-12	-0.001	0.063**	6.885**	0.09	301
86-05	-0.023**	0.011	7.239**	0.03	297
86-12	-0.032**	0.096**	7.112**	0.06	293
87-05	-0.029**	0.007	7.169**	0.03	295
87-12	-0.026**	0.023	7.104**	0.05	244
88-05	-0.024**	0.053*	7.045**	0.10	251
88-12	-0.029**	0.042*	7.096**	0.05	237

(1) Logarithm of the firm's sales, (2) Inverse of the Mill's ratio, (3) Intercept,  
 (4) Estimate of the residual variance, (5) Number of observations.

\* means a p-value < 0.10, \*\* means a p-value < 0.05.

Table 21: Maximum likelihood estimates of short-term debt contracts

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
79-05	7.28	-0.03	7.01	0.05	0.08	0.09	0.12	0.06	0.22	0.15	-0.3	-698
79-12	7.27	-0.01	7.17	0.02	0.02	0.03	0.04	0.02	0.16	0.05	-0.3	-247
80-05	7.42	-0.01	7.31	0.04	0.02	0.03	0.05	0.03	0.07	0.07	-0.2	1080
80-12	7.48	-0.02	7.29	0.05	0.04	0.05	0.06	0.06	0.10	0.11	-0.2	635
81-05	7.44	-0.01	7.33	0.03	0.02	0.04	0.06	0.04	0.08	0.08	-0.3	920
81-12	7.56	-0.02	7.40	0.03	0.04	0.03	0.07	0.04	0.09	0.09	-0.3	669
82-05	7.56	-0.02	7.40	0.04	0.02	0.06	0.06	0.04	0.09	0.09	-0.2	737
82-12	7.53	-0.02	7.33	0.03	0.04	0.03	0.09	0.07	0.07	0.11	-0.3	1010
83-05	7.49	-0.02	7.30	0.05	0.04	0.06	0.09	0.03	0.07	0.12	-0.3	1171
83-12	7.46	-0.02	7.28	0.03	0.06	0.06	0.07	0.01	0.07	0.10	-0.2	955
84-05	7.46	-0.02	7.28	0.06	0.04	0.08	0.06	0.03	0.07	0.11	-0.2	1016
84-12	7.46	-0.02	7.25	0.03	0.02	0.05	0.07	0.03	0.08	0.09	-0.2	633
85-05	7.46	-0.02	7.25	0.10	0.06	0.05	0.10	0.02	0.09	0.16	-0.3	571
85-12	7.45	-0.03	7.17	0.05	0.07	0.08	0.12	0.07	0.17	0.19	-0.2	-319
86-05	7.49	-0.04	7.13	0.10	0.11	0.12	0.13	0.09	0.11	0.24	-0.3	154
86-12	7.55	-0.05	7.05	0.13	0.07	0.25	0.19	0.07	0.12	0.28	-0.3	-4
87-05	7.49	-0.04	7.02	0.15	0.15	0.22	0.19	0.08	0.10	0.30	-0.3	109
87-12	7.48	-0.04	6.94	0.18	0.24	0.24	0.26	0.13	0.10	0.38	-0.3	19
88-05	7.58	-0.05	6.92	0.26	0.35	0.33	0.52	0.08	0.11	0.43	-0.3	-6
88-12	7.57	-0.06	6.70	0.42	0.47	0.73	0.77	0.29	0.12	0.82	-0.3	-134

(1) Intercept in the interest rate equation, (2) Logarithm of the firm's sales, (3) Intercept in the discrete part of the model, (4) Evaluation of the current treasury situation, (5) Demand for long-term financial funds, (6) Demand for short-term financial funds, (7) Demand for a short-term loan, (8) Current payments on previous debt, (9) Estimate of the square root of the residual variance in the interest rate equation, (10) Estimate of the square root of the residual variance in the discrete part of the model, (11) Correlation between the errors, (12) Logarithm of the likelihood function.

In the first eight columns, all estimates are significant at a 5% level.



Table 22: Short-term interest rate offered by banks

	(1)	(2)	(3)
79-05	-0.027**	7.238**	0.06
79-12	-0.007*	7.217**	0.02
80-05	-0.012**	7.411**	0.00
80-12	-0.021**	7.467**	0.01
81-05	-0.013**	7.424**	0.01
81-12	-0.017**	7.537**	0.01
82-05	-0.017**	7.543**	0.01
82-12	-0.021**	7.507**	0.00
83-05	-0.021**	7.471**	0.00
83-12	-0.019**	7.448**	0.00
84-05	-0.019**	7.448**	0.00
84-12	-0.020**	7.444**	0.01
85-05	-0.023**	7.442**	0.01
85-12	-0.027**	7.417**	0.03
86-05	-0.034**	7.462**	0.01
86-12	-0.046**	7.517**	0.01
87-05	-0.043**	7.470**	0.01
87-12	-0.043**	7.458**	0.01
88-05	-0.054**	7.564**	0.01
88-12	-0.057**	7.562	0.01

(1) Logarithm of the firm's sales, (2) Intercept, (3) Estimate of the residual variance.

\* means a p-value  $< 0.10$ , \*\* means a p-value  $< 0.05$ .

Table 23: Two-stage estimates of short-term bank loans when they are not mixed with long-term ones

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
79-05	-0.88**	0.09**	0.27**	-0.55**	0.35**	0.50**	0.07	7.22**	-0.03**	0.01
79-12	-0.92**	0.09**	0.30**	-0.72**	0.31**	0.46**	0.06	7.30**	-0.01**	-0.09**
80-05	-0.47**	0.07**	0.43**	-0.70**	0.13**	0.26**	0.09*	7.45**	-0.02**	-0.02**
80-12	-0.89**	0.11**	0.33**	-0.74**	0.18**	0.13**	0.13	7.47**	-0.02**	-0.02*
81-05	-0.47**	0.08**	0.31**	-0.74**	0.14**	0.27**	-0.20**	7.46**	-0.02**	-0.01*
81-12	-0.46**	0.07**	0.25**	-0.63**	0.07	0.29**	0.03	7.57**	-0.02**	-0.04**
82-05	-0.15	0.05**	0.32**	-0.79**	0.16**	0.12*	0.21**	7.56**	-0.02**	-0.01**
82-12	-0.83**	0.11**	0.26**	-0.84**	0.14**	0.22**	0.17**	7.53**	-0.02**	-0.01**
83-05	-0.86**	0.11**	0.33**	-0.78**	0.20**	0.23**	0.07	7.49**	-0.02**	-0.02**
83-12	-0.64**	0.08**	0.35**	-0.80**	0.29**	0.16**	-0.10	7.47**	-0.02**	-0.03**
84-05	-0.62**	0.08**	0.53**	-0.67**	0.14**	-0.01	-0.07	7.45**	-0.02**	-0.02
84-12	-1.30**	0.13**	0.28**	-0.74**	0.33**	0.33**	0.03	7.45**	-0.02**	-0.01
85-05	-0.88**	0.10**	0.52**	-0.75**	-0.01	0.12*	-0.04	7.47**	-0.02**	-0.01
85-12	-0.76**	0.08**	0.32**	-0.75**	0.11	0.29**	0.20**	7.42**	-0.02**	-0.05**
86-05	-0.98**	0.09**	0.46**	-0.62**	0.39**	0.14**	0.27**	7.50**	-0.03**	-0.03**
86-12	-1.63**	0.14**	0.38**	-0.56**	0.38**	0.19**	0.11*	7.62**	-0.05**	-0.06**
87-05	-1.02**	0.09**	0.29**	-0.61**	0.44**	0.22**	0.16**	7.50**	-0.04**	-0.03*
87-12	-1.11**	0.08**	0.44**	-0.51**	0.42**	0.43**	0.28**	7.50**	-0.04**	-0.03**
88-05	-0.98**	0.08**	0.22**	-0.50**	0.57**	0.29**	0.10	7.58**	-0.05**	-0.01
88-12	-0.79**	0.04**	0.33**	-0.47**	0.56**	0.26**	0.27**	7.55**	-0.05**	-0.01

(1) Intercept in the discrete part of the model, (2) Logarithm of the firm's sales, (3) Evaluation of the current treasury situation, (4) Demand for long-term financial funds, (5) Demand for short-term financial funds, (6) Demand for a short-term bank loan, (7) Current payments on previous debt, (8) Intercept in the interest rate equation, (9) Logarithm of the firm's sales, (10) Inverse of the Mill's ratio.

\* means a p-value < 0.15, \*\* means a p-value < 0.05.

Table 24: Two-stage estimates of long-term debt contracts when they are not mixed with short-term ones

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
79-05	-0.46	-0.14**	-0.08	0.49	-0.40**	-0.42**	-0.21	7.09	-0.03**	0.08*
79-12	-0.98**	-0.09**	-0.53**	0.43	-0.20	n. a.	0.01	7.46	-0.02*	-0.08
80-05	-0.97**	-0.11**	-0.44**	0.67	0.00	-0.45**	-0.23	7.30	0.01	-0.14*
80-12	-1.19**	-0.10**	-0.52**	0.89	0.01	-0.45**	-0.54*	7.40	0.02	-0.18**
81-05	-0.50	-0.13**	-0.30**	0.46	-0.19	-0.50**	-0.08	7.45	-0.01	0.06
81-12	-0.56	-0.14**	-0.55**	0.60	-0.15	-0.15	0.13	7.45	0.01	-0.16*
82-05	-0.70	-0.15**	-0.47**	0.74	-0.55*	-0.20	0.17	7.55	-0.02*	-0.01
82-12	0.33	-0.26**	-0.45**	0.98	-0.25	-0.65**	-0.16	7.42	0.00	-0.06*
83-05	-0.89**	-0.12**	-0.12	0.75	-0.77**	-0.31*	-0.28	7.53	-0.10*	0.31*
83-12	-1.04**	-0.09**	-0.76**	0.51	-0.09	-0.41	0.16	7.06	-0.01	0.11
84-05	0.40	-0.24**	-0.62**	0.79	-0.61**	0.24*	7.11**	7.11	-0.02*	0.11**
84-12	-0.65*	-0.11**	0.14	0.71	-0.62**	-0.67**	-0.28*	7.11	0.00	-0.06
85-05	-0.47	-0.13**	-0.58**	0.72	-0.10	-0.27**	0.24	7.18	0.02*	-0.21**
85-12	-0.52	-0.12**	-0.92**	0.78	n. a.	-0.42**	-0.48**	6.97	-0.03**	0.14**
86-05	0.72*	-0.25**	-0.68**	0.88	n. a.	-0.81**	-0.31*	7.29	-0.05**	0.09**
86-12	-1.16**	-0.08*	-0.54**	1.11	n. a.	-1.15**	-0.19	6.80	-0.01	0.06**
87-05	-0.38	-0.13**	-0.63**	0.75	-0.22	-0.36**	-0.48**	7.45	-0.05*	-0.07
87-12	-0.77*	-0.11**	-0.18	0.95	-0.55**	-0.60**	-0.14	7.10	-0.04**	0.08*
88-05	-0.59	-0.11**	-0.97**	0.65	-0.66**	n. a.	0.19*	6.61	0.00	0.11*
88-12	0.15	-0.17**	-0.42**	0.87	-0.38**	-0.21	-0.39**	6.88	-0.01*	0.06*

(1) Intercept in the discrete part of the model, (2) Logarithm of the firm's sales, (3) Evaluation of the current treasury situation, (4) Demand for long-term financial funds, (5) Demand for short-term financial funds, (6) Demand for a short-term bank loan, (7) Current payments on previous debt, (8) Intercept in the interest rate equation, (9) Logarithm of the firm's sales, (10) Inverse of the Mill's ratio.

All estimates in columns (4) and (8) are significant at a 0.05 level.

\* means a p-value < 0.15, \*\* means a p-value < 0.05.

Table 25: Two-stage estimates of mixed debt contracts

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
79-05	-2.50**	0.09**	-0.05	1.18**	0.03	-0.05	-0.27**	7.28**	-0.03**	0.00
79-12	-2.32**	0.08**	-0.02	1.29**	0.01	-0.02	0.21**	7.24**	-0.01**	-0.01
80-05	-2.16**	0.08**	-0.18**	1.07**	0.12*	0.06	0.17**	7.33**	-0.01**	0.00
80-12	-1.56**	0.02	-0.07	1.09**	0.08	0.19**	0.18**	7.34**	-0.01**	0.01
81-05	-1.72**	0.02	-0.09*	1.18**	0.14*	0.03	0.45**	7.32**	-0.01**	0.01
81-12	-1.86**	0.05**	-0.13*	0.99**	0.09	0.10*	0.15*	7.41**	-0.01*	0.00
82-05	-2.11**	0.07**	-0.14*	1.11**	0.12*	0.19**	-0.04	7.44**	-0.01**	-0.03**
82-12	-1.56**	0.02	-0.14**	1.17**	0.02	0.16**	0.11	7.48**	-0.02**	-0.01**
83-05	-1.47**	0.02	-0.06	1.09**	-0.06	0.09*	0.06	7.40**	-0.01**	-0.01*
83-12	-1.63**	0.03	-0.12	1.28**	-0.07	0.11*	0.06	7.34**	-0.01**	-0.01
84-05	-1.68**	0.04**	-0.22**	0.95**	0.11*	0.29**	0.24**	7.29**	-0.01**	0.02*
84-12	-1.76**	0.04**	-0.18**	1.06**	0.00	0.11*	0.24**	7.29**	-0.01**	0.01
85-05	-1.33**	0.00	-0.22**	1.07**	0.29**	0.17**	0.21**	7.28**	-0.02**	0.07**
85-12	-1.90**	0.05**	-0.09	1.20**	0.17*	0.13*	0.01	7.22**	0.02**	0.01
86-05	-1.74**	0.04*	-0.25**	1.16**	-0.05	0.23**	0.02	7.34**	-0.03**	0.01
86-12	-1.63**	0.03	-0.09	0.99**	0.22**	0.22**	0.03	7.39**	-0.04**	0.02*
87-05	-1.73**	0.02	-0.05	1.27**	0.11	0.31**	0.06	7.34**	-0.04**	0.01
87-12	-1.53**	-0.01	-0.14*	1.51**	0.23**	-0.02	-0.08	7.35**	-0.04**	0.01
88-05	-1.83**	0.01	0.17	1.48**	-0.06	0.41**	0.15*	7.42**	-0.05**	0.01
88-12	-1.87**	0.02	-0.01	1.32**	0.23**	0.37**	-0.08	7.36**	-0.04**	0.02

(1) Intercept in the discrete part of the model, (2) Logarithm of the firm's sales, (3) Evaluation of the current treasury situation, (4) Demand for long-term financial funds, (5) Demand for short-term financial funds, (6) Demand for a short-term bank loan, (7) Current payments on previous debt, (8) Intercept in the interest rate equation, (9) Logarithm of the firm's sales, (10) Inverse of the Mill's ratio.

\* means a p-value < 0.15, \*\* means a p-value < 0.05.

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