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This paper examines the role of interest rates and securities within the context of the small firm—bank lending relationship and questions whether banks alter their lending conditions on the basis of specific firm characteristics and the nature of the borrowing undertaken. The results suggest that the imposition of full collateralization reduces the role of interest rates considerably, although there is evidence of banks exercising their market power in more costly lending of the smallest of firms.

I. INTRODUCTION

The lending side of the credit market is often characterized by the risk-neutral bank. While it is unrealistic to assume that banks' have perfect foresight with respect to "good" and "bad" risk firms, it is not too absurd to assume that the bank has an array of potentially useful information on the firm a priori, that is before it determines the lending contract[1]. If this is indeed the case then there must be a number of interest rate/security trade-offs that leave the bank no worse off. Accepting that the presence of private information has a distortionary effect on the contract between bank and borrower (see Chan & Thakor, 1987), we use data collected in our 1991 survey of UK small firms to examine the role of interest rates and security, and ask whether banks differentiate between firms on the basis of a number of observable characteristics.

The plan of the paper is as follows. In the next section we discuss the firm and loan characteristics relevant to the hypotheses set out in Section 3. In Section 3 we provide an analysis of the data and methodology used, and set out three testable hypotheses. In Section 4 we provide a detailed analysis of the results. We conclude in Section 5 with an overview of our

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results focusing on banks' ability to differentiate between firms on the basis of observable characteristics. In doing so we question both the role of market power in the relationship, the impact of collateralization on the lending contract, and the "distance" maintained in the relationship.

II.   RELEVANT FIRM AND LOAN CHARACTERISTICS

The issue of small firm bank loans has been at the forefront of the current UK debate on the small firm/clearing bank relationship, after initially resurfacing as a major issue in 1991. It has been suggested in many quarters that the high street banks have been imposing extortionate margins on loans to small firms, in effect exploiting their dominant position as the major, and in many cases only, supplier of small firm lending. In addition the issue of security on loans was identified as an important concern for small firms in our 1991 survey, detailed in Cowling, Samuels, and Sugden (1991); approximately 22 percent of surveyed firms indicated that security was their major concern with existing bank practices.

However, Cowling et al. (1991) reported an average percentage over base of only three, with the median charge falling between two percent and three percent over base rates. Evidence of this nature suggests that this aspect of the relationship is not a major issue of contention and that banks are simply imposing a relatively small premium on what is, after all, probably their most risky area of lending. Such evidence is broadly in line with the results of the Bank of England-Treasury report on bank lending to small businesses. This recorded average margins on small firm loans in the 2.5 percent to 3.5 percent range. It is also consistent with empirical evidence from both Binks and Ennew (1993) and Keasey and Watson (1993).

On the issue of security our survey recorded an average ratio of around two times the loan value. This compares to Binks, Ennew, and Reed (1988), who found ratios on new loans in the 1.5-2 range, and Binks and Ennew (1993) who found average ratios on overdrafts of around two. What is interesting to note here is that most empirical studies report high average security ratios on small business lending. It would seem that on average loans are fully secured, for which we would anticipate collateralof merely one times the loan value plus some realization fee. It is important to question at this point, or at least raise the issue of, firms evaluation of assets they post as security when borrowing. Clearly in the event of loan default the sale value of an asset may be considerably less than its estimated value at the time the loan was authorized. If we consider that more firms default in recessions, when asset prices tend to be lower and demand tends to be

slacker, then this may be reflected in substantially lower prices for assets. Thus for a bank the valuation of assets may be less than that reported by the firm. Clearly the only true ratio is the value of the asset used as security if and when the firm defaults on the loan. At issue here is that banks have reported heavy losses on lending to small businesses. If, as Cowling et al. (1991), Binks et al. (1988), Binks and Ennew (1993) and Keasey and Watson (1993) seem to suggest, the majority of loans are fully collateralized, then the question must be asked as to how banks actually make these huge losses. We are left with four possible explanations:

1. small businesses are consistently overvaluing their assets over a considerable period of time;
2. the 20 to 30 percent of unsecured loans are responsible for all the reported losses attributable to this sector;
3. banks are misreporting losses on small business lending; or
4. the majority of loan defaults occur at the sole trader level and losses reported by the banks are the cumulation of thousands of small sum defaults.

Evidence pertaining to the latter type of trader, which is not heavily represented in our survey, can be found in Cressy (1992). Moreover, bearing in mind that evidence on security ratios reported in Keasey and Watson (1993) was provided by banks themselves, we reject explanation (i). We accept that overestimation on firms' part may occur when valuing asset cover but not by enough to undermine the basic arguments that the majority of loans are fully secured. To do this, firms would have to value their assets consistently at an average of twice their true value. This occurring at a time when house prices fell by only seven percent.

We now consider some of the most straightforward associations between interest rates and risk. Two kinds of financial market imperfections impinge on the small firm: information asymmetries and credit market power. In the real world, information is not costless, so that optimal rather than perfect information will be acquired. The problem in this context arises if the firm has more information about facts relevant to the lending contract than the bank. Such informational asymmetry may lead to adverse selection or moral hazard. Adverse selection occurs if the bank cannot distinguish between two types of borrower, the good risk and the bad risk, as the bad borrower has an incentive to pretend to be a good borrower and thus benefit from more favorable lending conditions. To prevent this problem, banks may raise the collateral level required from the good borrower thus removing the incentive for the bad borrower to default. However, by doing

so the bank imposes an unfair cost on the good borrower. With no asymmetries of information, each borrower receives a contract which reflects his or her risk to the bank.

Moral hazard refers to situations in which a borrower's success probability can be influenced by effort. In cases where effort cannot be monitored sufficiently, the borrowers may not put in the required effort. In response to this banks may design a lending contract that induces more effort from the borrower. Higher collateral requirements are consistent with this. With perfect information this would not be the case.

Credit market power consists in the ability to act as a price maker rather than a price taker. In the context of the small business/clearing bank relationship, then, large banks can influence the lending terms offered to small businesses. As such the small firm will have limited scope for bargaining over margins or security requirements.

In the context of our survey, we are seeking to evaluate how banks deal with the information that they do receive about firms. For instance a number of the variables relate to size of firm directly, for example, turnover, employment, and others such as age of firm, legal form, loan size and sector tend to be seen as indirect proxies for firm size. (On the issue of sector, for instance, we would expect service firms to be generally smaller, have less collateral and shorter-term financing requirements. More generally we would expect that larger firms have stronger management teams, are more likely to have limited status, and have been around for longer, that is, they are well established in their markets.) We would thus expect that banks, knowing that survival rates increase with firm size (and age), would impose higher margins on the smallest and therefore riskiest firms.

If we consider specific characteristics of a given loan, then this can potentially provide a bank with a good deal of information. Certainly small firms have a higher propensity for short-term, principally overdraft, funding. Cowling et al. (1991) in fact argue that longer-term funding necessitates stronger relationships between lender and borrower and implies a longer term commitment by both parties. Hence, the potential for removing information asymmetries is much greater in such a relationship. It follows that such funding may attract lower interest rates. IndeedCowling and Cressy (1993) state that "the preponderance of evidence indicates that for European SMEs, as well as larger firms in general, short-term finance is more expensive than longer-term finance."

However, there is an issue of control aversion here. This being the tendency for the owners of small firms to resist external involvement in the firm. As such overdraft funding is the most desirable form of borrowing as it reduces bank involvement with the firm. Firms that grow, however, tend

to open up their capital and take advantage of external advice and involvement in their businesses.

Another aspect of the loan is its intended purpose. The implications of what the firm is financing with its borrowing can quite clearly have a strong signalling effect to the lender. For instance, a firm funding investment in fixed assets is, in a sense, declaring its intention of being in the market for a considerable length of time. On the other hand a firm that is continually short of working capital and is constantly borrowing for this purpose may appear to a bank to be more risky.

A number of papers have argued that banking relationships in many European countries and also Japan are much closer due to banks' devolved structure. Minns (personal communication, 1988) argues that "Britain has a highly centralized system which produces damaging commercial and social consequences," and further adds that "there is substantial scope for promoting local financial markets in Britain." Petersen and Rajan (personal communication, 1992) argue that "the way to overcome frictions in the small firm/bank relationship is for firms to build close relationships with the suppliers of capital.... Relationships are not just important for small firms. Politicians wonder aloud whether the strong links between banks and small firms in Germany and Japan give firms in these economies an unfairlylow cost of capital, enabling them to take along-term perspective in their investments." In our sample approximately 39 percent of loan decisions were made at local level, 49 percent at regional and six percent at specialist small business branches. In contrast a similar but earlier study by Binks et al (1988) recorded figures of 61 percent local loan decisions, 30 percent regional and only two percent at special small business branches. This suggests an increase in centralization of banks' decision- making processes over the period. The implication of this centralization is that the lender does not directly observe the firm, merely responding to standard loan application data, supported in some cases by a variety of balance sheet figures. This raises the concept of "distance" in the relationship. On this note we would expect that loans made at the regional level would attract higher margins as the lender has little information on the managerial capabilities of such firms because there has been no relationship between the lender and the borrower. At a local level, according to Petersen and Rajan, a small firm can "through close and continual interaction...provide a lender with sufficient information about, and voice in, the firms affairs so as to lower the cost and increase the availability of credit."

Turning to the issue of when a loan is taken, as economic conditions change we would expect interest rate margins to reflect the general business climate. We would expect margins to show an upward trend from 1990 to 1991 as the UK economy slowed down and entered a recession.

The issue of collateral and bank risk has been the subject of much theoretical discussion. Empirical evidence is patchy on both the provision of collateral and the nature of it. Binks et al. (1988) found that around 30 percent of firms were not required to post collateral. In Cowling et al.(1991) this figure had fallen to 21 percent. Evidence from the US contained in Berger and Udell (1990) suggests that nearly 70 percent of all commercial and industrial loans are made on a secured basis. If we accept that collateral decreases the riskiness of a given loan, see for instance Barro (1976), then secured loans are safer than unsecured loans. Indeed, Altman (1985) suggests that use of collateral by banks is associated with observably riskier borrowers. This is in line with Buck, Friedman, and Dunkleberg (1991) who found that posting collateral had no effect on margins, and contrasts with Barro (1976) who predicts that as collateral is posted margins are reduced.

III. DATA AND METHODOLOGY

The approach we adopt is to generate, using data collected from a postal survey, average interest rate margins and security ratios on lending to various subsets of the small firm population in our sample. Our analysis is conducted using data from a survey of 272 small businesses in both England and Scotland in 1991.

Table 1 provides some summary statistics relevant to the analysis. As can be observed service sector firms are considerably smaller (and younger) than both construction and manufacturing firms on all size measures listed. Consequently, the average loan size for this type of firm is considerably smaller. Interestingly, though, service sector firms had a significantly lower percentage of collateralized lending than the other two groups. However,this may simply reflect the number of *very* small loans in this subset which do not merit the evaluation and posting of collateral. On this basis we would expect service sector firms to receive the least favorable lending terms, certainly with respect to bank margins. Our study, however, seeks to examine not only inter-group differences, but also intra-group differences, as well as examining aggregated data on specific relevant variables such as sales turnover, or age.

With these issues in mind and following from our discussion in Section II, it is our intention to test three basic hypotheses:

Table 1.

Sector	Construction	Manufacturing	Services	Total
Percent distribution	8.2	29.5	62.3	n/a
Employment	42 (23)	41 (26)	23 (10)	30 (16)
Sales Turnover	750-1m	750-1m	250-500	500-750
Age	23(18)	39 (25)	20 (10)	26 (15)
Loan Size (£'000)	176 (120)	315 (65)	137 (40)	193
Percent of Collateralized Lending	93	83	74	79

Notes: Figures in parenthesis are median figures. Otherwise figures quoted are averages.

H_1: Market power of banks manifests itself via more costly lending contracts to the smallest firms.

H_2: Unlimited (or full) collateral reduces potential constraints that small firms face when borrowing and tends to reduce the role of interest rates in the lending contract.

H_3: Firm size is perceived by banks to be a good proxy for riskiness

We begin from the assumption that the sample mean for our selected subsets provides the single best guess for an unknown population value "mu." In our subsequent discussion we assume that the populations sampled constitute the entire set of populations relevant to our analysis, that is, we use a fixed-effects model which considers only certain subsets or types of firm of interest to us. Using analysis of variance (ANOVA) there are two components of observed variability in the sample. These being variability within a specified group around the mean, and variability in group means. Variability between group means is measured by between-groups sum of squares;

$$SSB = \sum_{i=1}^{k} N_i (\overline{X}_i - \overline{X})^2$$

where the mean of the ith group is denoted $\overline{X}_i$ and the mean of the entire sample is $\overline{X}$.

To initially test the hypothesis that the selected groups pay the same margins over base or security ratios, the F-statistic is calculated. However, a significant F-statistic leads us to suspect that the population means are unequal. To determine which population means are different from each

other we use, where possible, a Duncan(p) multiple comparison test. We use such a test rather than a simple t-test to protect against calling too many differences significant. The Duncan test criteria are far stricter than the t-test, requiring the difference between the two sample means to be much larger to be identified as a true difference. This also reduces the risk of making Type 1 errors in a series of t-tests. The Duncan(p) test is constructed as a multiple comparison test procedure in the manner below: for each pair (i,j)

$$W_{ij} = q_\alpha(\rho, \nu) \frac{s}{\sqrt{2}} \sqrt{\frac{1}{\eta_i} + \frac{1}{\eta_j}}$$

where,

ρ = Number of sample means
s = $\sqrt{MSE}$
υ = D.f . associated with MSE
η_i = Observations ε sample ι
η_j = Observation ε sample j
$q\alpha(\rho,\upsilon)$ = Critical value of range.

Duncan(p) test is conducted at the 10 percent, five percent and one percent levels of significance. Unless specified the results on margins reflect only those firms which posted some form of collateral on loans.

IV.   RESULTS

Firm Size and Market Power

When considering margins by loan size we can observe a steady decline in interest rate margins as loan size increases, see Table 2. Significant differences were found between loans up to £500,000 and loans above this threshold. By measuring firms by employment once again, a downward trend in margins is observable as firm size increases.

Evidence of this nature tends to suggest that size is perceived as a good proxy for riskiness by banks. Yet given that the average security ratio reported was two, that is, that the average small firm loan was fully secured, we are left suggesting that this is rather a manifestation of banks' market power. The evidence is consistent with the theory that price is related to market power in the sense that for larger firms with access to more sources of capital banks are competing with these other sources so price falls. For the smallest firms with no other options the bank becomes a virtual monop-

Table 2

Loan Size(£'000)	0-10	11-50	51-150	151-500	> 500
Margin	3.49	3.01	2.77	2.41	1.73
Sales Turnover (£'000)	0-250	251-1m	> 1m		
Margin	3.31	2.87	2.65		
Employment	0-9	10-19	20-99	100-200	
Margin	3.38	2.94	2.61	1.79	

olist over lending, thus price rises. This is also apparent when sales turnover is used as a size measure. The evidence is consistent with Petersen and Rajan, who suggest that, "firms may borrow from a single lender because it is their only source of credit. If this is why borrowing is so concentrated for small firms, then concentrated borrowing should be associated with more expensive credit." Hence the results offer support for H1, that is to say that market power of bank's manifests itself via more costly lending to the smallest of firms.

Collateral and Credit Constraints

Further evidence from our survey also reflects both the homogeneity and the differences in charges to the various categories of firms that constitute the small firm population. For instance if we consider legal form of business there were no significant differences on either margins or collateral ratios.

This implies that unlimited or in this case full collateral eliminates problems of moral hazard and adverse selection, see for instance Chan and Thakor (1987). Indeed Chan and Thakor further suggest that "high quality borrowers may put up more collateral." Our results refute the latter contention, yet provide a degree of support for the notion that full collateral frees credit to firms that would otherwise find it difficult to raise external funds, in this case sole proprietors and partnerships. What also seems to be apparent is that fully collateralized lending alters the bank's perception of risk and seems to reduce the role of interest rates inthe lending contract. This is consistent with the concept of "distance" in the relationship; a bank has no need to understand a firm if it has so much collateral and therefore remains distant from the firm's activities, making no real attempt to understand its business, its unique characteristics, the peculiarities of its environment etc.

There appears to be no trade-off between interest rate margins and collateral in the way outlined by Chan and Thakor. Furthermore the evidence tends to suggest that unlimited or full collateral eliminates any potential

Table 3

Loan Size (£'000)	0-50	51-50	> 151
Services	3.45	2.69	2.31
Manufacturing	2.72	2.81	2.08
Other Industries	3.05	2.86	1.95

While we have already accepted the presence of market power in the small firm/bank relationship, there is also some evidence that size is still used as an indicator of riskiness. For instance manufacturing firms generally paid lower margins for a given loan than service sector firms who tended to be generally smaller, have less collateral and shorter-term financing requirements, and thus would appear more risky to banks. This evidence does offer some support to H_3 that size is perceived as a good proxy for riskiness. It is important to consider here that although the bank has "full" collateral, the decision to call the asset in to recoup the outstanding amount in the event of default is a worst case scenario, and tends to generate a disproportionate amount of adverse publicity for the bank. Thus the revenue generated from interest rate margins is more important to the bank in the short run.

The Role of Interest Rates

Turning to the role of interest rate margins more generally, we note that no differences were found when considered by payback period explicitly. The same was true for targeted use of finance, which implies excessive distance in the relationship. Interestingly there was a general upward shift in interest rates as the UK economy entered recession in 1990-91. In times of recession, as small businesses in particular become more prone to bankruptcy, this area of bank lending becomes progressively riskier. Bank behavior in this case is perfectly rational. This provides further support for the notion that collateralized lending reduces the role of interest rate margins in banks/small firm contracts.

V. CONCLUSION

There appears to be a homogeneity of security ratios across a broad spectrum of small businesses. While full collateralization may eliminate or reduce problems of moral hazard and adverse selection, thus reducing credit rationing, high security levels also reduce the need for banks to understand the firm. Certainly, security ratios appear higher than need be;it seems that levels of two are a banks' decision rule. However, this may reflect the non-divisibility of assets used as security. Related to the apparent

homogeneity of security ratios, there appears to be no trade-off between security and interest-rate margins.

With respect to interest rates, larger firms with access to more sources of capital pay lower margins. Smaller firms with more concentrated lending opportunities pay higher margins. In addition small firm customers of the "big-four" banks pay higher margins than customers of other, smaller banks. This evidence is consistent with market power in the small firm/bank relationship.

More generally, it does appear that banks, given the nature of the relationship, tend to react to broader changes in the economic climate rather than changes at a regional, local or firm level.

ACKNOWLEDGMENTS

NOTE

1. Implicit in our analysis is the assumption that the characteristics focused upon are freely observable by the bank in the normal course of making its lending decisions. In fact a good deal of the information is contained in a standard loan application form. This reduces the potential role that search costs could play in relation to the determination of the lending contract.

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