The Prime Premium:

Is Relationship Banking Too Costly for Some?

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The most important determinant of bank loan pricing is not borrower risk or other conventional variable but whether the interest rate is pegged to the Prime Rate or to a market index such as Libor. Controlling for the difference in level among such benchmarks, and for many other variables explanatory of bank loan pricing, Prime-based borrowers paid 140-150 basis points more on average during 1990-1995. This remarkable anomaly does not appear to be explained by differential access of borrowers to capital markets or other borrower differences, nor to risk differences between the benchmarks. The anomaly persists even when a choice of benchmarks is offered to the same buyer. Its explanation seems to lie in a generalized mechanism for recovery of bank information costs and relationship investments which now falls disproportionately on certain borrowers.

The Prime Premium: Is Relationship Banking Too Costly for Some?

This paper describes an economic anomaly of considerable size and theoretical interest which has been largely unnoticed in both the academic literature and the financial press. U.S. banks have two methods for charging interest on floating-rate loans: interest may be tied to the Prime Rate or to a market index such as Libor[1]. The choice between these may at first appear to be a mere technicality. However, controlling for the difference in level between these benchmarks and for borrower risk and size and many other variables which affect bank loan pricing, borrowers against Prime pay a great deal more.

The Prime premium is large and quite robust to methodology. It can be found by regression, by nonparametric methods or by data segmentation. On average over 1990-1995 it was 140-150 basis points and appeared to stand at about 170 basis points by the end of 1995. This represents in the aggregate about $3 billion per year.

It seems that there are two classes of firms: those which borrow against a market index and those which borrow against Prime. The latter are on average smaller and riskier, but there is considerable overlap as many small, risky firms borrow against an index and many larger, safer firms borrow against Prime. The class of Prime-based borrowers is large but shrinking as more firms discover the advantage of shifting to a market index. There is no obvious variable defining which firm is to be found in which pricing system.

The existence of substantially different prices for nearly-identical products from the same vendors in the same markets and even at times to the same customers is an economic anomaly of considerable interest. What can explain it? Several kinds of explanations come to mind.

The first set of possible explanations is that Prime-based borrowers may have some characteristic which makes them different from apparently similar market index borrowers. A plausible possibility is that index-based borrowers may have access to commercial paper or bond markets which are not available to the Prime-based borrowers. Alternatively, they may have some risk feature not captured in the risk measures used below, so that the anomaly is disguised risk premium. Or they may require more costly monitoring in that information about them is somehow more difficult to obtain, so that the anomaly is compensation for excess monitoring costs.

A second set of possible explanations is that higher pricing for Prime-based loans may reflect inherent differences between the Prime Rate itself and the market index benchmarks. For example, market indices are somewhat more volatile than the Prime Rate; they change daily while Prime changes only a few times per year. It is natural to ask whether this volatility difference constitutes a risk which borrowers rationally pay to avoid.

A third set of explanations involve information and relationships. The fact that banks obtain private information about borrowers in the course of building lending relationships gives them advantages over uninformed lenders. Sharpe (1990) and Rajan (1992) offer models in which banks "informationally capture" clients and can subsequently extract rents. It is possible that the Prime premium represents rents paid by borrowers to banks which have built relationships with this kind of informational advantage.

This paper explores each of these possible explanations for the Prime premium. It concludes that the most plausible explanation lies in the third set described above, but is not as simple as rents and informational capture of clients. Rather, it appears that the Prime Rate system is a generalized mechanism for recovering informational costs and relationship investments in a uniform way from an entire class of borrowers.

The system may have been efficient when informationally-intensive borrowers paid based on Prime Rate and only widely-known borrowers paid based on Libor. But those days are gone. Offering Libor-based loans has become an important competitive weapon for banks entering new territories following the geographic deregulation of banking. That is what makes the Prime premium so anomalous, and so uncorrelated with factors which might be expected to explain it.

Prime-based loans continue to represent more than 60% of the number of commercial loans written by large U.S. regional banks, but these loans are in ever-smaller quantities to ever-smaller borrowers. Consequently, they represent a declining fraction of the dollar value of loans. On a dollar-weighted basis, Prime-based loans now represent less than 30% of commercial and industrial (C&I) loans written by large U.S. regional banks, and this fraction is declining.

As the average size of the Prime borrowers and the Prime loans shrinks, their default risk and monitoring costs per dollar of loans seem likely to rise, driving the gap between Prime-based borrowers and others steadily higher each year. This rise is costly for all existing Prime-based borrowers and must strengthen their resolve to escape from the Prime Rate system and enter the world of market index banking if they have noticed the problem and can possibly do so.

The situation suggests, on a grand scale, the credit rationing model of Stiglitz and Weiss (1981). If this interpretation is correct, then one could predict an end to the Prime Rate system as the problem of adverse selection finally comes to dominate the remaining pool of borrowers willing to pay against Prime.

The paper proceeds as follows. Section I describes the loan data and interest rate data used. Section II estimates the Prime premium in several different regressions. Section III examines explanations for the premium based on borrower differences or benchmark differences. Section IV examines explanations based on information and relationship, and Section V concludes.

I. Data, benchmarks and spreads

A. Data

The data used in this paper come from the private loan database of Loan Pricing Corporation (LPC). They describe 75,162 corporate loan facilities signed between January 1, 1990 and December 31, 1995. Of these, 62,161 loans were based on a single benchmark and 13,001 offered the borrower a choice of benchmarks. Most of the analysis is performed on the first set of loans, although the second is analyzed separately in Section III.

Information on these loans was gathered by LPC primarily in the course of portfolio valuations performed at various times for 125 banks. In these valuations, banks pay LPC to evaluate a block of loans. Such a block will typically comprise all the bank's loans which meet certain parameter tests, such as signed during 1995 and of more than $100,000 commitment size.

The lending banks are typically part of large regional holding companies. Absent from the sample are a handful of the very largest bank holding companies and the many thousands of small community banks which characterize the American banking system. While borrowers of all sizes are represented, the data are concentrated in the "middle market": 72% of the loans are to borrowers with sales between $1 million and $100 million.

The distribution of Prime-based and market-index loans over a range of company size and risk levels is displayed in Table 1. The risk measure is explained more fully in subsection II-A and in Appendix A. The table shows the extent of overlap of the two pricing systems particularly in the middle market.

The trends in Prime-based lending are easily seen in Figure 1, where the month-by-month proportion of Prime-based loans in the dataset is plotted. The trendlines suggest that during 1990-1995, the proportion of Prime-based loans has dropped from 95% to 69% by number of loans, and from 69% to 26% by dollar volume.

B. Lending benchmarks

The most commonly used benchmark for floating-rate loans[2] to major borrowers is Libor, the London Interbank Offered Rate for Eurodollar deposits. Libor is the universal benchmark of international syndicated lending, and has become very popular in domestic U.S. loans as well. Most bank loans in the U.S. market require quarterly payments of interest and so are priced against 3-month Libor.

Another commonly used market index benchmark is the U.S. domestic Certificate of Deposit (CD) rates. Some banks use a Cost of Funds (COF) measure based on a bank's actual cost of deposits plus other debt; in practice this is just slightly higher than CD rates. Treasury Bills, Federal Funds and Bankers' Acceptances are occasionally used but are less popular.

Prime Rate is unlike any other benchmark in that it is set somewhat arbitrarily by the banks themselves. Furthermore, virtually all banks set exactly the same Prime Rate.[3] When one bank changes its Prime Rate, either all other banks follow or, within a few days, the bank which changed reverts to the national standard. See Mester and Saunders (1995) for a discussion of how the Prime Rate is changed.

Both academic literature and the financial press sometimes describe the Prime Rate as "the interest rate charged by a bank on loans to its most creditworthy customers." Nothing could be further from the truth. The Prime Rate is now the basis for lending to a bank's smallest and weakest customers, while the overwhelming majority of the largest and strongest customers borrow against market indices, as is clear from the upper-left cells of Table 1.

However, between the largest and smallest borrowers lies a large middle market of companies of various sizes and risk ratings. Companies in this middle market may have either Prime Rate loans or market index loans, and are sometimes offered a choice. There is little observable difference between middle market companies which pay against Prime and those which pay against an index or are offered a choice.

Data on interest rate benchmarks are monthly average figures taken from Citibase. Figure 2 shows the movements of Prime, Libor and CD rates over 1974-1995, and Figure 3 shows the differences between these rates in the same time frame. The relationships among rates were somewhat disordered in the first half of the period shown, but in recent years clear patterns have emerged. The premium of Libor over domestic CD rates has settled down to about 1/8 of 1%, so that the two indices have nearly converged. Prime Rate, however, has drifted steadily further above Libor and CD rates, as emphasized by the regression line. The upward slope of this line is about 11 basis points per year.

Table 2 gives descriptive statistics for the three rates and their monthly changes during this period. The market indices are somewhat more volatile than Prime, as can be seen from the standard deviations of monthly changes.

C. Adjusted spreads

The dependent variable in this study is the loan spread above the floating benchmark. To put all loans on a common basis, one must correct for the difference in level among the benchmarks. For example, if Prime stands at 2.50% above Libor, then a company which pays a spread of 0.50% above Prime might be expected to pay 3.00% above Libor.

In order to make spreads comparable, all are adjusted to a Libor-equivalent basis by adding to them the average difference, in the month in which the loan was signed, between their pricing benchmark and Libor:

$$\text{Adjusted spread} = \text{Spread above Benchmark} + (\text{Benchmark-Libor})_{\text{signing date}}$$

In the above example, the spread above the Prime benchmark was 0.50%, Prime-Libor was 2.50% and so the adjusted spread was 3.00%.

The adjustment to Libor-equivalent basis might be made differently. Since borrowers do not in general have the option of moving between Prime and Libor pricing[4], analysis should take into account not merely the Prime-Libor difference at the time the loan is signed, but the expected Prime-Libor difference over the life of the loan. Given the upward drift of the Prime-Libor difference, the expected future difference should be higher than the present difference.

The ideal measure for this more sophisticated adjustment would be a Prime-Libor swap of a term matching that of the loans. Although such swaps exist, data on them are difficult to obtain, particularly with so many different terms and time points. Furthermore, this more sophisticated adjustment is less conservative in that a larger Prime-Libor adjustment would make Prime-based loans appear more expensive, thus making this paper's central finding easier to prove.

An important feature of Prime-based loan spreads is the tendency of unadjusted spreads to cluster at the point of zero spread, pricing sometimes referred to as "Prime flat," so that the adjusted spread is simply the Prime-Libor difference. Of the pure-Prime based loans in the data studied, about 28% have zero unadjusted spread. The name "Prime Rate" and the fiction that this is the rate charged to the bank's most creditworthy customers doubtless tend to enforce this barrier. However, about 2% of Prime-based loans have negative spreads, so that the barrier at Prime flat is not absolute.

II. The Prime premium

A. Factors affecting loan pricing

To demonstrate the Prime premium, it is important to control for other factors which may affect bank loan pricing. The two factors which seem most important are borrower risk and borrower size.

A unique feature of the LPC database is that it contains each bank's internal scoring of each loan's default risk. Every bank has some sort of linear risk scoring system, typically using a numerical scale such as 1..6 or 1..10. Unfortunately, no two banks use the same system; even when the scale numbers are the same, the meaning assigned to the numbers may be quite different. The dataset does, however, record each bank's scoring of each of its loans.

These scorings are quite valuable since *they incorporate the banks' private information about the borrowers as well as facility-specific information such as collateral and covenants*, translated into a simple numerical scale. This gives the measure a degree of explanatory power which is unique in the published literature on bank loan pricing. The problem with the measure is consistency among banks.

To solve the consistency problem, a mapping from bank scales to a common 1..100 risk scale was created, using the fact that in many cases more than one bank made a loan within the same 12 months to the same borrower at the same level of seniority and security. These paired data were exploited to create the mapping, as described in the Appendix.

The borrower's size is also an important determinant of spreads, as reported in many studies such as Berger and Udell (1990), Booth (1992), and Petersen and Rajan (1994). In all of these studies, small companies pay larger spreads than large companies, other things equal. At least three possible reasons for the dependence of spread on borrower size come to mind.

First, size may proxy for an additional dimension of default risk, since it is widely believed that small companies are less proven than large ones, more volatile and subject to sudden reverses. Second, smaller companies may be more expensive to monitor than large ones, per dollar of loans, since the amount of effort needed to monitor a company is unlikely to rise proportionately with the size of the company or of a particular loan. Third, small size may represent a lack of bargaining power on the borrower's part, so that the excess spread charged to small companies is a form of rent unrelated to risk or monitoring cost. It is difficult to sort out which of these reasons is the correct explanation, or whether perhaps all three of them play a role.

In this study the size of borrowers is measured by the logarithm (base 10) of borrower sales. Although total assets is an alternative measure of borrower size, almost all banks use sales as their size measure. Base 10 is used because many banks are organized into departments which handle companies of different sales levels, often demarcated by a power of 10, and such institutional differences may have an impact on spreads. For example, the "middle market" of borrowers is often defined as companies with sales between $1 million and $100 million. It is convenient to see these demarcations as powers of 10, as in Table 1.

B. Regression results

The results of OLS regression of adjusted spreads against borrower risk, borrower size, signing date and a Prime dummy are reported in the first columns of Table 3. The Prime dummy shows a parameter of 144 basis points and a t-statistic of 162.00. The adjusted R^2 for the regression is 0.552, which is notably higher than the R^2 for other bank pricing regressions in the literature.

It is natural to ask whether these results are robust to the addition of other explanatory variables. In particular, it seems important to consider whether the Prime premium reflects access, or lack of access, to alternative capital markets such as the commercial paper (CP) and bond markets. In this study, the presence of a CP rating or a bond rating is taken as a proxy for access to these capital markets.

The LPC database contains fields for bond ratings and commercial paper ratings, although the field is null for the great majority of borrowers. To ensure that these fields were correctly filled in, a comprehensive name-matching exercise was undertaken between the borrowers in the loan data and the publicly available names of companies with Standard and Poor's ratings. In effect, the entries were double-checked and in some cases modified based on publicly available ratings information.

The second pair of columns of Table 3 therefore extends the regression to include dummy variables for presence of a CP rating or a bond rating. As is clear from the table, the significance of the Prime dummy is not materially reduced by the addition of market access variables. Access to commercial paper markets does indeed tend to reduce spreads, though not by as much as might have been imagined, and the variable is statistically significant.

In contrast, access to bond markets is not significant at the 95% level and has a positive sign whereas a negative one would have been expected. One must conclude that, controlling for borrower risk and commercial paper access, bond market access is not a significant additional factor in bank loan pricing.[5] This unexpected result is pursued somewhat further in subsection III-A below.

I next include a large number of further explanatory variables. It turns out that bank loan pricing, unlike bond pricing, responds to a myriad of factors, many of which are quantified in the LPC data. The new variables are these:

Discrete variables

Loan type: whether the facility is a term loan, demand loan, revolving credit, commercial paper backup line, etc.

Loan purpose: whether the proceeds are used for working capital, acquisition, debt repayment, stock buyback, etc.

Secured: whether the loan is secured by collateral.

Borrower industry: the two-digit SIC code for the borrower.

MSA: the Metropolitan Statistical Area in which the borrower is located.

Bank identity: a code for the bank making the loan.

Continuous variables

Term: the logarithm (base 10) of the loan's term to maturity.

Loan scale: the logarithm (base 10) of the ratio of the size of the loan commitment to the sales of the borrower, i.e. how important the loan is in the scale of the firm.

In addition, the dataset contains information on four categories of fees associated with the loan. It is often imagined that banks price loans on a "total return" basis, which takes into a account both the lending spread and the fees charged on the loan. If this were strictly true, higher fees would be associated with lower spreads, other things equal. Studies in the LPC database not reported here show that, on the contrary, higher fees in each of four categories are unequivocally associated with higher spreads. In other words, the conditions which make possible higher spreads also make possible higher fees. Because of this finding, fees are omitted as a variable explanatory of spreads: the causality appears to run from explanatory variables to both spreads and fees.

Creating dummies for all the discrete variables listed above produces more than 500 potential regressors, creating a matrix of almost unmanageable complexity. Through intermediate steps these were filtered to retain only those dummies which were important in absolute size and also statistically significant at the 99% level. The resulting data still contained 147 regressors which, given the large number of observations, implies an unwieldy regression matrix with more than 8 million entries.

In an alternative approach, which greatly simplifies the analysis with so many discrete variables, the complete data were analyzed using Alternating Conditional Expectations, a nonparametric procedure developed by Breiman and Friedman (1985). The ACE model is a generalization of the linear regression model $y = \alpha + \Sigma\beta_i x_i + \varepsilon$ into a form which still separates the variables but allows them a general functional form:

$$\theta(y) = \sum_{i=1}^{n} \varphi_i(x_i) + \varepsilon \qquad (1)$$

where y is the dependent variable, the x_i are the continuous or discrete explanatory variables and $\theta(y)$ and the $\varphi_i(x_i)$ are optimal transforms of their arguments, i.e. those transforms which maximize the correlation of the functions, and ε is the error term. In this model each discrete variable is treated as a single vector, not a large set of dummies. All functions are mean-zero over the data and the norm of θ is arbitrarily fixed at one.

The results of estimation are the functions of equation (1). To extract the Prime premium from this model, we ask what impact changing the Prime dummy from 1 to 0 has on the adjusted spread y, holding all else constant. In this case, all else constant means $\varphi_i = 0$ for all i except the one indicating the Prime dummy. The result, using the estimated functions, is as follows:

Prime Dummy x_i	$\varphi_i(x_i)$	$y = \theta^{-1}(\varphi_i)$
1	+0.00148	295.5
0	-0.01021	146.2
Difference in y:		**149.3**

This result tells us that, controlling for all the other variables, Prime-based borrowers pay average adjusted spreads of 295 bp and index-based borrowers pay 146 bp, a difference of 149 bp. This comes remarkably close to the estimates of the Prime premium in Table 3, despite the totally different methodology and the inclusion of a large number of additional explanatory variables. Thus estimation of the Prime premium is extremely robust.

C. Time trends

A final regression was undertaken to investigate the extent to which the Prime premium is changing over time. It is a variant of the first regression, but with the Prime dummy separated into 72 separate dummies, one for each month of 1990-1995. The continuous variable for signing date was left in the regression to control for the upward drift of adjusted spreads generally during this period.

The results are graphed in Figure 4. It appears that the premium was in the vicinity of 100 basis points in 1990, then rose over two years to the 150-200 basis point range where it has remained through the end of 1995. It has no evident correlation with the absolute level of rates (Figure 2) which fell during the first half of the period studied and rose in the second half.

III. Possible explanations

A. Capital market access

In this section I return to the question of capital market access to explore its connection to the Prime pricing anomaly.

Historically, the connection was significant. In the 1960's virtually all floating-rate U.S. bank lending was done against the Prime Rate. Libor-based lending originated in the Eurodollar market as international banks, most of whom did not participate in the U.S. Prime Rate system, were willing to lend to governments and major corporations at a defined spread above Libor, which in turn reflected the cost of their Eurodollar deposits.

The large U.S.-based companies which benefited from this system then began to demand Libor-based loans for their U.S. domestic needs, as the transparency of cost was deemed preferable to the arbitrariness of Prime. Thus in the early 1970's, one could say that all U.S. borrowers paid against Prime except for the largest companies which had access to global capital markets.

By the late 1970's, loans based on Libor or equivalent domestic market indices such as the CD rate were being demanded by many firms which had negotiating power over their banks. This negotiating power arose most powerfully from commercial paper markets, which had grown explosively during the same period. CP rates track CD rates rather closely, so a bank competing against the CP market might offer a CD-based loan.

By the 1980's, however, the CP market had virtually taken over the high-quality end of short-term credit markets in the U.S. Large banks looked increasingly to geographic expansion for loan growth, and the political barriers to such expansion began to fall. Offering index-based loans became a competitive advantage, at least in the short term, since it tended to undermine the lucrative cash flows of locally entrenched competitors.

In the present dataset, only 7% of the borrowers have a bond or CP rating. Of Prime-based loans, 98% are to borrowers with no bond or CP rating. However, 70% of market index loans are to borrowers with no bond or CP rating. Thus it is unusual for a borrower with market access to borrow against Prime, but it is not at all unusual for a borrower with no capital market access to borrow against a market index. Market index lending has moved well beyond the borrowers with capital market access and has invaded the heartland of the middle market where such access is uncommon.

This is why capital market access has relatively little effect on the regressions of Table 3. Such access is uncommon in these largely middle-market loans, but market index pricing is both common and growing.

B. Unobserved borrower differences

It is possible that some other difference exists between the Prime-based borrowers and the market-index borrowers such as an unobserved risk factor or different monitoring costs. One can never entirely rule out the possibility of unobserved borrower differences, and by definition one cannot measure them. In the case of the Prime premium, however, there is a subset of the data which was excluded from the results reported thus far and which casts considerable light on this explanation.

As noted above, banks sometimes give the borrower an option to choose between a Prime-based interest rate and a market index-based interest rate. Because the borrower is the same, we can rule out unobserved differences among borrowers in these cases. Here, of all places, one would expect the premium to vanish: if virtually identical products are offered by the same vendor to the *very same buyer*, how could there possibly be a pricing difference?

Yet, remarkably, the premium does not vanish nor even diminish in these cases. We do not need regressions to control for explanatory variables, since the borrower and the characteristics of the loan are identical in all ways except price. We need only observe the descriptive statistics of the spreads, as shown in Table 4. When Prime-based loans and market index-based loans are *simultaneously offered to the same borrower,* the Prime-based loans are on average 146 bp more expensive.

The similarity of this number to those previously estimated with different data and different methods is striking. One may well ask, however, why any firm would then want to borrow against Prime when it has the option not to do so.

In only 273 out of 13,001 optional-benchmark cases is the adjusted cost of the Prime-based loan below that of the market index equivalent. In most cases, the pricing anomaly is so great that the bank could not seriously intend that the borrower choose the Prime pricing. The option has little or no value, particularly in view of the tendency of Prime to drift further above Libor and CD rates with the passage of time. Why should banks expend effort to offer an apparently valueless option? They appear to be preserving and promoting the Prime Rate system as a system, regardless of its utility in particular cases.

If the Prime premium were caused by unobserved differences among apparently similar borrowers, it would vanish in simultaneous offers to the same borrower. The fact that it does not vanish suggests that something else is causing the anomaly.

C. Risk differences in the benchmarks

Can the Prime premium be explained by differences in the benchmarks themselves? As is clear from Figure 2 and Table 2, market indices are more volatile than Prime: market indices change daily while Prime changes only a few times during the year. Furthermore, Libor is an international dollar deposit rate while CD is a domestic one, and internationalism may imply more risk. Is this sufficient to explain the spread differences?

What should a borrower be willing to pay to avoid increased volatility of interest payments? We can estimate an answer to this question because companies frequently pay extra to borrow at fixed rates for medium or long terms in the bond market. The term premium helps us to scale the value of reduced interest rate volatility to corporations.

What matters is not the raw volatility of rates but the interaction between this volatility and a borrower's sampling frequency. A firm which issues a bond once every five years samples bond rates at five-year intervals. A firm which borrows against three-month Libor samples Libor once every three months. A firm which borrows against Prime samples Prime continuously since Prime-based loans, unlike market index loans, change interest rates on the day that Prime is changed. These sampling rates must be brought into the analysis.

In short, we cannot separate the volatility question from the variability of actual interest payments under some borrowing strategy. There is an unlimited number of possible borrowing strategies, so it is difficult to prove a general result. One can, however, simulate several typical borrowing strategies and examine the results for order-of-magnitude differences. What follows, therefore, is suggestive rather than rigorous.

The model borrower in this example carries a Baa/BBB bond rating. The great majority of bank borrowers do not have bond ratings, but the data studied in this paper contain 29 Prime-based loans and 346 Libor-based loans to borrowers rated Baa or BBB. The mean spread above Prime paid by the first group is 18.5 bp, and the mean spread above Libor paid by the second group is 54.4 bp.

Three alternative strategies are simulated here over the 20-year period 1976-1995. The first is to maintain a bank loan at Prime+0.185%. The second is to maintain a bank loan at Libor+0.544%. The third is to sell four successive five-year notes at Moody's Baa index rate. All interest payments are assumed to be quarterly; the bond index is adjusted for this timing difference from normal bond practice.

The interest payments and their volatility under each strategy are summarized in Table 5. It shows that a Libor-based borrower of $1000 paying average interest of 22.50 per quarter may be willing to increase interest payments to 28.54 in order to reduce the standard deviation of these payments from 9.05 to 4.34. But would the same borrower be willing, by shifting to the Prime-based loan, to pay 25.53 in order to reduce the standard deviation from 9.05 to 8.49? On casual examination, the cost seems disproportionate to the benefit.

To test the question more rigorously, I use the model of Agmon, Ofer and Tamir (1981). In this setup, a firm with a certain desired debt ratio implements it by selecting a "portfolio" of available liabilities. The problem is solved with a type of mean-variance analysis: the firm tries to minimize its interest expense subject to avoiding bankruptcy, which in this one-period model means avoiding interest variance sufficient to cause negative cash flow at time 1 with some high, fixed probability. The firm's tolerance for interest rate volatility is thus determined by the size of its expected cash flow and the aggressiveness of its debt policy.

Entering the data from Table 5 into this model as the portfolio of available liabilities, one finds that the Prime-based loan is not on the efficient frontier: it is never selected for the portfolio. If cash flow is low and/or the debt ratio high, the firm uses entirely bonds. If cash flow is high and/or the debt ratio low, the firm uses entirely Libor-based loans. In between, it selects a mix of these. But in no event does it select any of the Prime-based loan for its liability portfolio.

The simulation is obviously sensitive to the time periods chosen. However, as can be seen in the five-year subperiods of Table 5, the Libor-based strategy is actually *less* volatile than the Prime-based strategy in the more recent years. In these periods, the higher sampling frequency of Prime-based borrowing more than offsets the slightly greater volatility of Libor rates, so that Libor-based borrowing unequivocally dominates Prime-based borrowing. Yet it is in these more recent years that the Prime premium has opened up and grown large. It seems that risk differences in the benchmarks could not possibly explain the differences in cost.

IV. Information, Relationships and Monitoring

The modern understanding of banks is based upon the economics of information. Banks gain private information about their customers, build relationships with them and monitor their projects. These activities are in general costly. Since Diamond (1984) it has been understood that the costly monitoring of borrowers is at the center of the banking business.

Given the history of the dual pricing system described in subsection III-A above, it is natural to associate Libor and other market index lending with large, well-understood borrowers and Prime with smaller, less well-known borrowers. The latter, as a group, may require much higher investments in information, relationship and monitoring, which may well affect loan pricing.

A useful starting point is to ask whether banking relationships in general lead to higher or lower interest rates. There is support for both predictions in the theoretical literature.

A. Are banking relationships priced?

The theoretical banking literature has thoroughly explored the possible interactions between loan pricing and banking relationships. Some models predict that interest rates charged to customers will fall as the relationship proceeds. Petersen and Rajan (1993) developed a model in which banks offer higher rates to customers at an early stage of the relationship, when borrower types are unknown, then lower them later as information is revealed. Similarly in Boot and Thakor

(1994), borrowers pay high rates and offer collateral in the early stages of the banking relationship, but are more favorably treated as their projects succeed.

Other models, however, predict that interest rates will rise as the relationship proceeds. In Sharpe (1990), banks gain information about their borrowers by the act of lending, which then allows them to capture rents from older customers. Competition leads new banks to offer initially lower rates. Only a bank's concern for its own reputation moderates its exploitation of clients it has "informationally captured". In Rajan (1992) banks are contrasted with arms-length lenders. An entrepreneur obtains improved incentives from bank borrowing with monitoring, but also pays a cost since the bank will extract rents over time.

Of the empirical papers, Petersen and Rajan (1994) found that relationship length affected the available quantity of bank credit but not its price. In contrast, Berger and Udell (1995) found evidence that interest rates fall as a banking relationship proceeds.

Predictions that rates rise or fall in the course of banking relationships can be tested in two ways with the LPC data. First, the data contain an indicator variable for loan renewal, which should be a proxy for ongoing banking relationship. When either of the regressions of Table 3 is repeated with the loan renewal dummy, a statistically significant but economically insignificant effect is found.

For example, modifying Regression 2, the parameter on the renewal dummy is 2.3 basis points with a t-statistic of 3.36. A similar result is found using the ACE methodology with the full range of variables. This seems to be saying that relationship has no important effect on lending rates.

More detailed insight into the importance of relationships can be obtained by selecting all cases where the same company borrows more than once and separating those which borrow only from one bank from those with multiple banks. Of course, this approach is imperfect because the dataset does not contain all loans. Nevertheless, the dataset is sufficiently broad that the results are suggestive.

There are 19,457 cases of borrowers with more than one loan in the dataset. These are divided initially into two groups: those in which all such loans are made by the same bank, and those in which two or more banks are involved. The first set is then grouped by risk rating, to control for any change in risk rating between lending dates. Each such subset is then further separated by benchmark, so that only loans made on the same benchmark are compared. Each such further subset is then examined to see whether unadjusted spreads rose or fell. This is determined by regressing spreads on loan signing dates, checking for positive or negative slope. The second set, with multiple banks, is then analyzed similarly except that no effort is made to ensure consistency of risk ratings among the various banks.

The results are reported in Table 6 together with t-tests for significance of a difference in means between the two sets and the combined data. Borrowers with only one bank are more than twice as likely to experience no change in spreads as borrowers with two or more banks. The difference is statistically very significant. Conditional on spreads having changed, a decline in spreads is more likely than a rise regardless of the number of banks. But the proportion of changes which are rises in spread is not different between the two sets of cases. We cannot reject a null hypothesis that, conditional on spreads changing, the probability of spreads rising is the same for borrowers with one bank and those with two or more banks.

In other words, borrowers with one bank are associated with *stasis* in spreads: the status quo is likely to be maintained. Situations of changing spreads are more associated with multiple banks, but such change may be either positive or negative. The frequency of positive changes, given that change occurs, is the same for one-bank borrowers and multiple-bank borrowers.

This implies that having multiple banks is not distinctively positive or negative, because there are different reasons why a borrower may have multiple banks. In the "good scenario", a company's success and growth is noticed by new banks who then compete for its loan business, offering lower spreads as inducement. In the "bad scenario", a company's problems and failures make bank loans difficult to obtain from its traditional bank or banks, and it seeks new banks, offering higher spreads as inducement. Table 6 suggests that the good scenario is somewhat more frequent than the bad scenario in the sample being studied, but that the frequency with which either scenario occurs depends solely on events within the company and is not affected by the number of banks from which it currently borrows.

This result is fully consistent with Petersen and Rajan (1994), who found that lending cost rises and credit availability falls with the number of banks in a sample dominated by very small firms. We need only assume that the "bad scenario" may be far more common than the "good scenario" in such a sample. One would expect the opposite result in a sample of large, public firms, given that significant success and growth is required to be in such a sample.

To summarize, there is no significant tendency for interest rates either to rise or to fall as a banking relationship proceeds. On the contrary, rates tend to remain unchanged if the relationship continues. Change in rates is much more associated with a change in relationships.

B. Understanding the Prime premium

Theories which link lending rates to the costs of information, relationships or monitoring typically assume that a bank knows the magnitude of such costs for each borrower. It may seem uncontroversial to assume that a bank should know its own costs at this level of detail. In reality, however, this may not be the case. Banks certainly see their aggregate costs, but the problem of allocating costs on a borrower-by-borrower basis is a formidable challenge. Even if such an allocation were feasible, it would by itself add materially to the banks' costs.

Given this fact, it is plausible that the Prime Rate system offers a simple way for banks to recoup operating costs from an entire class of borrowers to which, in a general way, such costs ought to apply, without having to undertake a costly allocation. The Prime Rate is controllable by bank managements, and for many years may have been raised when aggregate operating costs rose more rapidly than assets.

This interpretation gains some support from the events of 1990-1995. As shown in Figure 4, the Prime premium rose rapidly in 1990 and 1991, and seems to have stabilized thereafter. Figure 5 shows data from the FDIC's quarterly compilation of the aggregate balance sheets and income statements of FDIC-insured commercial banks. Non-interest expenses of banks rose approximately 30% during 1990-1991, even as commercial and industrial (C&I) loan volumes were falling, and both figures stabilize thereafter.

These same statistics provide an estimate of the lower bound of the Prime premium's aggregate value. Aggregate C&I loans stood at $660 billion at the end of 1995. The trendline for the proportion of Prime-based loans in the LPC data reached 26% at the end of 1995; if this proportion can be extended to the entire market, it would imply $170 billion of Prime-based C&I loans. Using the estimated percentage premium of 170 basis points during the last quarter of 1995 produces a total value of $2.9 billion, or about 8% of banks' non-interest expenses.

Applying the same technique to all quarters of 1990-1995 results in estimates graphed in Figure 6. Consistent with the above reasoning, the annualized dollar value rose rapidly from $4 billion to $6 billion in 1990-1991 and has steadily fallen thereafter as loan volume has expanded and bank expenses have stabilized.

Assume that Prime pricing is a device to recover aggregate costs. This system, however convenient, must lead to a paradox if banks also aggressively offer Libor-based loans to the middle market, for then the pool of Prime-based borrowers is bound to shrink. Borrowers of quality, to the extent they observe the pattern, will want to break out of the Prime Rate system if they can possibly do so. The trends of Figure 1 suggest this is just what is happening.

If we further assume that banks cannot fully distinguish between good and bad borrowers, the situation begins to resemble the classic Stiglitz and Weiss (1981) analysis of adverse selection. In that model, each bank selects an interest rate at which it will make loans and borrowers react by deciding whether or not to borrow. As the interest rate rises, the lowest-risk firms drop out and the average risk of the remaining borrowers rises. Beyond a certain interest rate level, a bank's expected losses from defaults may exceed the additional income from the higher rate. Thus there may be an equilibrium interest rate at a point below the Walrasian equilibrium rate which would clear supply and demand for loans, and credit rationing occurs.

Applying this logic to the Prime Rate system, one of two outcomes is foreseeable. If banks are able to stop the upward drift of Prime at the equilibrium point, we would expect to see a stabilization of the percentage of loans made against Prime, so that the trends shown in Figure 1 flatten to horizontal, and in this equilibrium, in the words of Stiglitz and Weiss (1981), "among loan applicants who appear to be identical some receive a loan and others do not, and the rejected applicants would not receive a loan even if they offered to pay a higher interest rates".

Alternatively, if banks continue to raise the Prime Rate past the Stiglitz-Weiss equilibrium point, many banks will likely declare themselves unwilling to lend against Prime at all, as they discover that the expected losses in the remaining pool of borrowers willing to pay Prime has escalated beyond the profitability brought about by raising the Prime to that level. At this point the entire Prime Rate system would probably be abandoned.

Based on the continuing rapid fall in the proportion of Prime-based loans, the second scenario seems more likely. Indeed, the Prime Rate may currently incorporate a risk premium for adverse selection. Banks may not be able to distinguish fully between good borrowers and bad, but the fact that a firm is willing to pay Prime may already be signaling an increased probability of bad type.

VI. Conclusion

This paper has documented a previously unreported anomaly in the pricing of U.S. bank loans. Firms which borrow against the Prime Rate are paying substantially more interest than firms which borrow against a market index such as Libor. The anomaly is large -- tt averaged 140-150 basis points during this time period, and appears to have stood at about 170 basis points in the last quarter of 1995. Its estimated annual dollar value rose from $4 billion to $6 billion in 1990-1991 and then declined to about $3 billion per year by the end of 1995.

Explanations based on inherent borrower differences and on differences between the benchmarks were considered, but none seems to hold up on close examination. The more likely explanation is that the Prime Rate system is a method by which banks attempt to recoup costs of gaining information about borrowers, building relationships with them and monitoring the borrowers' performance.

This is an anomaly because the premium is flatly assessed over a certain class of borrowers which seem to have little in common except weak condition or bad luck. Competitive forces have unleashed market-index loans as a competitive tool in most U.S. cities, but all borrowers do not have equal or uniform access to market-index loans. Those who can escape from the Prime Rate system are doing so at a considerable pace. A Stiglitz-Weiss end is foreseeable, as banks may finally feel reluctant to make further Prime-based loans because of the difficulty of selecting good firms from the remaining Prime Rate borrowers.

This would be an ironic end indeed to an interest rate originally conceived as the rate charged to a bank's most creditworthy customers.

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Figure 1

The single-benchmark loans in the dataset are divided into monthly subsets according to their signing date. The chart shows the proportion of Prime-based to total loans in each month, both by number of loans and by dollar value of loans. Trendlines are generated by OLS regression on the month of signing.

Figure 2

This figure graphs the monthly average values of Prime Rate, 3-month Libor and 3-month U.S. domestic Certificate of Deposit (CD) rates during 1974-1995 as reported by Citibase.

Figure 3

This figure draws from the same data as Figure 2. It displays the difference between Prime Rate and Libor, and the difference between Libor and CD rate. The straight line is an OLS regression line of the Prime-Libor differences on time. The upward slope of this line is 11 bp per year.

Figure 4

An OLS regression was run of adjusted spreads on risk, log sales and month of signing, plus dummies for a Prime-based loan in each month of 1990-1995. This figure plots the parameters estimated on the 72 Prime dummies to show the evolution of the Prime premium during the period studied.

Figure 5

Quarterly data on the volume of commercial and industrial (C&I) loans and banks' aggregate non-interest expense were drawn from the Federal Deposit Insurance Corporation's publication *Quarterly Banking Profile*. Banks' expenses rose materially in 1990 and the first half of 1991, even as loans outstanding were falling.

Figure 6

This figure displays rough estimates of the dollar value of the Prime premium in C&I loans by quarter over 1990-1995. The dollar value of C&I loans is the same as used in Figure 5. The percentage of loans priced at Prime is estimated from the dollar-value trendline of Figure 1. The percentage Prime premium is the set of quarterly averages of the monthly estimates of Figure 4. The dollar estimates shown in this figure are the product of these.

Figure 7

This figure plots the mean bank risk rating for each level of Standard & Poor's bond rating, utilizing all observations for which such a bond rating exists. The downturn of bank ratings at higher bond ratings suggests that banks lend to these higher-risk categories only with security and covenants which actually enhance the credit back to the unsecured level of firms with better bond ratings.

Figure 1

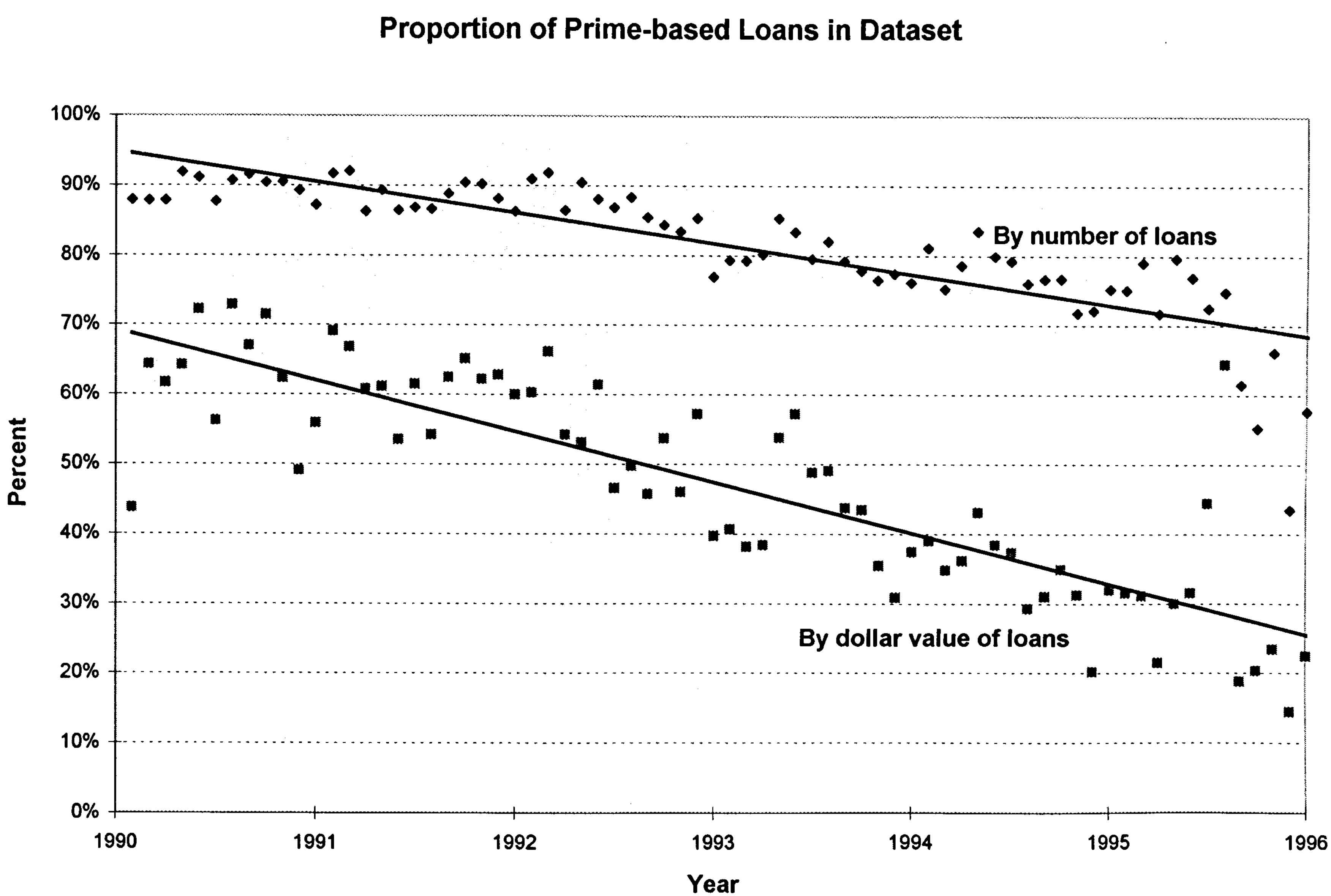
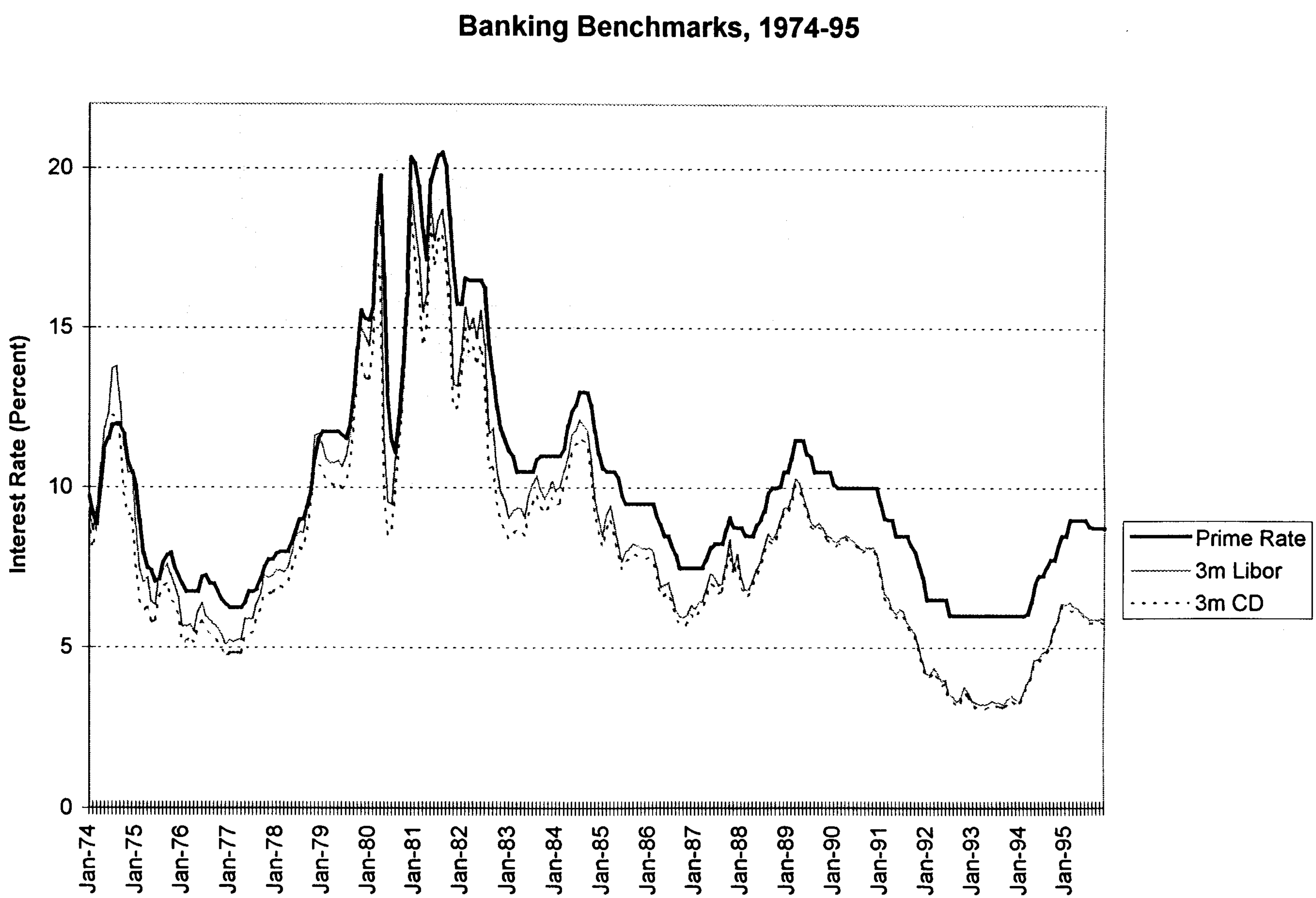
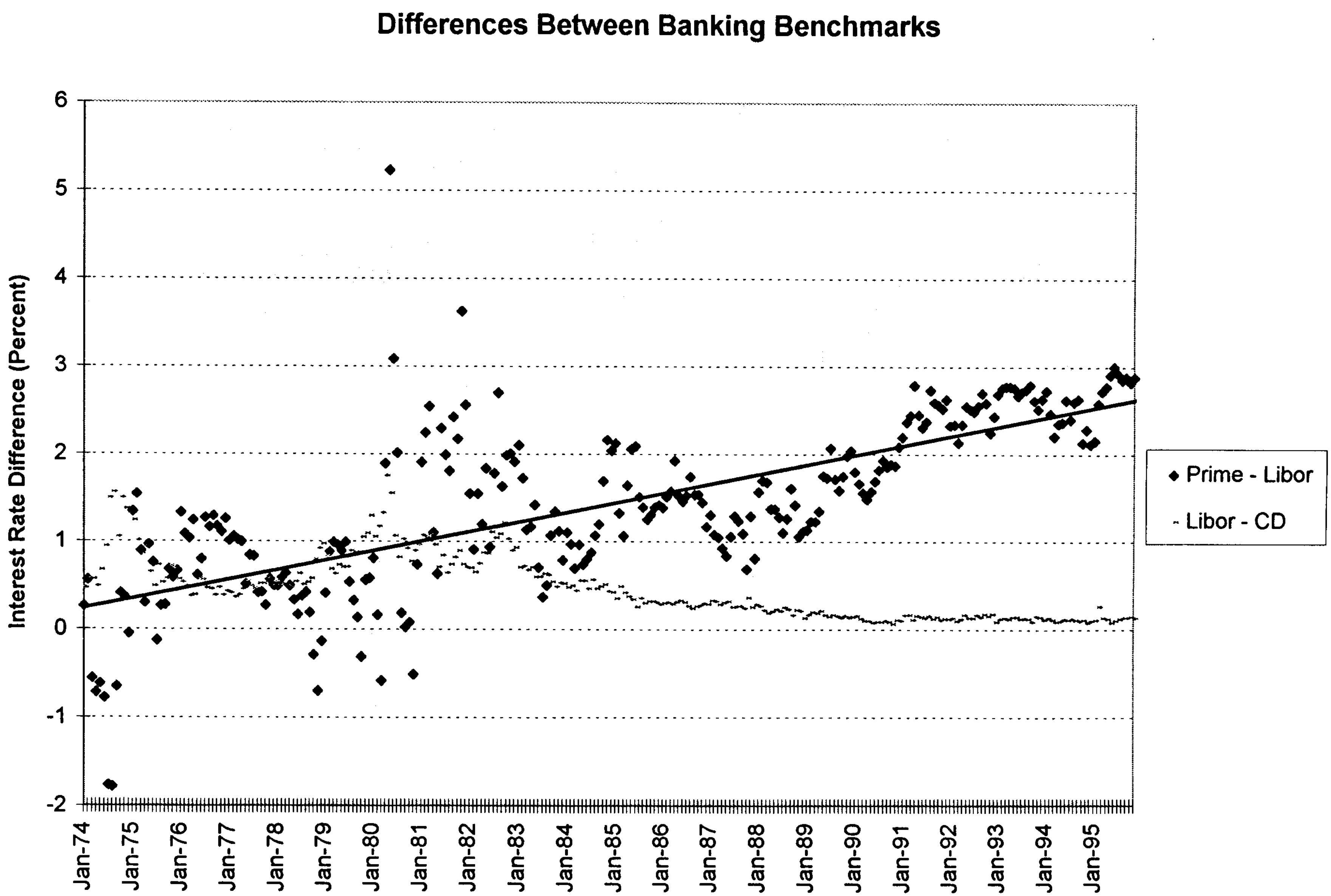

Proportion of Prime-based Loans in Dataset
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Percent
1990
1991
1992
1993
1994
1995
1996
Year
By number of loans
By dollar value of loans

Figure 2



Banking Benchmarks, 1974-95
Interest Rate (Percent)
0
5
10
15
20
Jan-74
Jan-75
Jan-76
Jan-77
Jan-78
Jan-79
Jan-80
Jan-81
Jan-82
Jan-83
Jan-84
Jan-85
Jan-86
Jan-87
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Prime Rate
3m Libor
3m CD

Figure 3



Differences Between Banking Benchmarks
Interest Rate Difference (Percent)
6
5
4
3
2
1
0
-1
-2
Jan-74
Jan-75
Jan-76
Jan-77
Jan-78
Jan-79
Jan-80
Jan-81
Jan-82
Jan-83
Jan-84
Jan-85
Jan-86
Jan-87
Jan-88
Jan-89
Jan-90
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Prime - Libor
Libor - CD

Figure 4

Monthly Estimates of the Prime Premium

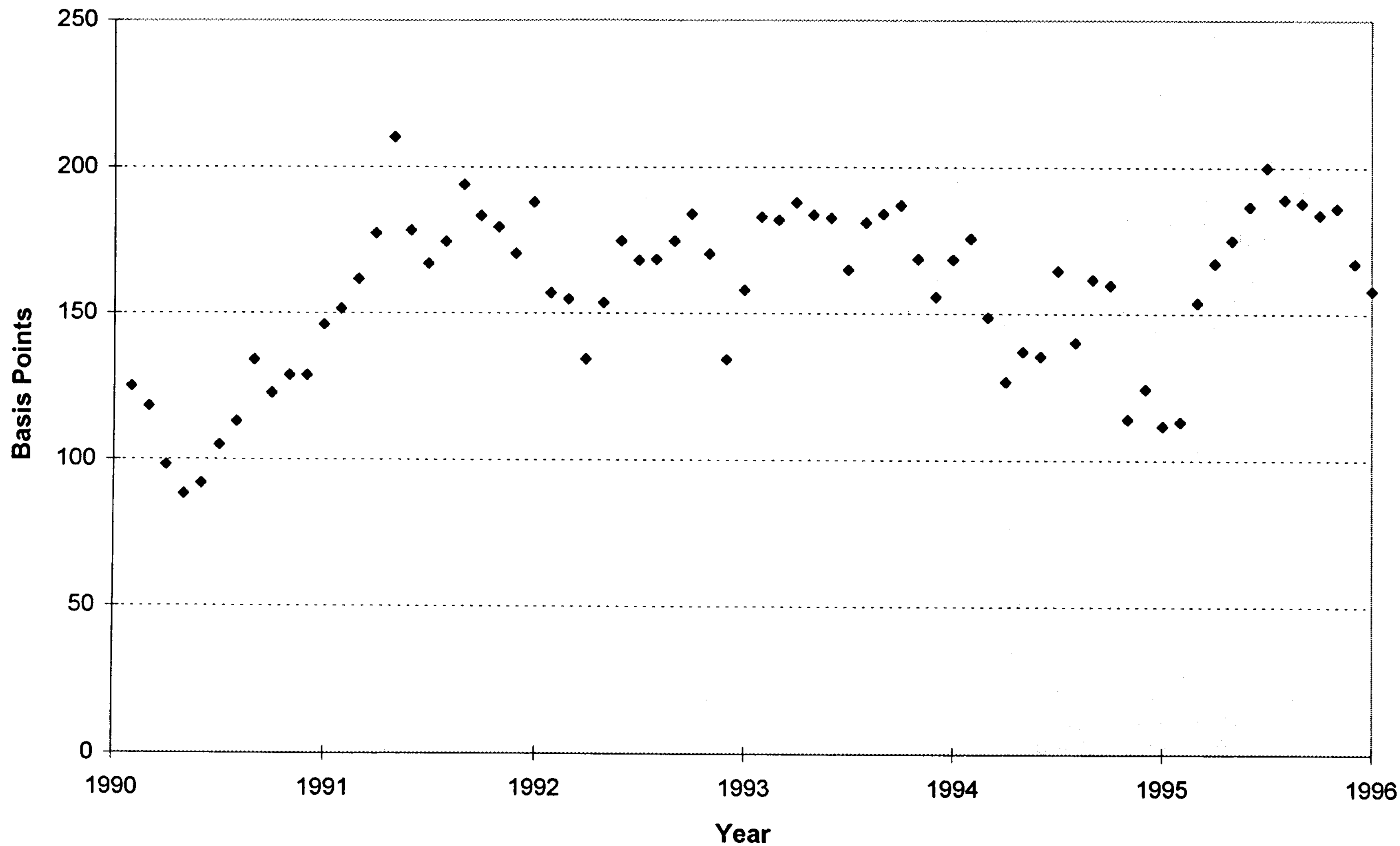


Figure 5

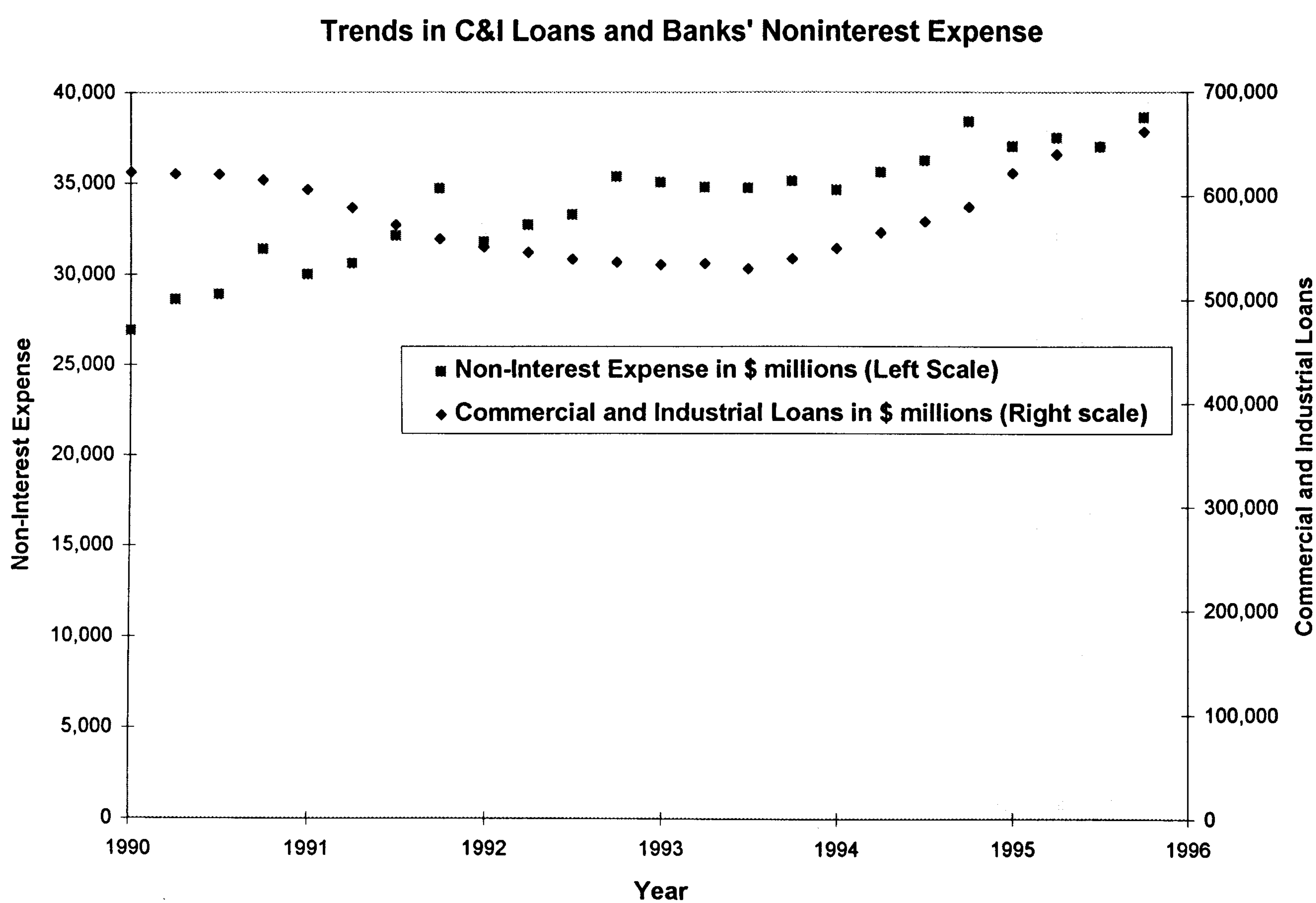
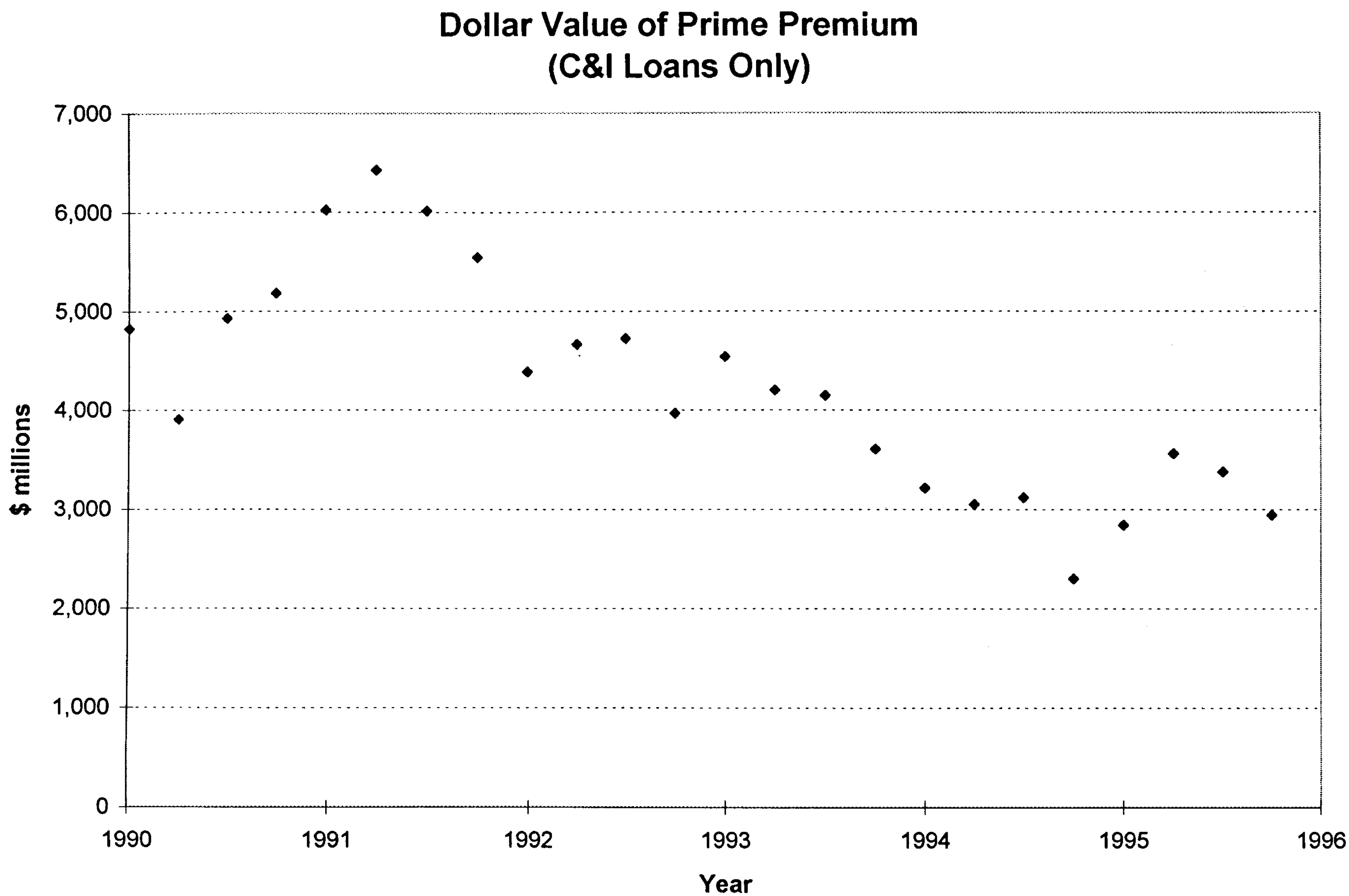
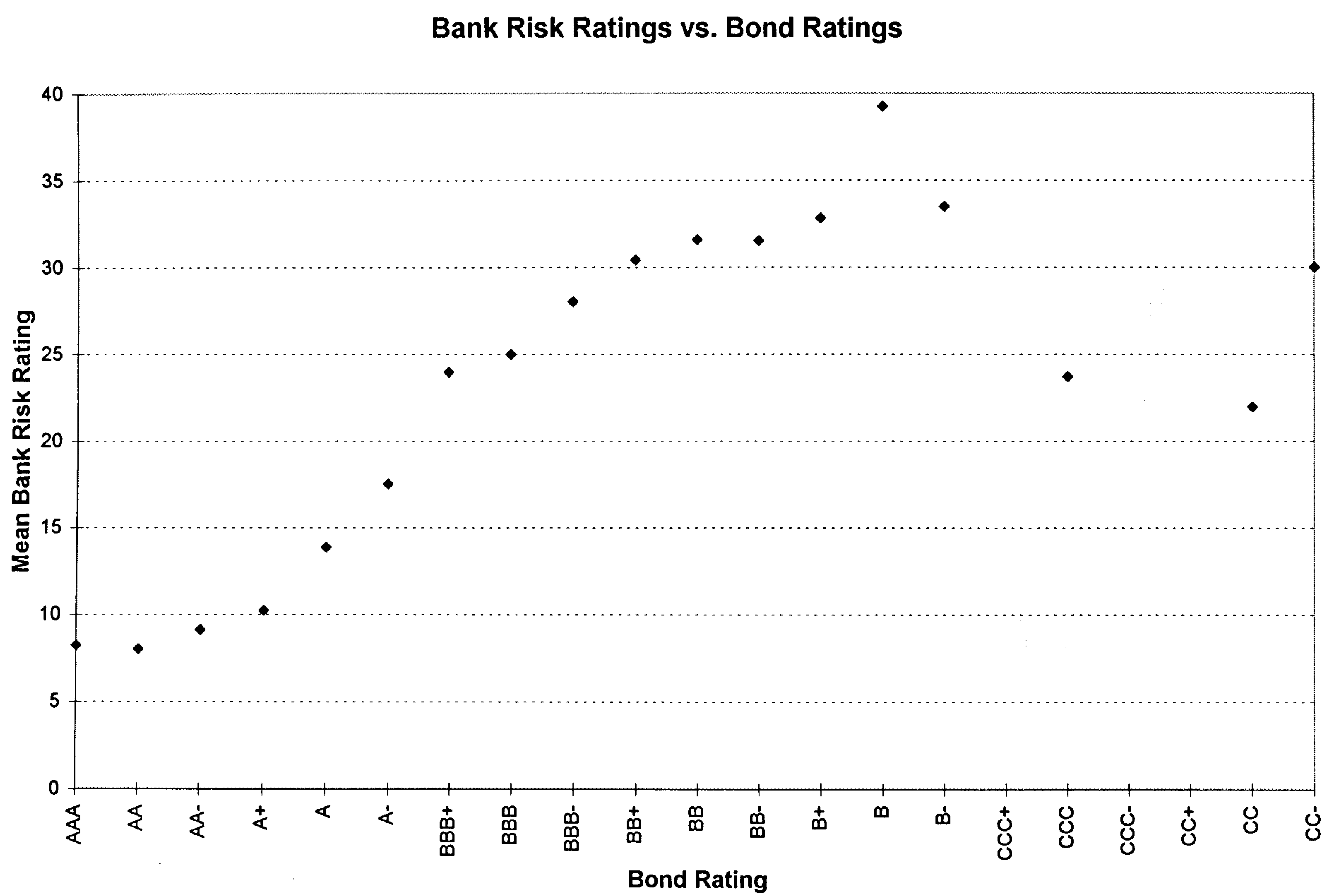

Trends in C&I Loans and Banks' Noninterest Expense
Non-Interest Expense
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Commercial and Industrial Loans
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
1990
1991
1992
1993
1994
1995
1996
Year
Non-Interest Expense in $ millions (Left Scale)
Commercial and Industrial Loans in $ millions (Right scale)

Figure 6



Dollar Value of Prime Premium
(C&I Loans Only)
$ millions
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1990
1991
1992
1993
1994
1995
1996
Year

Figure 7



Bank Risk Ratings vs. Bond Ratings
Mean Bank Risk Rating
0
5
10
15
20
25
30
35
40
AAA
AA
AA-
A+
A
A-
BBB+
BBB
BBB-
BB+
BB
BB-
B+
B
B-
CCC+
CCC
CCC-
CC+
CC
CC-
Bond Rating

Table 1

Percentage Loan Distributions by Size and Risk

This table shows a two-dimensional percentage distribution of the number of single-benchmark loans by borrower risk (R) and $\log_{10}$ sales (logS). The risk measure is explained in Appendix A. The size range of sales between $1 million and $100 million, usually referred to as the "middle market", is highlighted. On average, Prime-based loans are offered to smaller and riskier borrowers, but in the middle market the two pricing systems substantially overlap.

Panel A: Percentage Distribution of Prime-Based Loans

	R≤25	25<R≤35	35<R≤45	45<R	Total
2<logS	3.07	2.15	1.12	0.91	7.25
1<logS≤2	6.02	13.98	11.14	7.66	38.80
0<logS≤1	5.19	14.10	13.05	9.57	41.91
logS≤0	2.05	3.60	3.92	2.47	12.04
Total:	16.33	33.83	29.23	20.61	100.00

Panel B: Percentage Distribution of Market index Loans

	R≤25	25<R≤35	35<R≤45	45<R	Total
2<logS	43.08	11.74	6.05	2.55	63.42
1<logS≤2	10.61	6.46	5.38	1.82	24.27
0<logS≤1	2.87	2.07	3.02	1.80	9.76
logS≤0	0.92	0.55	1.12	0.66	3.25
Total:	57.48	20.82	15.57	6.83	100.00

Table 2

Descriptive Statistics for Monthly Average Benchmark Rates, 1974-1995

This table shows the means, standard deviations and correlations with Prime of monthly average Prime Rate, 3-month Libor and 3-month CD rates as reported by Citibase. The statistics are also shown for the monthly changes in these rates.

	Mean	Standard Deviation	Correlation with Prime
Interest Rates			
Prime Rate	10.019	3.388	1.000
Libor - 3 month	8.642	3.616	0.967
CD - 3 month	8.163	3.373	0.970
Monthly Changes in Rates			
Change in Prime	-0.005	0.669	1.000
Change in Libor	-0.012	0.841	0.782
Change in CD	-0.011	0.816	0.766

Table 3

Results of OLS Regression of Adjusted Spreads

This table reports results designed to check the robustness of the ACE procedure in identifying the Prime premium. Adjusted spreads are regressed on a constant and just four variables, one of which is a Prime dummy. In the second regression, dummy variables for existence of a bond rating or CP rating are added as proxies for capital market access.

	Regression 1		Regression 2	
	Parameter	t-statistic	Parameter	t-statistic
Constant	98.10	67.26	99.42	67.73
Risk	1.75	77.73	1.72	76.28
Log sales	-25.15	-73.36	-24.32	-66.78
Signing date	0.88	56.55	0.88	56.40
Prime dummy	**144.4**	162.00	**143.4**	157.61
CP rating dummy			-18.07	-8.27
Bond rating dummy			3.53	1.87
Adjusted R^2	0.552		0.553	

Table 4

Descriptive Statistics for Spreads in Optional-Benchmark Loans

For the 13,001 cases in which a Prime and market index pricing option are offered to a borrower in the same loan facility, Prime-based spreads are adjusted to Libor equivalents and directly compared to the adjusted market index spread.

Variable	Minimum	Maximum	Mean	Standard Error of Mean
Raw Prime spread	-175.0	500.0	32.5	0.50
Prime-Libor difference	148.5	299.7	243.7	0.29
Adjusted Prime spread	53.1	713.1	276.2	0.57
Adjusted Index spread	-52.4	741.0	130.1	0.76
Prime premium	-459.5	414.4	**146.1**	0.58

Table 5

Interest Paid under Simulated Borrowing Strategies

A representative Baa/BBB-rated company borrows $1000 under three alternative strategies during 1976-1995. The table displays descriptive statistics for its quarterly interest expense. Standard deviations are in parentheses. On average, the Libor-based strategy is cheapest but most volatile.

Period	Prime+18.5 bp	Libor+54.4 bp	Bonds
1976-80	25.79 *(9.15)*	24.84 *(9.29)*	24.80 *(-0-)*
1981-85	33.71 *(8.74)*	30.80 *(8.22)*	35.78 *(-0-)*
1986-90	23.83 *(2.90)*	21.05 *(2.67)*	27.71 *(-0-)*
1991-95	18.81 *(3.15)*	13.30 *(3.14)*	25.85 *(-0-)*
1976-95	25.53 *(8.49)*	22.50 *(9.05)*	28.54 *(4.34)*

Table 6

Impact of Multiple Bank Lenders on Spreads

This table analyzes cases in which the same borrower makes more than one loan against the same benchmark on two different dates. These are shown in the aggregate (column 3) and separated according to whether the borrower changes banks or stays with the same bank (columns 1-2). The cases are separated according to whether the spread changes or not; cases in which spread changes are then further separated between those in which (unadjusted) spreads rise and those in which they fall. Line B shows that borrowers which stay with the same bank are more than twice as likely to keep the same spread. Line C shows that, conditional on spreads changing, the likelihood of a rise or a fall is not statistically different between companies which stay with their bank and those which change banks.

	Borrowers with one Bank		Borrowers with two or more Banks		Total: All Borrowers	
A. Total cases	8,170		3,368		11,538	
B. Cases in which spreads are unchanged	4,346		833		5,179	
B / A = Proportion unchanged		*0.532*		*0.247*		*0.449*
Standard deviation		*0.006*		*0.007*		*0.005*
t-statistic for a difference of means		***15.050***		***-27.108***		
C. Cases in which spreads change	3,824		2,535		6,359	
C1. Spreads rise	1,672		1,156		2,828	
C2. Spreads fall	2,152		1,379		3,531	
C1/C = Proportion of positive changes		*0.437*		*0.456*		*0.445*
Standard deviation		*0.008*		*0.010*		*0.006*
t-statistic for a difference of means		***-0.933***		***1.141***		

Appendix: The borrower risk measure

The problem of scale consistency among banks is handled in the following way. A standardized scale of 1..100 is created, with 1 corresponding to the lowest default risk. It is assumed that all banks observe this risk scale, and agree about the correct measure on this scale to be assigned to every loan. Where banks differ is in mapping different segments of the 1..100 scale onto their local scales.

Each bank's local risk scale is represented by a set of brackets on the 1..100 scale. A particular bank might assign $1 \leq risk < 23$ to its category "1", $23 \leq risk < 35$ to "2" and so forth. Such a bank's scale would be represented by the set of breakpoints between brackets { 23, 35, ... }. A complete collection of these sets of breakpoints, one for each bank, is termed a concordance.

The concordance used in this study was constructed in the following manner. First, a "verbal concordance" was created as a first draft. This utilized the words used by banks in their own descriptions of their scales, matching them to a standardized verbal description for points on the 1..100 scale. This "verbal concordance" was discussed with most of the banks by LPC. If during the period studied a bank had changed its scale, or the definition used to describe its scale, it is treated as two separate banks, one before and one after the change, for this purpose.

Refinement of this draft concordance exploited the fact that the dataset contains 20,371 pairs of loans to the same company by two different banks within the same 12-month period with similar seniority and collateral status . (Note that if n banks participate in the same loan, $n(n-1)/2$ pairs are created). These paired ratings are used to improve the alignment of the separate bank scales against the 1..100 standard. It is assumed that the covenant and security structure of the paired loans is comparable, although this cannot be separately confirmed. The following loop was iterated:

1. Use the draft concordance to estimate the true risk of each loan in the paired-rating list. If the brackets assigned by the two banks overlap, use the midpoint of the overlap zone. If the two brackets are disjoint, use the midpoint of the space between them. If one bracket contains the other, use the midpoint of the inside bracket.

2. Use the loan risk numbers to re-estimate a draft concordance. This is done bank by bank with ordered probit analysis. The estimated risk numbers of all loans in the paired list rated by a particular bank are treated as the independent variable, and the bank's local risk rating is treated as the dependent variable. Ordered probit provides a maximum likelihood estimate of the breakpoints in the independent variable. If ordered probit fails because the data are too sparse or disordered, breakpoints are estimated using mean risk values in each rating category.

After five iterations the concordance changed little and the procedure was stopped.

It is natural to compare the bank ratings with bond ratings in the 3,243 cases where the latter exist. This relationship turns out to be nonlinear and is graphed in Figure 7. Banks treat loans to companies with bond ratings of AAA through AA- as essentially equivalent. The curve then rises about linearly through the investment grade ratings, but flattens noticeably below BBB; indeed it declines for the lowest-rated junk bonds. This flattening and decline reflect the fact that in most cases banks require both collateral and strong covenants when they lend to the lowest-rated companies, giving them more safety than bonds or unsecured loans to better companies. It is clear from the pattern of Figure 7 that the risk ratings incorporate the effect of collateral and covenants.

Notes

[1]Libor is an acronym for London Interbank Offered Rate. It is announced daily by the Bank of England as a consensus rate for deposits in major banks of 1, 3, 6 and 12 months term. It has become the nearly universal pricing index for international loans and coupon swaps.

[2]In LPC data grouped annually over 1990-1995, fixed rate loans represent 3-4% of bank loans by number of loans and 1-3% by dollar volume. They are typically offered in very small quantities to the smallest of borrowers. Fixed rate loans are omitted from this study.

[3] Banks in Louisiana set a separate "Louisiana Prime" for certain borrowers in that state. Some banks maintain a separate "Agricultural Prime" for loans to farms. However, both of these benchmarks, which are included under "Other" in Table 1, represent only a fraction of 1% of the loans studied, and the average size of the borrowers under both of these exceptions is very much smaller than the average size of borrowers under the regular Prime Rate.

[4]Loans which contain this option are separated out from the main dataset and studied in Subsection III-B.

[5]Data on access to private placement markets are not available.