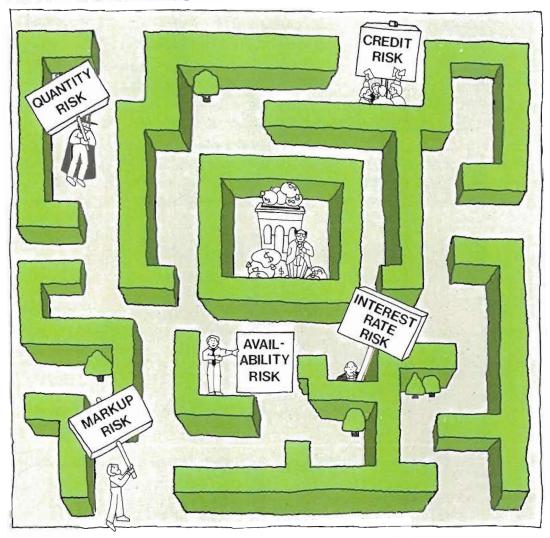


Federal Reserve Bank of Philadelphia

MAY • JUNE 1986



Loan Commitments
Insurance Contracts in a Risky World

Mitchell Berlin

Hedging Bank Borrowing Costs
With Financial Futures

Michael Smirlock



Federal Reserve Bank of Philadelphia Ten Independence Mall Philadelphia, Pennsylvania 19106

MAY/TUNE 1986

Increased volatility of interest rates recently has created risks for both banks and their customers. For example, when interest rates head up unexpectedly, banks can face a profit squeeze; their short-term borrowing costs are higher while the revenues on their long-term loans are tied to the lower rate. Volatility imposes other risks as well, for higher borrowing costs may limit a bank's ability to make loans available to its customers.

In this issue of the *Business Review*, two approaches to hedging these risks are presented. Mitchell Berlin analyzes loan commitments in the framework of insurance contracts between borrowers and banks. Michael Smirlock describes and discusses interest rate futures contracts, and compares the effectiveness of various kinds of futures contracts in hedging interest rate risk.

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The BUSINESS REVIEW is published by the Department of Research every other month. It is edited by Judith Farnbach. Artwork is directed by Ronald B. Williams, with the assistance of Dianne Hallowell. The views expressed herein are not necessarily those of this Bank or of the Federal Reserve System. The Review is available without charge.

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Loan Commitments Insurance Contracts in a Risky World

Mitchell Berlin*

INTRODUCTION

Over the last fifteen years, banks have been increasingly concerned with managing the risks that stem from volatile interest rates, both for themselves and for their loan customers. One response to this uncertain environment has been a large increase in the volume and variety of loan commitments — promises by banks to make future loans at the customer's demand. These

*Mitchell Berlin is an Economist in the Banking Section of the Research Department of the Federal Reserve Bank of Philadelphia. agreements provide commercial borrowers with assurance that funds will be available, often at a contractually set rate. One can view the loan commitment as an insurance contract, in which borrowers purchase protection against certain risks, and banks — as insurers — take risks upon themselves.

The growth of loan commitments reflects a more general trend toward the explicit pricing of individual customer services by banks. Although the traditional loan relationship had always provided insurance through informal understandings and implicit promises, loan commitments increasingly contain binding con-

tractual promises and explicitly priced insurance services. An analysis of the growth of commitments and the relative growth of different types of commitments provides a striking illustration of banks' attempts to adapt traditional customer services to a riskier and less regulated environment.

WHY CUSTOMERS AND BANKS USE LOAN COMMITMENTS

Loan commitments — promises by banks to lend up to some maximum amount over a fixed period — are not new instruments. Their widespread use, though, is relatively new, especially among smaller commercial customers. This growth in loan commitments has been apparent

since 1977 (the first year for which detailed data are available) for short-term, commercial and industrial (C&I) loans of all sizes (see Table 1).

The first step toward understanding this trend is to explain why customers want commitments. Why, for instance, would a commercial customer desire a commitment by a bank to make loans rather than simply apply for loans as needed? The underlying reason is that customers without commitments face considerable uncertainty about both the cost and availability of funds. An example helps to illustrate the point.

Consider Shmattas and Hatts (S&H), a mediumsized clothing manufacturer. Like many clothing firms, S&H has separate seasonal lines. Each

TABLE 1
THE SHARE OF SHORT-TERM C&I LOANS
MADE UNDER COMMITMENT^a

Size of Loan (thousands)

Year	\$1 - 24	\$25 - 49	\$50 - 99	\$100 - 499	\$500 - 999	\$1000 and above
1977	18%	24%	26%	41%	61%	59%
1978	15	21	27	38	63	49
1979	23	31	40	46	59	55
1980	24	30	39	47	64	51
1981	26	30	40	47	66	51
1982	36	37	48	54	63	62
1983	33	37	4 6	49	67	67
1984	31	38	43	54	67	71
1985	36	41	52	58	70	70

^aThe figures are constructed from a sample of 340 commercial banks of all sizes. The figures are short-term (one year or less) C&I loans granted under commitment as a percent of total short-term C&I loans.

SOURCE: "Survey of Terms of Lending at Commercial Banks," Federal Reserve Bulletin (various years).

winter, the firm manufactures swimsuits to be placed in department stores by early summer. Every spring, S&H produces sweaters that will be sold in the fall. Until the clothes have been sold and the remittances received from retail outlets, S&H requires funds to cover its material, labor, and warehousing costs.

In the past S&H has always borrowed from First National Bank and has built up a reputation for prompt repayment. But when it applies for its spring loan, the loan officer explains that the bank has experienced unusually large loan demand, so it can provide only half of the firm's working capital requirement. Now S&H must cut back production or make a costly search for alternative sources of funds. Without a promise to lend from the bank, S&H faces availability risk—the possibility of getting less funds than it needs.

In another scenario, suppose that the loan officer says that the full loan can be accommodated but at the prime rate plus 200 basis points, instead of the 100 basis point markup over prime that the bank had required on previous loans. The higher markup raises S&H's production costs and the firm must either renegotiate prior agreements with sales outlets or accept lower net revenues. Therefore, when a firm applies for separate loans as needed it is also subject to markup risk — the possibility of increases in the loan rate due to a higher markup. Loan commitments, though, permit customers to purchase insurance against availability risk and markup risk.¹

A bank also finds it profitable to supply loan commitments for several reasons. First, loan commitments have some of the virtues of the more traditional long-term loans: by signing a single contract, the bank can both reduce the costs of negotiating a series of shorter-term loans, and banks can more easily plan future loan demand. At the same time, banks can take advantage of customers' willingness to pay for the insurance a loan commitment offers. The most common form of payment, a fee based on the unborrowed balance of the commitment, is especially attractive to banks seeking a stable source of income in an uncertain environment. Another benefit to the bank lies in the regulatory treatment of loan commitments. Unlike a long-term loan, a loan commitment enters the bank's balance sheet piecemeal — each time the customer borrows, the bank enters the amount borrowed as an asset. Thus the bank receives income based on the total amount committed - the interest on the loans actually made and the fee on the unborrowed balance — while its assets include only the loans granted. Since regulators require banks to maintain a minimum capital-to-asset ratio, loan commitments place less pressure than longterm loans on the bank's capital requirement while still producing income.

THE GROWTH IN COMMITMENTS REFLECTS AN INCREASED DEMAND FOR INSURANCE

The sources of borrowers' increased demand for insurance lie in a combination of factors that made loan rates more volatile in the 1970s and 1980s, and increased borrower risk. Before the 1970s, the prime rate was changed very little and very infrequently. Deposit rate regulation, low inflation rates, and the Fed's practice of restricting interest rate fluctuations ensured that bankers could attract deposits at a low, stable cost, and this permitted them to offer stable loan rates to borrowers. But as inflation and interest rates moved higher in the late 1960s and 1970s, depositors became increasingly dissatisfied with low, regulated rates of return, and bankers came under pressure to satisfy depositors' demands for market rates of return. The deregulation of interest rates on large, negotiable certificates of deposit (CDs) in 1973 permitted banks to satisfy this demand, at least for large depositors. Thus

¹Of course, the firm still bears *interest rate risk*—the possibility of loan rate increases due to rising market rates, because virtually all loan commitments permit loan rates to move with market rates. The customer locks in a commitment to lend and often a markup, but not a fixed reference (or base) rate

banks became more and more dependent upon liabilities whose cost moved directly with market interest rates. (See Figure 1.)

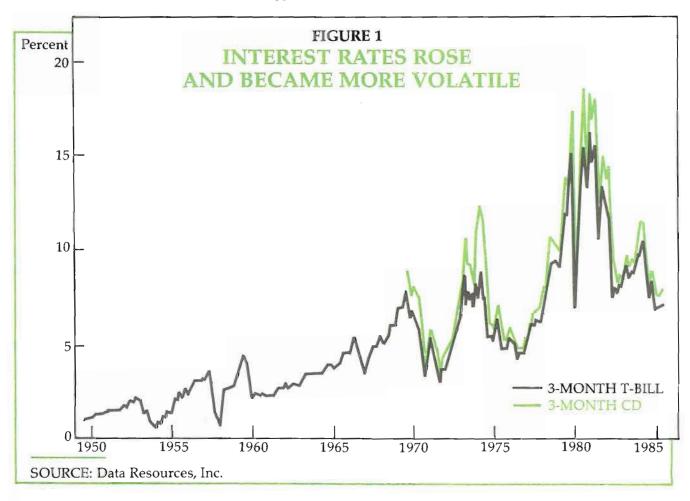
The sluggishness of the prime rate that marked the pre-1970 period was a major casualty of this transformation of the liability side of bank balance sheets. By the early 1970s, banks had begun adjusting the prime rate more rapidly in response to fluctuations in their cost of funds, and with the Fed's change in operating procedures in October 1979, bankers faced much more volatile CD rates. As CD rate fluctuations became more pronounced, borrowers were increasingly confronted with volatile loan rates.²

Volatile Loan Rates Increased Borrower Risk. When loan rates became more variable, customers borrowing on a loan-by-loan basis faced

²See Brian C. Gendreau, "When Is the Prime Rate Second Choice?" this *Business Review* (May/June 1983) pp. 13-21.

both greater markup risk and greater availability risk. The reason is that the bank's perception of a customer's creditworthiness depends, in part, upon the loan rate the bank charges. A firm forced to borrow at a higher rate due to an unexpected increase in the bank's cost of funds may engage in riskier behavior with a higher probability of default.³ For instance, to protect profit margins, the clothing manufacturer may choose a less traditional, more uncertain product line in the hope that its sales revenues will be greater than normal. Although the bank cannot predict each customer's expected revenues with complete accuracy, it realizes that there are many

³For a rigorous demonstration of the relationship between the loan rate and default risk, see Joseph Stiglitz and Andrew Weiss, "Credit Rationing in Markets with Imperfect Information," *American Economic Review* (June 1981) pp. 393-410



customers like the clothing manufacturer and raises its assessment of the average likelihood of default. For loan customers without a contractual commitment, the bank has two alternatives. One is to increase the customer's markup as compensation for increased credit risk. The other is to refuse to lend on the grounds that the higher markup increases the customer's probability of default. The first alternative confronts the loan customer with markup risk, while the second creates availability risk. These risks reduce the gains to both the bank and the borrower from maintaining a continuing loan relationship.

The greater markup and availability risk that accompanied the interest rate volatility of the 1970s and 1980s thus raised the value of insurance to the loan customer. This, in turn, generated a greater demand for loan commitments. By satisfying this demand, banks were able to maintain a traditional clientele — customers who required funds on a continuing basis.

Further insight into the banking industry's innovative response to a riskier environment requires a detailed look at how the various types of loan commitment contracts allocate risk between the bank and the borrower. Each contract type imposes a distinctive compromise between the customer's desire for protection against risk and the bank's costs of providing that insurance. Thus, it is not surprising that customers' and banks' preferences for different types of commitments have shifted as banking markets have changed.⁴

REVOLVING LOAN COMMITMENTS VS. CONFIRMED CREDIT LINES

Although all commitments involve a contractual promise to lend up to some maximum amount

⁴For interesting recent empirical discussions of loan commitment contracts, see Thomas Brady, "Changes in Loan Pricing and Business Lending at Commercial Banks," Federal Reserve Bulletin (Jan. 1985) pp. 1-13, and John Ham and Arie Melnick, "Bank Lending Practices and the Market for Loan Commitments: Survey and Analysis," unpublished paper, University of Haifa (Feb. 1984).

over a given period, revolving loan commitments also contain a loan formula. This loan formula includes a reference rate —either the prime rate or some market rate such as the 60-day CD rate — and a contractually fixed markup. The size of the markup is determined by the customer's creditworthiness. Revolving loan commitments therefore protect the customer against both availability risk and markup risk. In contrast, a commitment that permits the bank to set the loan rate unilaterally each time the commitment is used, or "taken down," is called a confirmed credit line. This type of commitment only provides insurance against availability risk.

The provision of insurance, however, is not costless for the bank. While the fixed markup provided by a revolving loan commitment is a definite advantage to the customer, it increases bank risk. Thus, customers with revolving loan commitments are usually required to compensate the bank in the form of a commitment fee. The fact that commitment fees are seldom required on confirmed credit lines indicates that it is the combination of the promise to lend and the fixed markup that poses special risks, for which the bank requires added compensation.

The first type of risk to the bank is known as quantity risk, the possibility that many customers will borrow unexpectedly from the bank at the same time. Although firms normally borrow funds from time to time according to their individual needs, at certain times many firms will borrow at once. This is true, in particular, when alternative sources of funds are costly and difficult to find. To satisfy an unexpectedly large loan demand, banks must compete aggressively for funds against other banks. This drives up market rates, including CD rates, and leads banks to raise the prime rate. Since loan commitments use these rates as reference rates, part of the bank's costs of meeting greater loan demand is passed on to borrowers with commitments. But the increase in the reference rate, which is only one component of the loan rate, does not necessarily compensate the bank fully for the added costs of satisfying loan demand. In particular,

banks are subject to regulatory capital constraints and are not free to increase loans without limit. If, for example, regulators require capital equal to 6 percent of total assets outstanding, and the total loans taken down under commitment would drive the capital-to-asset ratio to 5 percent, the bank either must deny new loans to customers unprotected by commitments or must increase its capital. Either alternative is costly to the bank and these costs are not reflected in the reference rate.

The second type of risk to the bank is known as *credit risk* — the possibility of customer default. While banks face credit risk on all loans, not just loans granted under commitment, the fact that commitments extend into the future creates added uncertainty. Typically, commitments are made for 1 to 3 years. A bank may be able to evaluate a customer's creditworthiness accurately in the near term; however, a customer's ability to repay loans to be made in the future will be harder to predict. This risk is compounded because firms are especially likely to take down commitments when alternative credit sources are unavailable because of increased credit risk.

In sum, since under a revolving loan commitment, the bank is unable to adjust the markup in response either to large loan demand or to a decline in a customer's creditworthiness, the contract must contain provisions that either reduce the bank's risks or compensate the bank for the risks it bears. The commitment fee is the standard provision that compensates the bank for bearing quantity and credit risk. Since the risk borne by the bank at any time depends upon the customer's maximum potential borrowings, the commitment fee usually takes the form of a percentage payment on the unborrowed balance of the loan commitment (0.5 percent is a typical fee).5 To limit the risks imposed by the fixed markup, commitments also contain provisions to renegotiate or even cancel the agreement if there are major declines in the

⁵See Ham and Melnick, "Bank Lending Practices..."

customer's creditworthiness. Many commitments require that borrowers achieve a zero balance at least once a year, because the bank can use the customer's ability to clear its balance periodically as an indicator of the customer's creditworthiness. If the firm cannot clear, then the bank may decide to examine the firm's books and determine whether the commitment should be discontinued or renegotiated.⁶

Revolving Loan Commitments Have Become a Larger Share of Total Commitments... The growth in the use of revolving loan commitments has outpaced the growth of confirmed credit lines (see Table 2). How can the apparent increasing preference for revolving loan commitments be explained? Perhaps the primary reason is that the risks facing borrowers have changed with the deregulation of deposit rates. While markup risk and availability risk due to loan rate volatility have increased, another traditional source of availability risk has declined in importance because of banks' expanded liability powers. In the years before the deregulation of deposit rates, when market rates rose above deposit rate ceilings, funds flowed out of the banking system. This outflow of funds has been termed "disintermediation." Depositors shunned the below market returns offered by banks and shifted their funds into financial instruments paying higher interest rates offered by unregulated competitors. Unable to purchase sufficient funds, banks were compelled to reduce the availability of loans to customers unprotected by commitments. Since the restricted availability of loans resulted from banks' restricted access to funds rather than the increased credit risk due to high loan rates, confirmed credit lines provided adequate protection against the risk faced by the borrower in obtaining a loan.

However, the threat of disintermediation has

⁶Some contracts require the firm to maintain working capital above some minimum level. Such clauses have the same basic intent as provisions that require customers to clear their balance periodically.

diminished as banks have acquired enhanced powers to compete for funds. In periods of high interest rates banks can secure funds, but only at a higher cost. Thus availability risk due to disintermediation has declined in importance, while the risks arising from loan rate volatility have increased. Accordingly, revolving loan commitments have become relatively more attractive than confirmed credit lines, which provide no markup protection.⁷

...But It Is Still Efficient for Banks to Offer Both Types. The declining share of confirmed credit lines is by no means evidence that they are falling into disuse. Because different loan customers have different needs, banks will try to satisfy them with differentiated products. For example, a large firm may be confident that it will remain creditworthy and that its credit status will be verified by public rating agencies such as Standard and Poor's. This firm will find the markup protection of revolving loan commitments less valuable than will a small, unrated firm with more uncertain prospects. Also, by offering both revolving loan commitments and confirmed credit lines, banks can generate information about customers that is otherwise difficult to collect, because the customer's choice between contract types can reveal his likelihood of borrowing. Thus banks increase the predictability of loan

To see this, consider a very simplified example with two different loan customers, firm A and firm B. Imagine that firm A is more likely than firm B to require funds, but that it is difficult for

TABLE 2 C&I LOANS MADE UNDER REVOLVING LOAN COMMITMENTS

Year	Dollarsa (billions)	Percent of All C&I Loans Made Under Commitment
1977	19.7	24.7%
1978	23.5	24.8
1979	31.0	27.1
1980	36.6	29.1
1981	46.3	32.6
1982	62.9	40.1
1983	62.5	41.2
1984	73.5	44.2
1985	75.0	47.8

aRefers to the monthly average for each year.

SOURCE: "Commercial and Industrial Loan Commitments at Selected Large Commercial Banks," Federal Reserve Statistical Release G.21 (423). The survey includes 119 large banks.

the bank to determine either firm's probable need for funds by direct examination. Clearly, in many cases firms know a great deal more than the bank does about their likely need for a loan. The different characteristics of the two types of commitments may induce firm A to choose a revolving loan commitment and firm B to choose a confirmed credit line, and in the process they reveal their probability of borrowing. The revolving loan commitment requires a commitment fee, but limits upward movements in the loan rate by fixing the markup; the confirmed credit line, however, requires no fee, but also places no restriction on the bank's prerogative to raise the markup and hence the loan rate. Everything else equal, firm A will be willing to pay the commitment fee to gain protection against

⁷Another explanation of the move to revolving loan commitments involves the different sizes of borrowers. Since the largest increase in the use of loan commitments appears to have occurred among smaller borrowers, the greater than proportional growth of revolving loan commitments may reflect the different characteristics of large and small borrowers. If, for instance, small borrowers' creditworthiness is more likely to vary over the 2- to 3-year life of a commitment, then they are more likely to demand markup protection and banks are more likely to require fee compensation for a commitment to lend. Currently available data do not permit a test of this hypothesis.

drastic loan rate increases because it is more likely to borrow. For this type of firm, protection against the loan rate increasing is very valuable. On the other hand, firm B, which is less likely to borrow, will be less concerned with the possibility of a high loan rate, and will choose the confirmed credit line to avoid paying the commitment fee.

Without this kind of information about customers, the bank is forced to plan its future funding needs as if all its customers were identical, "average" loan customers. But if customers reveal their individual probabilities of borrowing through their choice of contract type, the bank can reduce its uncertainty about likely loan demand, and can plan its funding accordingly. Since loan demand has been made more predictable, the bank bears less quantity risk.8

FIXED VS. FLOATING REFERENCE RATES

Choice among loan commitment contracts is not limited to deciding whether or not the markup should be contractually fixed. In addition, loans taken down under commitment differ according to the variability of the reference rate, which may be either a fixed or floating rate. For a floating rate loan, the reference rate is adjusted continuously throughout the life of the loan. The actual loan rate paid is some weighted average of the rates prevailing until the loan is repaid. For a fixed rate loan, the reference rate prevailing on the day the loan is taken down remains in force until the loan is repaid. The fixed rate loan provides the customer with insurance against interest rate risk — the possibility of a rise in the reference rate during the life of the loan.

Floating Rate Loans Have Become More Prevalent... Published data that aggregate ordinary loans and loans made under commitment reflect a trend toward increasing use of floating rate loans

(see Table 3). This trend can be observed across all loan sizes except the very largest, which tend to have very short maturities (one month or less). The growth of floating rate loans is usually ascribed to the greater volatility of bank funding costs. When the cost of funds is variable, a bank making fixed rate loans funded by liabilities of shorter maturity faces interest rate risk. If, for example, the bank funds a 6-month fixed rate loan with 3-month CDs, an unanticipated rise in the CD rate reduces the bank's profit margin. To avoid interest rate risk, though, the bank has an alternative to the restrictive policy of matching each loan with a liability of identical maturity. If the reference rate is allowed to float, the bank can shift interest rate risk to the customer.

The most recent data distinguish fixed and floating rate loans according to whether they were granted under commitment or not. The data from the last four loan surveys indicate that a loan granted under commitment is more likely to have a floating rate than an ordinary loan. In dollar terms, the share of committed loans with floating rates in these four surveys ranged from a high of 37 percent to a low of 24 percent, while the fraction of noncommitted loans with floating rates ranged from 27 percent to 18 percent.⁹

Loan commitments come with a variety of repayment options, and customers have some flexibility in determining when to repay the loan. Uncertainty about the repayment time creates difficulty for a bank that wishes both to offer fixed rate commitments and to limit its own interest rate risk. Unless the bank can confidently predict the maturity of the loan, it is unable to fund the loan with a matching CD. Thus, banks are more likely to insist on the floating rate option for loans granted under commitment.

...But It Is Still Efficient for Banks to Offer Fixed Rate Loans. Although banks have increased

⁸For a formal model, see Anjan Thakor and Gregory Udell, "An Economic Rationale for the Pricing Structure of Bank Loan Commitments," Banking Reasearch Center Working Paper, Northwestern University (April 1984).

⁹See "The Survey of Terms of Bank Lending," Federal Reserve Statistical Release E.2. The four surveys are from November 5-9, 1984; February 4-8, 1985; May 6-10, 1985; and August 5-9, 1985.

TABLE 3
THE SHARE OF SHORT-TERM C&I FLOATING RATE LOANS a

Size of Loan (thousands)

Year	\$1 - 24	\$25 - 49	\$50 - 99	\$100 - 499	\$500 - 999	\$1000 and above
1977	25%	31%	43%	53%	55%	67%
1978	32	34	44	51	57	66
1979	22	27	36	43	62	65
1980	22	33	48	59	71	35
1981	29	39	48	59	71	35
1982	35	44	56	61	64	23
1983	35	46	52	64	68	30
1984	33	44	51	64	69	32
1985	35	49	65	73	75	21

^aThe figures are constructed from a sample of 340 commercial banks of all sizes. The figures are short-term (one year or less) C&I loans made with floating rates as a percent of total short-term C&I loans.

SOURCE: "Survey of Terms of Lending at Commercial Banks," Federal Reserve Bulletin (various years).

the share of floating rate loans, many loans are still granted at fixed rates. This is especially apparent for smaller loan sizes. The continued popularity of fixed rate loans indicates that in many cases there are efficiency gains when the bank provides insurance against interest rate risk.

The most important reason why the bank and customer may elect to use the fixed rate alternative is to reduce the customer's risk of default. The positive relationship between interest rate risk and default risk is a particular concern for loans granted to small borrowers, who in general find it difficult to insure against interest rate risk on their own. The bank can increase its profits by bearing the risk of increases in its cost of funds, thereby increasing the customer's probability of repayment.

In addition, banks have access to other hedging

strategies that are available to only their largest loan customers. Although relatively few banks — primarily the largest money center and regional banks — have actively experimented with hedging interest rate risk through the use of futures, there has been substantial recent interest in their use. The use of such instruments as an alternative means of hedging interest rate risk has the desirable feature that risk is actually reduced for both the bank and the borrower rather than simply shifted to the borrower.

CONCLUSION

Banks have traditionally been specialists in maintaining "loan relationships" — long-term, repeated dealings with individual borrowers. In a stable and regulated world, banks and their commercial customers relied on informal promises

to support a series of individual loan agreements. But the transformation of the liability side of banks' balance sheets has entailed changes in traditional lending practices. In particular, loan commitments that explicitly provide customers with insurance increasingly have replaced "implicit" or informal agreements. Thus, the terms of loan commitment contracts reflect a compromise between customers' demand for insurance and banks' costs of satisfying this demand.

Although interest rate volatility was an important factor behind the growth of commitments, a period of lower, more stable rates is not likely to lead to a decline in their use. The formalization of the loan relationship is part of a more general trend in bank-customer relations. By making the traditionally informal promises of the loan relationship explicit and binding, loan commitment contracts mirror the trend toward explicit pricing of deposit and payments services by banks. Implicit charges and informal agreements were hallmarks of highly regulated banking markets. The explicit pricing of services, including the provision of insurance to loan customers, is a direct outcome of deregulation that is not likely to be reversed.