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Abstract

Credit derivatives are the latest in a series of innovations that have had a significant impact on credit markets. Using a micro data set of individual corporate loans, this paper explores whether use of credit derivatives is associated with an increase in bank credit supply. We find evidence that greater use of credit derivatives is associated with greater supply of bank credit for large term loans—newly negotiated loan extensions to large corporate borrowers—though not for (previously negotiated) commitment lending. This finding suggests that the benefits of the growth of credit derivatives may be narrow, accruing mainly to large firms that are likely to be "named credits" in these transactions. Further, the impact is primarily on the terms of lending—longer loan maturity and lower spreads—rather than on loan volume. Finally, use of credit derivatives appears to be complementary to other forms of hedging by banks.

Key words: credit derivatives, risk management, credit supply, bank lending

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Credit Derivatives and Bank Credit Supply

I. Introduction

The market for credit derivatives has grown enormously in recent years. Notional amounts of credit derivatives reached $45.5 trillion as of mid-2007, a 50-fold increase from the level at mid-year 2001 (International Swaps and Derivatives Association 2007). The development of these instruments is an important innovation, the latest of a series of innovations such as loan sales in the 1980s and securitizations in the 1990s that have had a significant impact on the nature and operation of credit markets. Like these earlier innovations, a key property of credit derivatives is that they separate the origination of credit, the funding of credit, and the holding and management of credit risk.

This separation has implications for the distribution of credit risk across the financial system and, in turn, for the supply of credit. Banks that originate credit to corporate borrowers need no longer hold the credit risk associated with these loans, while other financial firms can hold credit risk without having to originate or fund the underlying credit.

The risk diversification potential of credit derivatives has been widely discussed and acknowledged. But a follow-on question is whether greater risk diversification, both within the banking industry and between banks and other financial institutions, has led to an increase in the supply of credit. To what extent has the ability to spread credit risk outside the banking system allowed banks to originate and hold more credit? Have banks used the diversification potential of credit derivatives to reduce their overall risk exposures, or have they "undone" diversification-related risk reductions by expanding their loan portfolios? If credit supply has expanded, which borrowers have benefited?

Research examining earlier credit market innovations such as loan sales and securitizations has generally found that banks have used opportunities to diversify credit risk exposures to increase lending (Cebenoyan and Strahan 2004, Franke and Krahnen 2005, Goderis

et al. 2006). This paper extends this previous work by examining the impact of banks' use of credit derivatives on their credit supply. Using a confidential data set of thousands of commercial and industrial (C&I) loans made by a sample of U.S. banks between 1997 and 2006, we look at how the volume of new loans changes as a bank purchases more protection through the credit derivatives market. A key advantage of this data set is that we can look not only at the volume of credit provided, but also at lending terms and the characteristics of the new lending, including credit spreads and the maturity of loans. We can also separate the loans by borrower size (proxied by the size of the loan) and by the type of lending arrangement (term lending versus lending under previously negotiated commitments).

We find evidence that banks increase the supply of credit as they obtain additional credit protection through credit derivatives, but only for certain types of loans and borrowers. The evidence is strongest for large term loans: average maturities increase, new loan flows (weakly) increase, and spreads fall as credit derivatives protection rises. Further, the impact on loan maturities and spreads is economically meaningful, with a one standard deviation increase in credit derivatives protection implying a six-month increase in average loan maturity and a 21 basis point drop in spreads. For small term loans and lending done under loan commitment, however, the results are decidedly more mixed, with offsetting positive and negative effects of increased credit derivatives protection across new loan amounts, maturities, and spreads. Even in the cases where the results indicate a positive effect on supply of these types of loans, the impact is economically small.

The term loan results may be the most relevant for assessing the impact of credit derivatives on new credit supply, since lending terms on commitment loans may reflect arrangements that were negotiated months, or even years, prior to the loan extension, and the timing and size of extensions is largely determined by borrowers. Further, since large firms are more likely to be "named credits" in the credit derivatives market, the findings suggest that the benefits of credit derivatives may accrue mainly to these firms, rather than being spread more

broadly across the business sector. It is also interesting to note that the most significant impact comes on the terms of lending – loan maturity and loan spreads – rather than on the volume of lending.

Finally, the extent to which a bank engages in other forms of hedging – particularly, its holdings of financial (non-credit) derivatives – affects the impact of credit derivatives on credit supply. Hedging via credit derivatives appears to be complementary to other forms of hedging in that credit supply tends to increase more in response to an increase in credit derivatives protection for banks that are active hedgers in other arenas.

The remainder of the paper is organized as follows. The next section reviews previous work on credit derivatives and other credit market innovations on the supply and terms of credit. Section III discussed the confidential loan data and empirical specification used in the analysis, while Section IV presents the key results. Section V concludes.

II. Credit Market Innovation and Bank Credit Supply

In the traditional model of bank lending, the bank performs all aspects of the credit process: originating the loan, holding it on the balance sheet (funding it), and holding and managing the associated credit risk. Credit market innovations in the 1980s and 1990s altered this model in some significant ways. In particular, innovations such as loans sales, syndications, and securitizations separated the process of loan origination – establishing a relationship with the borrower, gathering and analyzing information about the borrower's creditworthiness, and establishing the terms of the loan – from funding the loan. These arrangements sometimes also removed the credit risk associated with the loan, though the originating bank frequently provides credit guarantees or holds a first-loss or other recourse position that retains some portion of the credit risk exposure.

Credit derivatives provide another way to de-couple the various aspects of the credit process. The key feature of these contracts as compared to earlier credit risk transfer arrangements is that credit derivatives separate credit risk from both origination and funding.

Credit derivatives are financial contracts that allow one party – the guarantor – to assume the credit risk associated with a particular debt obligation or with a group of debt obligations from another party – the beneficiary. The debt obligations in question are largely those of commercial and industrial firms, particularly large, investment grade corporate borrowers.[1] The risk transfer can involve contingent payments from the guarantor to the beneficiary related to a credit event such as a bankruptcy, default or rating downgrade (as in a credit default swap), or transfer of the cash flows from a reference asset such as a loan or bond in return for interest payments (as in a total return swap).[2] In theory, credit derivatives allow parties to take on credit risk without doing any actual lending, or to do lending without assuming any credit risk.[3]

Credit derivatives allow credit risk transfer within the banking system and also between banks and non-bank financial institutions. This risk transfer is frequently cited as a stabilizing factor in the financial system, reducing concentrations of exposures at individual banks and spreading credit risk more widely to those parties best able to hold it (Geithner 2006, Greenspan 2005). A recent study by an international group of banking, securities, and insurance regulators argues that risk transfer at some individual firms may be substantial, though it suggests that the overall extent of risk transfer is relatively small, at least in comparison to total credit risk in the banking system (Joint Forum 2005).

For individual banks, the ability to transfer or assume credit risk via credit derivatives facilitates risk management and the optimal use of bank capital. The key idea is that in managing their loan portfolios, banks make a series of related decisions about how much to lend, the terms on which loans will be made, and how the risk of those loans will be managed (Froot and Stein 1998, Duffee and Zhou 2001). As the discussion above suggests, innovations in credit markets

[1] Some credit derivatives are also written on sovereign creditors and, increasingly, on credit market indices.
[2] See Lopez (2001) for a more detailed description of particular types of credit derivatives.
[3] This is an overstatement, even in theory, since banks assume counterparty credit risk when entering into a credit derivative contract. Counterparty credit risk is the risk that the party on the other side of the derivative will fail to perform on the terms of the contract. For a broader discussion of the operational risks to banks of using credit derivatives, see Gibson (2007).

have considerably widened the options available for managing credit risk. Duffee and Zhou (2001), for instance, argue that credit derivatives allow banks to reduce credit risk exposures in a more flexible, dynamic way over the life of a loan as compared to loan sales, which are for the loan's full term. Instefjord (2005) suggests that banks may be willing to take on credit risk because liquid credit derivatives enable them to "offload" this risk if necessary.[4]

Decisions about whether to lend to a particular borrower or group of borrowers, how much to lend, and the terms of that lending thus may be made jointly with the decision about how to manage the risk of the resulting loan: to keep it on the books and accept the risk, to sell it or securitize it, or to keep it and hedge some or all of the credit risk. All of these decisions are made in the context of the bank's overall appetite and capacity for additional risk exposure, in particular, with regard to the extent of economic and regulatory capital capacity to absorb additional risk (Froot and Stein 1998). Risk-reducing mechanisms such as credit derivatives can result in lower allocated capital for a given scale of business or can allow a business to expand its activities for a given amount of capital.

Thus, a bank's decision to lend and on what terms depends on a series of factors, including the strength of loan demand and the quality of investment opportunities, the bank's capital position, and its ability to hedge or disperse risk. Regarding the last of these, it is important to note that a can bank determine and execute its hedging strategy in several ways. For instance, a bank could make lending and hedging decisions on a flow basis relative to individual borrowers – so that it might be willing to lend to that particular borrower because it can hedge that borrower's risk using a credit derivative (Gibson 2007, Bomfim 2005). The bank could also

[4] The growth of the market for credit derivatives may alter conditions in markets for alternative credit risk management mechanisms such as loan sales and syndications. For instance, Duffee and Zhou (2001) argue that banks' use of credit derivatives could alter the characteristics of the pool of loans offered in the loan sales market in ways that worsen the adverse selection problem and undercut the effectiveness of loan sales in reducing the cost of distress to banks. Morrison (2005) argues that because banks' use of credit derivatives is less transparent than their loan sales activity – in the sense of knowing which borrowers are affected – that the certification value of bank loans could be undercut, resulting in disintermediation from the banking system, as borrowers choose to issue low quality bonds rather than take on bank debt.

engage in *ex ante* hedging, essentially "keeping its powder dry" to be able to expand lending when good opportunities arise. In the first scenario, firm benefit from credit derivatives only if they are "named credits," while in the second, the impact is felt by a much wider range of borrowers. But in both scenarios, the ability to hedge the risks associated with some borrowers has a positive impact on the supply of bank loans.

The question that emerges in practice is whether credit derivatives have had a tangible impact on bank credit supply and, if so, for which borrowers? This is, of course, primarily an empirical question. To begin addressing this question, we review aggregate data on U.S. commercial banks' use of credit derivatives. Table 1 reports credit derivative usage for all U.S. commercial banks, based on data in bank regulatory reports (the "Call Reports"). The Call Reports have collected data on banks' credit derivatives holdings since 1997. These data include the notional principal amounts on for credit derivatives contracts for which the bank is the "beneficiary" (purchases credit protection) and for which the bank is the "guarantor" (sells credit protection). We use these notional principal amounts as the measure of credit derivatives activity.

As previously reported in Minton, Stulz, and Williamson (2006), very few U.S. banks actually hold credit derivatives. At the end of 2006, just 42 banks reported any credit derivatives holdings. While the number has risen over time – from 20 banks in 1997 to 30 or more in the 2000s – this total still represents just a tiny fraction of all U.S. banks. Usage is clustered among the largest banks, however, with nearly all banks with $100 billion or more in assets using credit derivatives. Some of these large banks are dealers who manage large portfolios of customer-related positions, as well as positions held for their own internal credit risk management purposes.

Figure 1 provides some perspective on how credit derivatives use by U.S. banks has evolved over time. The figure plots the notional principal amounts of credit derivatives held by U.S. banks as a share of commercial and industrial loans held on the balance sheet, separated into contracts on which banks have bought protection from contracts on which they have sold protection. Dealer banks – defined as those with average notional principal amounts of $10

billion and above for the sample period – are excluded to give a sense of the extent to which these contracts are being used for risk management purposes. While both credit protection bought and credit protection sold have increased since the late 1990s, the increase in protection bought has been significantly sharper. Even at the end of the sample period, however, aggregate notional amounts of protection bought represented just 5 percent of aggregate C&I loans, a relatively small share.

The specific types of derivatives used by banks might provide some insight into the likely impact of credit derivatives on bank loan supply. The Call Report data indicate that the vast majority of credit derivatives held by U.S. banks are credit default swaps[5], but for the questions of interest in this paper, differences in the type of derivatives instrument may be of less significance than differences in the creditors covered by the instrument. In particular, significant use of index-based or multi-name credit derivatives – derivatives on which the payoff is derived from the default behavior of more than one creditor – would be consistent with banks' doing portfolio-level hedging, suggesting that a wide set of borrowers might benefit from credit derivatives. In contrast, if single-name derivatives dominate, then the impact may be more narrow, limited to just those borrowers named in the derivatives. For instance, Gibson (2007) argues that banks use single-name credit derivatives primarily to hedge large exposure risk from individual corporate borrowers, a view echoed by the chief risk officer of a major U.S. commercial bank (Truslow 2007).

Unfortunately, the Call Reports data do not provide information about single- versus multi-name positions, so we cannot examine this question on a bank-by-bank basis. However, survey data from the Bank for International Settlements (BIS) indicate that between 2004 and 2006, about two-thirds to three-quarters of credit derivatives held by non-dealer banks and

[5] In 2006, the first year in which the Call Reports collected information on credit derivatives by type of instrument, 97 percent of all credit derivatives held by U.S. commercial banks were credit default swaps. Among non-dealer banks, this share drops to about 80 percent, with most of the remainder being total return swaps.

securities firms were single-name instruments. The survey data thus present some *prima facie* evidence that the impact from banks' credit derivatives use is likely to be narrow, though of course it is possible that banks could use single-name credit derivatives to hedge the risk of one borrower and use the resulting freed-up risk capacity to lend to someone else. One of the goals of the empirical work that follows is to shed some light on this question.

Previous empirical work on the impact of credit derivatives on credit supply is limited. However, there are several papers suggesting a positive relationship between bank credit supply and active credit risk management more generally. Credit market innovations such as loan sales (Cebenoyan and Strahan 2004), collateralized debt obligations (Franke and Krahnen 2005), and collateralized loan obligations (Goderis et al. 2006) all seem to be associated with increases in lending by banks. In a related vein, Brewer et al. (2000) find that banks that use interest rate derivatives have faster growth of C&I loans.

The work that has directly examined the impact of credit derivatives presents a more mixed picture. Minton, Stulz, and Williamson (2006) find that banks with higher shares of C&I lending are more likely to be net purchasers of credit derivatives protection and are also more likely to use other credit risk transfer techniques. However, their focus is more on explaining whether or not banks purchase credit derivatives protection rather than on the impact of credit derivatives on bank loan supply. Ashcraft and Santos (2007) do tackle this question directly by examining the effect of the onset of credit default swap trading on the spreads that the underlying firms pay on their bonds and loans, and find mixed results. Spreads for risky and opaque firms rise at the onset of trading, while spreads on safer and more transparent firms fall somewhat. The beneficial effects increase as credit derivatives trading becomes more liquid.

The main goal of this paper is to provide empirical evidence about the existence and size of the impact of credit derivatives on banks' credit supply. In particular, we ask how the volume of new C&I loans originated and the terms of those loans change as banks increase their use of credit derivatives to reduce credit exposures. We also examine how the impact of credit

derivatives varies across borrower types, loan types, and bank types. An important contribution relative to earlier work is that we examine several aspects of credit supply aside from the volume of lending held on the balance sheet, providing a more complete picture of the impact of credit derivatives on the credit process.

III. Data and Empirical Approach

The data used in this paper are a combination of several regulatory and confidential data sets. Information on banks' use of credit derivatives is derived from the Call Reports, which contain quarterly balance sheet, off-balance sheet, and income statement information for all U.S. commercial banks.[6] We link the Call Report data on credit derivatives and other bank-specific characteristics to two confidential data sets about banks' lending activities. The first of these is loan-level data from the Federal Reserve's Survey of Terms of Business Lending (STBL).[7] The STBL collects data on new commercial and industrial loans extended to U.S. borrowers by a sample of approximately 250 banks during one-week periods in February, May, August, and November of each year.[8] The survey collects information on loan amount, maturity, risk rating, interest rate, and selected loan characteristics (e.g., whether the loan is secured and whether it is made under a commitment). The data set does not identify or contain information about individual borrowers, however.

The basic empirical approach is to do panel regressions relating banks' supply of credit to commercial and industrial borrowers to their use of credit derivatives to hedge credit exposures. Specifically, we estimate the following equation:

$$(1): \qquad Credit\ Supply_{i,t} = \beta_1 Credit\ Derivatives\ Usage_{i,t-1} + X_{i,t-1}\Gamma + \varepsilon_{i,t},$$

[6] These data are available at http://www.chicagofed.org/economic_research_and_data/commercial_bank_data.cfm.
[7] The data collected in the survey are aggregated in public reports (the Federal Reserve E.2 report, available at http://www.federalreserve.gov/releases/e2/).
[8] Note that the STBL collects information about loans extended, not about new credit facilities such as loan commitments.

where i refers to a bank, t is the month of the STBL survey, and t-1 refers to the quarter-end prior to the STBL survey month. Credit Supply is one of a series of variables (described below) that capture various aspects of the banks' supply of credit to commercial borrowers, and Credit Derivatives Usage is a measure of the extent of credit protection obtained through credit derivatives.

X is a vector of bank characteristics, which includes log asset size and log asset size squared, the ratio of C&I loans held on the balance sheet to total assets (to capture the extent to which a given bank is active in C&I lending), the ratio of unused commercial loan commitments to total assets, the total risk-based capital ratio, the ratio of risk-weighted assets to total assets, the deposits-to-assets ratio, the ratio of assets held in the trading account to total assets, the ratio of non-performing C&I loans to total C&I loans, and the ratio of the notional principal amount of other derivatives (that is, all derivatives other than credit derivatives) to total assets. We also include the ratio of non-credit-risk derivatives held for purposes other than trading ("hedging derivatives") to total assets as a proxy measure of the bank's general propensity to hedge its exposures.[9] The regressions also include bank-specific fixed effects. We adjust for the impact of significant mergers by treating the post-merger bank as a different entity from the pre-merger bank.[10]

A key issue in this specification is identifying the direction of feedback between a bank's decision to lend and its decision to use credit derivatives to hedge the risk of that lending. The concern is that a positive correlation between credit derivatives use and lending might reflect shocks in loan demand that simultaneously cause the bank to increase its lending (or alter loan

[9] Bank regulatory reports contain information on financial derivatives – such as interest rate, foreign exchange, commodity, and equity derivatives – held for purposes other than trading, but do break out credit derivatives in this way.

[10] We define a significant merger as one in which the assets of the acquired bank equal 20 percent or more of the assets of the acquiring bank. We drop any observations where the merger occurred between the STBL survey month and the previous quarter-end.

terms) and to take on more credit derivatives protection, rather than indicating a positive impact on loan supply from hedging via credit derivatives.

Our strategy is to try to isolate changes in a bank's propensity to use credit derivatives for risk management from any short-term changes in derivatives use due to shocks to loan demand. The idea is that increased familiarity with credit derivatives – such as having on-going relationships with derivatives dealers, familiarity with contract form, and legal expertise in house – would facilitate a bank hedging via these instruments. That is, changes in a bank's propensity to use credit derivatives on an on-going basis could affect its agility in using credit derivatives and its ability to take advantage of good lending opportunities when they arise.

To begin, the credit derivatives and other Call Report control variables are lagged relative to the new loan data, so that they reflect a bank's position prior to the period covered by the loan data. Assuming that credit derivatives use is persistent, lagged values would capture a bank's propensity to use credit derivatives, but should not be affected by shocks to demand over the subsequent period when the lending is done. Note that because the regressions include bank-level fixed effects, the control variables capture changes in a bank's use of credit derivatives over time, rather than simple cross-sectional variation.

The specification also includes variables intended to reflect changes in loan demand over time. First, the regressions include quarterly dummy variables to control for macroeconomic and industry-wide factors that may vary over time, and which capture economy-wide changes in loan amounts and terms.[11] Second, the ratio of unused loan commitments to total assets is included in the specification as a means of controlling for the potential for future loan originations. Increases in unused commitment amounts may cause the bank to anticipate greater future loan draw-downs

[11] The results are quite similar if we omit the quarterly time dummy variables and use variables that directly aim to capture economic and financial market conditions. These variables include the three month Treasury bill rate, the spread between the ten-year and three month Treasury rates (the yield curve slope), the spread between the AAA and BBB bond indices (credit spread) and the 4-quarter real GDP growth rate.

and to increase credit derivatives protection in expectation of those new loans being made. The unused commitment variable controls directly for this source of feedback.

Finally, the regressions include a direct measure of loan demand conditions faced by each bank over each lending period, based on confidential bank-level information from the Federal Reserve's Senior Loan Officers Opinion Survey on Bank Lending Practices (SLOOS). Four times a year, the Federal Reserve conducts a survey of senior loan officers of a sample of about 60 large U.S. commercial banks to ask about credit terms and standards and loan demand. Results of this survey are published in aggregate form.[12] Loan officers are asked to rank on a 1-to-5 scale whether demand from commercial borrowers has increased or decreased (lower numbers mean increased demand), providing separate assessment for large and small commercial borrowers.[13] We include the 1-to-5 responses of the loan officers on the two questions relating to loan demand.[14] We map responses from the SLOOS survey so that the responses cover the period during which the banks were extending the credit captured in the STBL as much as possible.[15] Including the loan demand variables, the regression equation is:

$$(2): \quad Credit\ Supply_{i,t} = \beta_1 Credit\ Derivatives\ Usage_{i,t-1} + \beta_2\ Demand\ L\arg e_{i,t} + \beta_3\ Demand\ Small_{i,t} + X_{i,t-1}\Gamma + \varepsilon_{i,t},$$

The final data is thus constructed by mapping confidential bank-level responses to the SLOOS to the STBL data on new C&I loan extensions, and in turn to Call Report data on credit derivatives and other bank characteristics. There is significant overlap in the banks in SLOOS

[12] These surveys are available at: http://www.federalreserve.gov/boarddocs/SnLoanSurvey/.
[13] A response of "1" means that demand is "substantially stronger", "2" means "moderately stronger", "3" means "about the same", "4" means "moderately weaker", and "5" means "substantially weaker". See http://www.federalreserve.gov/boarddocs/SnLoanSurvey/.
[14] Using alternative forms of the SLOOS information – for instance, converting the 1-to-5 responses into indicator variables for whether the bank faced increased or decreased loan demand – does not alter the results.
[15] While the SLOOS was conducted roughly once a quarter during the 1997 to 2006 sample period, the precise months the survey was taken vary, so the timing of the STBL-SLOOS mapping also varies over the sample. In the first half of the sample, the SLOOS and STBL are generally from the same month, while in the second half of the sample, the STBL takes place during the early part of the three-month period covered by the SLOOS.

and STBL samples, so that we are able to match about two-thirds of the observations in the STBL sample with information from the SLOOS.

Table 2 presents information about the combined STBL-SLOOS sample. As the table illustrates, the sample banks include about half of all credit derivatives users, including most of the very largest. In November 2005, for instance, the combined sample included 3 of the 5 largest credit derivatives users (measured by total notional principal of credit derivatives held), and 11 of the 20 largest. Like the overall population, credit derivatives usage is clustered among the largest banks in the combined sample.

Given this clustering, we focus on large banks in our analysis. In particular, we limit the final data sample to banks with average real assets of $10 billion or more over the quarters they are in the sample. We also exclude foreign-owned banks, since their U.S. credit derivative holdings may reflect lending done outside the United States. Finally, we also exclude a small number of dealer banks because their positions include customer transactions unrelated to their internal credit risk management process.[16] The final sample consists of 979 observations for 58 banks from Q2 1997 to Q4 2006. These 979 bank-level observations are based on data for nearly 550,000 individual commercial and industrial loans. Table 3 contains basic statistics of the regression data set.

The key variables of interest are those that measure credit supply and credit derivatives usage. Our main credit supply variable is quarterly bank-aggregate loan principal amounts from the STBL data scaled by total C&I loans held on the balance sheet. This "new loan" variable measures the flow of new loans extended to commercial borrowers. We also examine loans extended to different cohorts of commercial borrowers, where we use loan size to proxy for borrower size. Specifically, we calculate new loan supply to small and to large corporate

[16] Dealer banks are defined as those (1) having at least $10 billion in credit derivatives notional principal at some point between 1997 and 2005 and (2) being among the 4 largest credit derivatives users during that period.

borrowers (measured as the aggregate of all loans with principal amounts less than/greater than $1 million[17]).

Most of the previous studies of the relationship between credit risk management and credit supply have focused on the volume of C&I lending held on the balance sheet, so using the STBL data on credit flows is a complementary extension of that earlier work. As a benchmark and to aid comparison to earlier work, we also examine data from the Call Reports on levels and changes in C&I loans held on the balance sheet.

Beyond looking at credit flows, the information in the STBL also allows us to examine other dimensions of credit supply. These dimensions include the maturity of the loans and the interest rates charged. Banks' supply of credit could change not only in terms of the volume of lending, but also in terms of the duration of the credit relationship the bank is willing to assume or the price of credit offered to borrowers. The STBL data provide a rich opportunity to examine these aspects of the credit supply relationship.

The STBL data contain information about loan maturity, measured in months. We calculate average maturity of the new loans as the weighted average maturity of the individual loans, using loan principal as the weight. A complicating factor is that a significant portion of loans – about 25 percent of the STBL sample – are open-ended loans with no stated maturity. Since the maturity of these loans is undefined, we drop them from the bank-average figures. To be sure that the bank-averages are meaningful, we drop observations where more than 90 percent of loans have undefined maturities.

The final credit supply variable is the loan spread, calculated as the effective interest rate on the loan minus the 3-month LIBOR rate. Unlike the other credit supply variables, which are bank-level aggregates, we examine spreads at the individual loan level. These regressions include additional control variables reflecting loan characteristics collected in the STLB,

[17] As noted, this definition is based on the size of the loan, not the size of the borrower. However, this approach is consistent with the Call Report definition of "small business loans", which is all commercial and industrial loans with original principal amounts of less than $1 million.

including loan size, risk rating, maturity, whether the loan is secured, whether there is a prepayment penalty, and whether the loan has been made under a commitment. As noted above, the STBL data do not include borrower characteristics other than risk rating.

The key control variable is the measure of credit derivatives usage. In particular, we want to measure the extent of credit protection obtained by the bank through the credit derivatives market. Similar to Minton, Stulz, and Williamson (2006), we calculate net credit derivatives protection as the notional amount of credit derivatives on which the bank is the beneficiary minus the notional amount on which the bank is the guarantor, divided by total C&I loans. This is an imperfect proxy for the net protection obtained, as notional amounts capture the scale of credit derivatives coverage, but not the terms of the contracts or the risk of the underlying credits. Equal amounts of notional principal need not translate into equal amount of credit risk bought or sold. Nevertheless, this measure is the best proxy variable using available information. As a check, we also estimate regressions with separate variables for derivatives on which the bank is a beneficiary ("credit protection bought") and for which the bank is the guarantor ("credit protection sold").

As illustrated in Table 3, the amount of net credit protection purchased through the credit derivatives market is relatively small. Net credit protection purchased averages just 1.6 percent of C&I lending; even on a gross basis (that is, not netting out protection sold), credit protection bought represents just 2.7 percent of C&I lending on average for the banks in the sample. In part, these low figures reflect that relatively few banks use any credit derivatives, as noted above. But even among those banks that use credit derivatives, net protection purchased averages just 4.6 percent of C&I loans held on the balance sheet (about 25 percent of credit derivatives users are net sellers of protection).

IV. Credit Derivatives and Credit Supply

Credit Derivatives and the Volume of C&I Lending

Table 4 presents the results of the estimates relating the flow of new C&I loans to banks' purchase of credit protection through credit derivatives. The first two columns of the table contain results for all new C&I loans in the aggregate. Two specifications are reported: the first, with net credit protection (that is, the difference between credit protection bought and credit protection sold) as the credit derivatives measure, and the second with credit protection bought and credit protection sold entered separately.

In both specifications, the results suggest that as banks increase the amount of credit protection purchased through the credit derivatives market, the volume of new C&I lending decreases. The coefficient on the net credit protection variable is negative and statistically significant (column 1). When the credit derivative variables are entered separately (column 2), the results suggest that this effect comes through the purchase of credit protection. The coefficient on credit protection bought is negative and significant, while the amount of credit protection sold has no significant effect on the flow of new C&I loans extended.

The remaining columns of the table report results for different cohorts of C&I borrowers, proxied by the size of loan. The middle columns of the table report results for small commercial borrowers (loans less than $1 million), while the last two columns report results for large commercial borrowers (loans greater than $1 million). It is interesting to examine the impact of credit derivatives on lending to these different cohorts of borrowers, since larger borrowers are much more likely to be "named credits" in specific credit derivatives contracts. Thus, the impact of credit derivatives on credit supply for these borrowers may be significantly different than for smaller commercial firms.

The direct effect of increased credit derivatives protection is negative and significant for both large and small C&I borrowers. For small borrowers, both protection bought and protection sold have a significant effect on the flow of new lending: as with the overall results, new lending

appears to decline (increase) as the amount of credit protection purchased (sold) increases. The flow of new lending to large corporate borrowers also decreases as net credit derivatives protection rises, though in this case the effect is solely through credit protection purchased. While the direction of the impact is similar across the two cohorts of borrowers, the economic impact of increases in credit derivatives protection is much larger for small corporate borrowers. A one-standard-deviation increase in net credit derivatives protection implies a 0.3 standard deviation decrease in the flow of credit in small corporate loans, as compared to less than a 0.1 standard deviation decrease in the flow of larger loans.

The results suggest differences in the impact of credit derivatives protection across types of borrowers. It is also informative to ask whether there are differences across types of banks. In particular, some banks may be more active and efficient than other banks in managing risk, and these differences may alter the impact of their credit derivatives use. Such a finding would be consistent with earlier work on the impact of risk management, such as Cebenoyan and Strahan (2004), who found that banks that were active risk managers had lower risk and higher profits than other banks.

To explore this idea, we use the ratio of hedging derivatives to total assets as a proxy for the extent of active risk management at banks. As noted above, this variable captures the extent to which a bank uses other, non-credit derivatives (derivatives based on interest rates, equity prices, foreign exchange rates, and commodity prices) for hedging, as opposed to trading, purposes. We interact this hedging ratio with the credit derivatives variables to see whether the impact of credit protection varies with a bank's overall propensity to hedge. The coefficient on the main credit derivatives variable captures the impact for banks that do no other hedging, while the impact for banks that are "hedgers" depends both on the size and signs of the coefficients and on the extent of other hedging activities:

$$(3) \qquad Net\ Impact = \beta_{Credit\ Protection} + \beta_{Credit\ Protection\ X\ Hedging} * \frac{Hedging\ Derivatives}{Assets}.$$

The results of this interacted specification are reported in Table 5. The coefficients on the main credit derivatives variables continue to suggest that as credit derivatives protection increases, the flow of new lending to both large and small corporate borrowers decreases. As in the initial results, this effect comes mainly from credit protection bought for large borrowers, and from both credit protection bought and credit protection sold for smaller borrowers.

A bank's propensity to hedge does not appear to affect the relationship between credit derivatives and the flow of new loans to large C&I borrowers (see the last two columns of the table), as the coefficients on the interacted terms are at best only weakly statistically significant. In contrast, the negative impact of credit derivatives on the flow of new C&I lending to small borrowers is reduced as a bank's hedging activity increases (see the middle two columns of the table). The coefficient on the cross term between credit derivatives protection and hedging propensity is positive and significant. The estimates suggest that net impact of credit derivatives use on new C&I lending is positive for banks that are very active hedgers.[18]

Thus far, the results suggest differences in the impact of credit derivatives protection across different types of corporate borrowers and across different types of banks. The STBL data allow us to do one further important decomposition across different types of C&I loans. In particular, the STBL data identifies loans made under commitment and those made without a broader lending agreement ("term loans"). About three-quarters of the loans in the STBL sample are made under commitments. This distinction could be important because the terms of a commitment loan may have been negotiated months, or even years, before the actual extension of funds by the bank.[19] The bank has less control over the flow of lending from previously negotiated commitments than it does with newly negotiated term credit arrangements. By

[18] The estimates suggest that the net impact of credit derivatives protection is positive for banks with values of the hedging variable greater than 95.6 percent (0.431/0.451), about 6 percent of the sample.
[19] The STBL has collected information on commitment date since the end of 2003. Nearly 25 percent of commitment loans made between 2004 and 2006 were made under commitments negotiated a year or more before the loan extension. The median commitment age was about six months.

separating the sample into commitment and term lending, we may be better able to identify the impact of credit derivatives protection on (new) bank credit supply. Previous research (Drucker and Puri 2007) has found differences in the way term loans and loan commitments are treated in the loan sales market, further suggesting that this distinction could be important.

Tables 6 and 7 report the results of the new lending regressions on the commitment lending and term lending sub-samples. Different patterns appear for the two sub-samples. The results for commitment lending (Table 6) mirror those for the overall sample. Increases in credit derivatives protection are associated with reduced future flows of new C&I loans, and this negative impact is offset for small C&I borrowers as a bank's overall propensity to hedge increases. Since commitment loans represent about three quarters of all loans in the STBL dataset, this finding is perhaps not surprising.

The relationship between credit derivatives and the flow of new term loans differs somewhat, however (Table 7). For small term borrowers, increased credit derivatives protection is once again associated with reduced future lending, mainly through the impact of credit protection purchased. A bank's overall propensity to hedge has no significant impact on this result; the coefficients on the interacted terms are essentially zero.

For large term borrowers, increased credit derivatives protection appears to have no significant impact on the flow of new loans. The coefficients on both the net credit protection and credit protection bought variables are not statistically significant, nor is there a significant impact for banks that are active hedgers. Interestingly, the flow of new loans does appear to decrease as credit protection sold increases, suggesting that there may be some substitution between these two different means of taking on credit risk. Put another way, as a bank reduces the amount of credit protection it sells through credit derivatives, the flow of new lending to large term borrowers increases.

Overall, the results thus far provide little support for the idea that increased use of credit derivatives is associated with increases in the supply of bank credit. The direct effect of

increased credit derivatives protection on the flow of new C&I loans is nearly uniformly negative. Large term borrowers are an exception to this general result, with either no significant relationship or a positive one through the (inverse) impact of sales of credit protection. The generally prevailing negative effect does appear to be reversed at banks that are active hedgers using other types of derivatives, but this reversal is significant only for small commitment borrowers.

These results are not consistent with previous research that has found a positive relationship between active risk management and bank credit supply (for instance, Cebenoyan and Strahan 2004, Goderis et al. 2006). However, as noted above, the STBL data allow us to examine credit supply through flows of new loans, while past studies of the relationship between credit market innovations and credit supply have focused on loans held on the balance sheet. It may be that differences in both the definition of credit supply (on-balance sheet holdings versus new loans originated) and data sources account for the difference in findings. Thus, for comparison, we also examine the on-balance sheet holdings of C&I loans to see if the negative relationship between credit derivatives protection and credit supply is evident there. These results are reported in Table 8.

These estimates have the same basic structure as those based on the STBL data in that a measure of credit supply is regressed on lagged bank characteristics, including credit derivatives positions. In this case, we use Call Report data on C&I loans in quarter t regressed on bank characteristics in quarter t-1, using the same set of control variables as in the regressions using the STBL data. We look both at the level of balance sheet C&I lending (scaled by assets) and the quarterly percent change in C&I loans held on the balance sheet.[20] We include all banks with

[20] Note that the control variables include the lagged level of C&I loans to assets, so the loan levels equations include a lagged dependent variable. Since the specification includes bank-level fixed effects, the loan levels equations are estimated with the dynamic panel data framework developed by Arellano and Bond (1991). This framework – which uses lagged values as instruments – means that some observations are dropped.

average assets of $10 billion or more, whether or not they are in the STBL sample, so our overall sample expands to approximately 1200 observations.

Consistent with the estimates using the STBL data, these results provide little evidence of a positive impact of credit derivatives usage on on-balance sheet amounts of C&I lending. While the coefficients on net credit protection and credit protection bought are positive (and the coefficients on credit protection sold are negative), none are statistically significant either individually or jointly (see the bottom row of the table). There is some evidence of a more positive effect at banks that are active hedgers, but only in one specification of the loan growth equation. Overall, then, the on-balance sheet findings are more consistent with the findings for the flow of new loans than they are with previous research examining the impact of earlier credit market innovations on bank credit supply, in the sense that they do not suggest a positive relationship between credit derivatives protection and the volume of commercial lending.

Credit Derivatives, Maturity, and Spreads

The results thus far provide at best weak support for the idea that banks that purchase more credit derivatives protection increase their credit supply. However, we have explored this question only by examining the amount of credit extended, whereas "credit supply" arguably encompasses loan terms, such as maturity and loan interest rates, as well as loan volume. Corporate borrowers may benefit from banks' use of credit derivatives through lower loan spreads or longer loan maturities, even if the amount of new loans originated does not increase. As noted above, the key advantage of the STBL data is that they allow us to examine additional aspects of credit supply other than the volume of lending. In particular, the data allow us to examine the relationship between banks' use of credit derivatives and the maturity and spreads charged on new C&I loans.

Tables 9 and 10 present regression results examining the link between credit derivatives and the average maturity of new C&I loans extended by banks for commitment and term loans,

respectively.[21] One way that banks could increase loan supply is to be willing to enter into longer-maturity loans and thus have a more extended credit relationship with their borrowers. For commitment loans (Table 9), the primary evidence for this effect is among small borrowers. The direct impact of increased credit derivatives protection is negative – and once again comes entirely through credit protection purchased. As other hedging activity at a bank increases, however, the impact reverses, such that the net impact of increased credit derivatives protection on average loan maturity is positive for those banks that are very active hedgers. However, the economic impact is fairly small: for a bank at the 95th percentile in hedging activity in the sample, a one-standard-deviation increase in credit derivative protection implies just a 0.1 standard deviation increase in average loan maturity (about one month). For large commitment loans, changes in credit derivatives protection appear to have no impact on average loan maturity.

In contrast to the results for commitment loans, the results for term loans suggest an overall positive relationship between credit derivatives protection and average loan maturity for banks that are active hedgers (Table 10). While the direct impact of increases in credit derivatives protection is negative, the coefficient estimates for the interacted variables are positive and significant for both large and small borrowers. Further, the estimates suggest that net impact of increased credit protection is positive for a relatively large portion of the banks in the sample, especially for large term loans.[22] The economic impact is also fairly large: for a bank at the 90th percentile in hedging activity, a one-standard-deviation increase in net credit derivatives protection implies an increase of 5.7 months in the average maturity of new large term loans, against an typical average maturity of 22 months.

The final set of results concerns the relationship between credit derivatives and loan spreads. Here we regress loan-level spreads over the 3-month LIBOR rate against the loan

[21] Since the results for the flow of new loans suggest there are significant differences between term and commitment loans, we focus on these separate results – rather than the aggregate sample – in this section.
[22] The estimates suggest that the net impact of credit derivatives protection on the average maturity of large term loans is positive for banks whose hedging ratio is in the range of 0.09 to 0.12, approximately the top 30 to 40 percent of the sample.

characteristics included in the STBL data – loan size, risk rating, maturity, and whether the loan is secured or has a pre-payment penalty – as well as the bank characteristics included in the previous regressions, including the loan demand variables from the SLOOS. The regressions include bank-level fixed effects and the residuals are clustered at the bank level.

Table 11 contains the results for commitment loans. Given the large number of loans in the sample – more than 500,000 – most of the loan-specific control variables are statistically significant and most have the anticipated sign (riskier loans have higher spreads and secured loans have higher spreads). Fewer of the bank-specific control variables are statistically significant – reflecting the impact of bank fixed effects and clustering the residuals – but the results do indicate that banks that rely more heavily on deposits for funding tend to have loans with higher spreads and that banks that are active overall hedgers tend to have lower spreads.

The key variables of interest are the ones that capture credit derivatives exposures (the bottom panel of the table). The results suggest that credit derivatives have no impact on spreads for small commitment loans (the coefficients are uniformly not statistically significant), but that spreads on large commitment loans decrease as credit derivatives protection increases. This effect comes from credit protection bought. The economic importance of this effect is small, however: a one-standard deviation increase in credit derivatives protection implies just a 3 to 7 basis point reduction in the loan spread (less than one-tenth of a standard deviation). The extent of other hedging at the bank appears to have no impact on spreads.

The results for term lending, reported in Table 12, are much stronger. The coefficient estimates suggest that increases in credit derivatives protection are associated with lower loan spreads. For small term borrowers, this impact is offset for banks that engage in greater overall hedging activity, such that for active hedgers (the top 10 percent of the sample), increased credit derivatives protection is associated with higher spreads. For large term borrowers, however, a bank's overall propensity to hedge does not have an impact and higher credit derivatives protection leads to lower loan spreads. This effect is economically meaningful: a one-standard

deviation increase in credit protection is associated with a 21 basis point reduction in the loan spread.

Summary and Assessment

What do all these results imply about the impact of credit derivatives on bank credit supply? The answer depends on the type of borrower, the type of loan, and the type of bank. For commitment lending, there is little to suggest that increased use of credit derivatives leads to a significant increase in loan supply. For large commitment borrowers, spreads fall a small amount as credit derivatives protection increases, but the flow of new lending also falls and maturities are unchanged. For small commitment borrowers, spreads are unchanged as credit derivatives protection varies and both the flow of new loans and average loan maturity decrease as credit derivatives protection increases. These results reverse at banks that are very active hedgers, though the economic impact is small even for banks near the top of hedging activity distribution. Thus, the impact of impact of credit derivatives on loan supply to commitment borrowers is at best mixed (lower spreads but less lending) or weakly positive, while in some cases, the results seem more consistent with an outright decrease in loan supply to commitment borrowers.

In contrast, the evidence is more consistent with an increase in credit supply to large term borrowers. Increases in credit derivatives protection have a weakly positive impact on the volume of new large term loans (when protection sold decreases), and average maturity increases (especially at active hedgers) and spreads fall. The impact on maturity and spreads is economically meaningful, especially at active hedgers. For smaller term borrowers, the picture is more mixed. For banks that are not active hedgers, increased credit derivatives protection is associated with lower amounts of new term lending to small borrowers and shorter maturities, but also lower spreads. At active hedgers, maturity increases as banks purchase more credit protection, but so do spreads.

For purposes of understanding the net impact of credit derivatives on bank credit supply, the term loan results may be the most relevant. Term loans, by definition, are newly negotiated

and reflect current credit conditions. Commitment loans, in contrast, have terms that may have been negotiated months or even years previously. Banks have less control over the volume and timing of commitment loan extensions, since these are largely up to the discretion of the borrower, subject to any "material adverse change" clauses in the commitment contract. The flow of new term lending may thus more closely capture a bank's current ability and desire to create new credit supply.

It is also interesting to note that the strongest evidence of increased credit supply comes for large, rather than small, term borrowers. Large borrowers are much more likely to be "named credits" in credit derivative transactions – that is, to have single-name credit default swaps written on their debt. While the evidence is indirect, the findings concerning large term borrowers suggest that much of the benefit of the growth in the credit derivatives market accrues to these borrowers, rather than being spread more broadly across firms. This is consistent with BIS survey data indicating that non-dealer banks predominantly hold single-name credit derivatives. Overall, the impact of credit derivatives use by banks appears to be narrow.

One final aspect of the results worth highlighting concerns the interaction of credit derivatives protection and a bank's overall propensity to hedge. In several of the equations, the impact of credit derivatives protection differed significantly as the extent of hedging via financial derivatives increased. For measures of extent of credit granted (volume of new lending and average maturity), the difference was generally in the direction of increased credit supply, though in terms of price, increased overall hedging was associated with decreased supply (higher spreads). One interpretation of these findings is that hedging via credit derivatives is complementary to other forms of hedging. Banks that are active hedgers in one arena – through their use of financial derivatives – appear to be using credit derivatives to increase credit supply more than banks who are less active hedgers. This finding is consistent with Minton, Stulz and Williamson (2006), who find that banks using credit derivatives are more likely to use other credit risk mitigation techniques.

V. Summary and Conclusions

This goal of this paper is to examine the relationship between banks' use of credit derivatives and the supply of bank credit. Credit derivatives represent an important credit market innovation that, in theory, allows banks to originate and fund loans without holding the associated credit risk. More broadly, credit derivatives are the latest in a series of innovations that have facilitated credit risk management and made it easier for banks to diversify their credit risk exposures.

The key question is whether banks have used these instruments primarily to diversify and thus reduce their risk exposures, or whether banks have undone the diversification by expanding their lending. Research on earlier credit market innovations has found that activities such as loans sales and securitizations have not resulted in overall reductions in bank risk, but rather an expansion of lending. Such an increase is credit supply would be an important consequence of the recent rapid growth of the market for credit derivatives.

We find limited evidence supporting the idea that banks increase the supply of credit as they obtain additional credit protection through credit derivatives, with the strongest results for large term borrowers. Commitment borrowers do not appear to benefit greatly from increased use of credit derivatives by their lenders. These results suggest that the benefits of increased credit derivatives protection are relatively narrow, in the sense that they accrue mainly to the type of borrower most likely to be a "named credit" in a credit derivatives transaction.

It is further interesting to note that the impact of credit derivatives protection for these borrowers is primarily on the terms of lending – longer loan maturity and lower spreads – rather than on loan volume. This is a key advantage of working with the STBL data rather than focusing exclusively on on-balance sheet holdings of commercial loans. Had we focused exclusively on loan amounts – either on-balance sheet holdings or the flow of new originations – we would have missed the most economically meaningful impact of credit derivatives protection, on maturities and loan spreads for large term loans.

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Figure 1

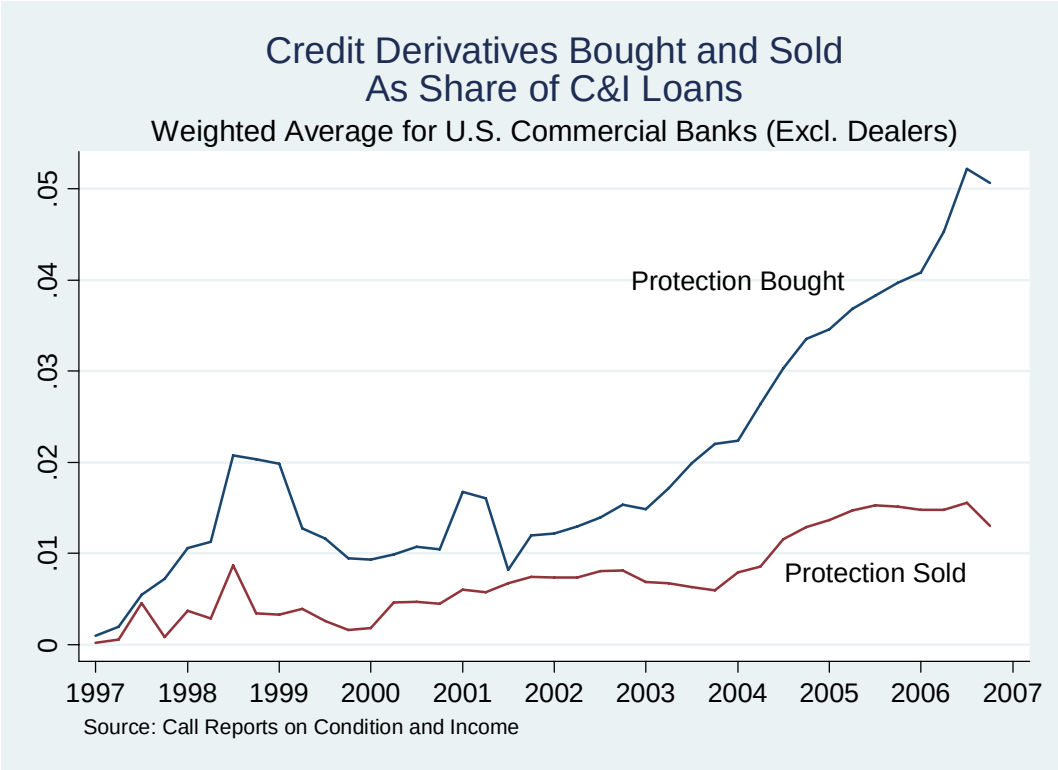
Credit Derivatives Bought and Sold
As Share of C&I Loans
Weighted Average for U.S. Commercial Banks (Excl. Dealers)
0
.01
.02
.03
.04
.05
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Protection Bought
Protection Sold
Source: Call Reports on Condition and Income

Table 1: Number of U.S. Commercial Banks Using Credit Derivatives by Asset Size Category

(Number of Banks in Category)

Asset Size	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Less than $1 Billion	4 (8764)	1 (8454)	1 (8162)	1 (7935)	3 (7703)	4 (7482)	6 (7348)	5 (7183)	5 (7054)	5 (6952)
$1 to $10 Billion	1 (355)	3 (358)	3 (358)	3 (331)	2 (342)	2 (343)	4 (359)	4 (371)	4 (387)	8 (394)
$10 to $100 Billion	8 (72)	9 (73)	12 (78)	14 (81)	17 (74)	11 (80)	10 (79)	12 (78)	16 (74)	20 (74)
More than $100 Billion	7 (8)	7 (8)	7 (7)	8 (9)	9 (10)	8 (9)	10 (10)	10 (11)	8 (8)	9 (9)
TOTAL	20 (9199)	20 (8896)	23 (8605)	26 (8356)	31 (8129)	25 (7914)	30 (7796)	31 (7643)	33 (7523)	42 (7429)

Source: Call Reports for September 30 of each year. Assets in 2006 dollars.

Table 2: Combined STBL and SLOOS Data Set Number of Banks Using Credit Derivatives by Asset Size Category

(Number of Banks in Category)

Asset Size	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Less than $1 Billion	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
$1 to $10 Billion	0 (7)	0 (3)	0 (4)	0 (6)	0 (6)	0 (5)	0 (6)	0 (3)	0 (3)	0 (4)
$10 to $100 Billion	8 (32)	7 (31)	10 (30)	9 (27)	10 (25)	7 (27)	5 (26)	7 (23)	8 (22)	11 (26)
More than $100 Billion	5 (6)	3 (4)	3 (3)	5 (6)	6 (7)	7 (8)	7 (7)	7 (7)	7 (7)	8 (8)
TOTAL	13 (45)	10 (38)	13 (37)	14 (39)	16 (38)	14 (40)	12 (39)	14 (33)	15 (32)	19 (38)

Source: Federal Reserve Survey of the Terms of Business Lending, Federal Reserve Senior Loan Officers Opinion Survey, and Call Reports. Call Report data as of September 30; STBL sample as of November. Assets in 2006 dollars.

Table 3: Basic Statistics of the Regression Data Set

Variable	Mean	Median	Standard Deviation	Minimum	Maximum	Number of Observations
Loan Supply Variables						
New Loans/ C&I Loans	0.066	0.037	0.095	0.0001	0.709	979
C&I Loans On Balance Sheet/ Total Assets	0.168	0.158	0.084	0.026	0.511	1038
Change in C&I Loans/ Total C&I Loans	0.020	0.015	0.085	-0.549	1.093	1218
Average Maturity	18.643	17.285	11.969	0.236	99.941	974
Spread	3.302	3.167	1.368	-5.656	14.945	537,441
Credit Derivatives Variables						
Net Credit Derivatives Protection/ C&I Loans	0.016	0.000	0.085	-0.279	0.698	979
Credit Protection Bought/ C&I Loans	0.027	0.000	0.090	0.000	0.811	979
Credit Protection Sold/ C&I Loans	0.011	0.000	0.033	0.000	0.295	979
Bank Characteristics						
Asset Size	62.529	38.573	67.007	8.298	415.859	979
C&I Loans/ Assets	0.187	0.179	0.085	0.027	0.529	979
Unused Commitments/ Assets	0.273	0.228	0.182	0.001	1.066	979
Total Risk Based Capital Ratio	0.115	0.112	0.013	0.093	0.220	979
Risk Based Assets/ Assets	0.841	0.826	0.133	0.389	1.421	979
Deposits/ Assets	0.626	0.620	0.119	0.236	0.920	979
Trading Assets/ Assets	0.015	0.003	0.039	0.000	0.236	979
Nonperforming C&I Loans/ C&I Loans	0.011	0.009	0.009	0.000	0.059	979
Other Derivatives/ Assets	1.238	0.257	2.848	0.000	25.002	979
Hedging Derivatives/ Assets	0.227	0.063	0.614	0.000	5.116	979
Loan Demand						
Demand from Large Borrowers	3.069	3	0.721	1	5	979
Demand from Small Borrowers	3.025	3	0.641	1	5	979

Source: Federal Reserve Survey of Terms of Business Lending, Federal Reserve Senior Loan Officers Opinion Survey, and Call Reports.

Table 4: Credit Derivatives and New C&I Loan Extensions

Bank Characteristics	All Loans		Small Loans		Large Loans	
Log (Asset Size)	0.0047	-0.0315	-0.0152***	-0.0187***	0.0199	-0.0128
	(0.0419)	(0.0422)	(0.0048)	(0.0049)	(0.0405)	(0.0407)
Log (Asset Size) Squared	-0.0026	0.0024	0.0018***	0.0023***	-0.0044	0.0001
	(0.0061)	(0.0062)	(0.0007)	(0.0007)	(0.0059)	(0.0061)
C&I Loans/ Assets	-0.5018***	-0.5267***	-0.0153	-0.0177	-0.4865***	-0.5090***
	(0.1812)	(0.1817)	(0.0143)	(0.0144)	(0.1697)	(0.1702)
Unused Commitments/ Assets	0.0455	0.0258	0.0012	-0.0007	0.0443	0.0265
	(0.0466)	(0.0469)	(0.0038)	(0.0040)	(0.0461)	(0.0464)
Total Risk-Based Capital Ratio	0.2437	0.2589*	0.0227	0.0242	0.2210	0.2348
	(0.1530)	(0.1543)	(0.0151)	(0.0153)	(0.1465)	(0.1476)
Risk-Based Assets/ Total Assets	0.1341**	0.1559**	-0.0165***	-0.0144**	0.1506**	0.1703**
	(0.0675)	(0.0696)	(0.0060)	(0.0061)	(0.0643)	(0.0663)
Deposits/ Assets	-0.2603*	-0.2185	0.0013	0.0054	-0.2616*	-0.2239
	(0.1569)	(0.1579)	(0.0118)	(0.0113)	(0.1524)	(0.1538)
Trading Assets/ Assets	-0.3520	-0.3840	0.0513**	0.0482**	-0.4034	-0.4322
	(0.2917)	(0.2905)	(0.0234)	(0.0235)	(0.2828)	(0.2817)
Nonperforming C&I Loans/ C&I Loans	-0.0436	-0.0483	0.0071*	0.0067*	-0.0507	-0.0549
	(0.0480)	(0.0478)	(0.0039)	(0.0040)	(0.0471)	(0.0469)
Other Derivatives/ Assets	-0.0214***	-0.0215***	0.0003*	0.0003*	-0.0217***	-0.0219***
	(0.0033)	(0.0034)	(0.0002)	(0.0002)	(0.0033)	(0.0033)
Hedging Activity	0.0243***	0.0238***	-0.0003	-0.0004	0.0246***	0.0242***
	(0.0051)	(0.0051)	(0.0004)	(0.0004)	(0.0050)	(0.0050)
Loan Demand						
Demand from Large Borrowers	0.0043	0.0049	-0.0002	-0.0001	0.0044	0.0050
	(0.0041)	(0.0041)	(0.0003)	(0.0003)	(0.0040)	(0.0040)
Demand from Small Borrowers	0.0022	0.0014	0.0004	0.0003	0.0019	0.0011
	(0.0039)	(0.0039)	(0.0003)	(0.0003)	(0.0037)	(0.0038)
Credit Derivatives						
Net Credit Protection / C&I Loans	-0.1177***		-0.0344***		-0.0833**	
	(0.0412)		(0.0050)		(0.0397)	
Credit Protection Bought/ C&I Loans		-0.1493***		-0.0374***		-0.1118***
		(0.0417)		(0.0055)		(0.0400)
Credit Protection Sold/ C&I Loans		-0.0188		0.0211***		-0.0399
		(0.0544)		(0.0051)		(0.0532)
Number of Observations	979	979	979	979	979	979
R-Squared	0.193	0.197	0.199	0.205	0.199	0.202
P-value: Credit Derivatives Variable Equal 0?	0.004	0.000	0.000	0.000	0.036	0.001

The dependent variable is the sum of principal amounts of new C&I loans extended by each bank in the sample in each quarter, divided by previous quarter-end C&I loans. Small loans are those with principal amounts of $1 million or less; large loans are those with principal amounts exceeding $1 million. Net credit protection is the notional principal of credit derivatives on which the bank is the beneficiary (credit protection bought) minus the notional principal of credit derivatives on which the bank is the guarantor (credit protection sold), divided by C&I loans. Loan Demand data are from the Federal Reserve's Senior Loan Officers Opinion Survey (SLOOS). Bank characteristics are from the Call Reports, while new loan data is from the Federal Reserve's Survey of Terms of Business Lending (STBL). The sample consists of all banks in both the STBL and SLOOS panels with average real assets greater than $10 billion. Data are from Q2 1997 to Q4 2006. The regression included bank-specific fixed effects and quarterly dummy variables. The symbols ***, **, and * mean that the coefficient is statistically different from zero at the 1%, 5% and 10% levels, respectively.

Table 5: Credit Derivatives and New C&I Loan Extensions with Hedging Interaction

Bank Characteristics	All Loans		Small Loans		Large Loans	
Log (Asset Size)	0.0045	-0.0041	-0.0155***	-0.0157***	0.0200	0.0116
	(0.0420)	(0.0421)	(0.0048)	(0.0053)	(0.0405)	(0.0405)
Log (Asset Size) Squared	-0.0025	-0.0015	0.0019***	0.0019**	-0.0044	-0.0034
	(0.0061)	(0.0062)	(0.0007)	(0.0008)	(0.0059)	(0.0060)
C&I Loans/ Assets	-0.5009***	-0.5189***	-0.0137	-0.0154	-0.4872***	-0.5035***
	(0.1816)	(0.1833)	(0.0143)	(0.0145)	(0.1701)	(0.1716)
Unused Commitments/ Assets	0.0454	0.0248	0.0010	-0.0011	0.0443	0.0259
	(0.0467)	(0.0469)	(0.0038)	(0.0039)	(0.0461)	(0.0464)
Total Risk-Based Capital Ratio	0.2429	0.2465	0.0211	0.0212	0.2218	0.2252
	(0.1532)	(0.1543)	(0.0151)	(0.0153)	(0.1467)	(0.1477)
Risk-Based Assets/ Total Assets	0.1332*	0.1476**	-0.0181***	-0.0168***	0.1514**	0.1643**
	(0.0679)	(0.0703)	(0.0060)	(0.0062)	(0.0647)	(0.0670)
Deposits/ Assets	-0.2645*	-0.2263	-0.0067	-0.0027	-0.2578*	-0.2235
	(0.1604)	(0.1604)	(0.0125)	(0.0117)	(0.1561)	(0.1567)
Trading Assets/ Assets	-0.3525	-0.3442	0.0505**	0.0524**	-0.4030	-0.3966
	(0.2921)	(0.2925)	(0.0233)	(0.0232)	(0.2831)	(0.2838)
Nonperforming C&I Loans/ C&I Loans	-0.0431	-0.0350	0.0080**	0.0091**	-0.0511	-0.0442
	(0.0478)	(0.0481)	(0.0039)	(0.0041)	(0.0470)	(0.0473)
Other Derivatives/ Assets	-0.0214***	-0.0220***	0.0004**	0.0003*	-0.0218***	-0.0223***
	(0.0033)	(0.0034)	(0.0002)	(0.0002)	(0.0033)	(0.0034)
Hedging Activity	0.0243***	0.0179***	-0.0004	-0.0012***	0.0247***	0.0191***
	(0.0051)	(0.0048)	(0.0004)	(0.0004)	(0.0050)	(0.0047)
Loan Demand						
Demand from Large Borrowers	0.0043	0.0048	-0.0002	-0.0001	0.0045	0.0049
	(0.0041)	(0.0041)	(0.0003)	(0.0003)	(0.0040)	(0.0040)
Demand from Small Borrowers	0.0022	0.0012	0.0004	0.0003	0.0019	0.0010
	(0.0039)	(0.0039)	(0.0003)	(0.0003)	(0.0037)	(0.0038)
Credit Derivatives						
Net Credit Protection / C&I Loans	-0.1223**		-0.0431***		-0.0792*	
	(0.0475)		(0.0061)		(0.0455)	
Net Credit Protection X Hedging	0.0239		0.0451***		-0.0211	
	(0.0839)		(0.0126)		(0.0815)	
Credit Protection Bought/ C&I Loans		-0.1772***		-0.0493***		-0.1279***
		(0.0463)		(0.0056)		(0.0452)
Credit Protection Bought X Hedging		0.1744**		0.0640***		0.1104
		(0.0841)		(0.0134)		(0.0831)
Credit Protection Sold/ C&I Loans		-0.0456		0.0248***		-0.0703
		(0.0594)		(0.0065)		(0.0583)
Credit Protection Sold X Hedging		0.1456		-0.0228*		0.1684*
		(0.0943)		(0.0123)		(0.0916)
Number of Observations	979	979	979	979	979	979
R-Squared	0.193	0.201	0.210	0.225	0.199	0.205
P-value: Credit Derivatives Variable Equal 0?	0.016	0.000	0.000	0.000	0.088	0.000

The dependent variable is the sum of principal amounts of new C&I loans extended by each bank in the sample in each quarter, divided by previous quarter-end C&I loans. Small loans are those with principal amounts of $1 million or less; large loans are those with principal amounts exceeding $1 million. Net credit protection is the notional principal of credit derivatives on which the bank is the beneficiary (credit protection bought) minus the notional principal of credit derivatives on which the bank is the guarantor (credit protection sold), divided by C&I loans. Loan Demand data are from the Federal Reserve's Senior Loan Officers Opinion Survey (SLOOS). Bank characteristics are from the Call Reports, while new loan data is from the Federal Reserve's Survey of Terms of Business Lending (STBL). The sample consists of all banks in both the STBL and SLOOS panels with average real assets greater than $10 billion. Data are from Q2 1997 to Q4 2006. The regression included bank-specific fixed effects and quarterly dummy variables. The symbols ***, **, and * mean that the coefficient is statistically different from zero at the 1%, 5% and 10% levels, respectively.

Table 6: Credit Derivatives and New C&I Loan Extensions: Commitment Loans

Bank Characteristics	All Loans		Small Loans		Large Loans	
Log (Asset Size)	-0.0643*	-0.0529	-0.0191***	-0.0178***	-0.0452	-0.0351
	(0.0331)	(0.0327)	(0.0043)	(0.0048)	(0.0330)	(0.0327)
Log (Asset Size) Squared	0.0068	0.0051	0.0024***	0.0022***	0.0043	0.0029
	(0.0049)	(0.0049)	(0.0006)	(0.0007)	(0.0049)	(0.0049)
C&I Loans/ Assets	0.0239	0.0206	0.0438***	0.0432***	-0.0199	-0.0225
	(0.0467)	(0.0472)	(0.0088)	(0.0089)	(0.0467)	(0.0470)
Unused Commitments/ Assets	0.0337	0.0257	0.0037	0.0024	0.0300	0.0233
	(0.0352)	(0.0356)	(0.0042)	(0.0043)	(0.0357)	(0.0362)
Total Risk-Based Capital Ratio	-0.1087	-0.1131	-0.0182	-0.0187	-0.0905	-0.0944
	(0.1098)	(0.1100)	(0.0136)	(0.0137)	(0.1081)	(0.1083)
Risk-Based Assets/ Total Assets	-0.0442	-0.0426	-0.0330***	-0.0326***	-0.0113	-0.0100
	(0.0391)	(0.0403)	(0.0048)	(0.0050)	(0.0388)	(0.0400)
Deposits/ Assets	-0.2239*	-0.2099*	-0.0030	-0.0007	-0.2209*	-0.2092*
	(0.1166)	(0.1202)	(0.0105)	(0.0102)	(0.1164)	(0.1197)
Trading Assets/ Assets	-0.2707	-0.2463	0.0185	0.0217	-0.2891	-0.2679
	(0.1937)	(0.1943)	(0.0205)	(0.0204)	(0.1936)	(0.1944)
Nonperforming C&I Loans/ C&I Loans	-0.0952**	-0.0857**	0.0056*	0.0070**	-0.1008**	-0.0926**
	(0.0411)	(0.0414)	(0.0033)	(0.0035)	(0.0412)	(0.0415)
Other Derivatives/ Assets	-0.0160***	-0.0165***	0.0007***	0.0006***	-0.0167***	-0.0171***
	(0.0031)	(0.0031)	(0.0002)	(0.0002)	(0.0031)	(0.0031)
Hedging Activity	0.0091**	0.0037	-0.0014***	-0.0021***	0.0105***	0.0058
	(0.0038)	(0.0037)	(0.0003)	(0.0004)	(0.0038)	(0.0037)
Loan Demand						
Demand from Large Borrowers	0.0003	0.0004	-0.0006**	-0.0006**	0.0009	0.0010
	(0.0024)	(0.0024)	(0.0003)	(0.0003)	(0.0023)	(0.0024)
Demand from Small Borrowers	0.0021	0.0017	0.0004*	0.0004	0.0017	0.0013
	(0.0022)	(0.0023)	(0.0002)	(0.0003)	(0.0022)	(0.0023)
Credit Derivatives						
Net Credit Protection / C&I Loans	-0.1160***		-0.0372***		-0.0788**	
	(0.0389)		(0.0055)		(0.0379)	
Net Credit Protection X Hedging	0.0509		0.0456***		0.0053	
	(0.0634)		(0.0126)		(0.0603)	
Credit Protection Bought/ C&I Loans		-0.1464***		-0.0418***		-0.1046***
		(0.0386)		(0.0053)		(0.0384)
Credit Protection Bought X Hedging		0.1749***		0.0633***		0.1116*
		(0.0589)		(0.0131)		(0.0584)
Credit Protection Sold/ C&I Loans		0.0360		0.0249***		0.0110
		(0.0508)		(0.0062)		(0.0497)
Credit Protection Sold X Hedging		0.1109		-0.0228*		0.1336**
		(0.0680)		(0.0130)		(0.0646)
Number of Observations	979	979	979	979	979	979
R-Squared	0.231	0.238	0.312	0.324	0.222	0.228
P-value: Credit Derivatives Variable Equal 0?	0.009	0.000	0.000	0.000	0.064	0.000

The dependent variable is the sum of principal amounts of new C&I loans made under commitment extended by each bank in the sample in each quarter, divided by previous quarter-end C&I loans. Small loans are those with principal amounts of $1 million or less; large loans are those with principal amounts exceeding $1 million. Net credit protection is the notional principal of credit derivatives on which the bank is the beneficiary (credit protection bought) minus the notional principal of credit derivatives on which the bank is the guarantor (credit protection sold), divided by C&I loans. Loan Demand data are from the Federal Reserve's Senior Loan Officers Opinion Survey (SLOOS). Bank characteristics are from the Call Reports, while new loan data is from the Federal Reserve's Survey of Terms of Business Lending (STBL). The sample consists of all banks in both the STBL and SLOOS panels with average real assets greater than $10 billion. Data are from Q2 1997 to Q4 2006. The regression included bank-specific fixed effects and quarterly dummy variables. The symbols ***, **, and * mean that the coefficient is statistically different from zero at the 1%, 5% and 10% levels, respectively.

Table 7: Credit Derivatives and New C&I Loan Extensions: Term Loans

Bank Characteristics	All Loans		Small Loans		Large Loans	
Log (Asset Size)	0.0688**	0.0488	0.0037	0.0021	0.0652**	0.0467
	(0.0316)	(0.0331)	(0.0026)	(0.0028)	(0.0296)	(0.0308)
Log (Asset Size) Squared	-0.0093**	-0.0066	-0.0006	-0.0003	-0.0087**	-0.0062
	(0.0047)	(0.0050)	(0.0004)	(0.0004)	(0.0044)	(0.0047)
C&I Loans/ Assets	-0.5249***	-0.5396***	-0.0575***	-0.0586***	-0.4674***	-0.4810***
	(0.1824)	(0.1839)	(0.0156)	(0.0157)	(0.1672)	(0.1686)
Unused Commitments/ Assets	0.0117	-0.0009	-0.0026	-0.0035	0.0143	0.0026
	(0.0295)	(0.0293)	(0.0030)	(0.0030)	(0.0268)	(0.0266)
Total Risk-Based Capital Ratio	0.3516***	0.3596***	0.0393***	0.0399***	0.3123***	0.3197***
	(0.1090)	(0.1100)	(0.0110)	(0.0111)	(0.0997)	(0.1006)
Risk-Based Assets/ Total Assets	0.1775***	0.1902***	0.0149***	0.0158***	0.1626***	0.1744***
	(0.0582)	(0.0600)	(0.0051)	(0.0052)	(0.0534)	(0.0550)
Deposits/ Assets	-0.0406	-0.0164	-0.0037	-0.0020	-0.0369	-0.0143
	(0.1200)	(0.1162)	(0.0074)	(0.0073)	(0.1141)	(0.1106)
Trading Assets/ Assets	-0.0818	-0.0980	0.0321*	0.0307	-0.1139	-0.1287
	(0.2380)	(0.2397)	(0.0194)	(0.0196)	(0.2205)	(0.2220)
Nonperforming C&I Loans/ C&I Loans	0.0520*	0.0506*	0.0023	0.0022	0.0497**	0.0485*
	(0.0267)	(0.0269)	(0.0022)	(0.0022)	(0.0248)	(0.0250)
Other Derivatives/ Assets	-0.0054***	-0.0055***	-0.0003***	-0.0003***	-0.0051***	-0.0052***
	(0.0017)	(0.0017)	(0.0001)	(0.0001)	(0.0016)	(0.0016)
Hedging Activity	0.0152***	0.0142***	0.0010***	0.0010***	0.0142***	0.0133***
	(0.0037)	(0.0036)	(0.0003)	(0.0003)	(0.0034)	(0.0033)
Loan Demand						
Demand from Large Borrowers	0.0040	0.0044	0.0004	0.0005	0.0036	0.0039
	(0.0036)	(0.0036)	(0.0003)	(0.0003)	(0.0033)	(0.0033)
Demand from Small Borrowers	0.0001	-0.0004	-0.0001	-0.0001	0.0002	-0.0003
	(0.0034)	(0.0034)	(0.0003)	(0.0003)	(0.0031)	(0.0031)
Credit Derivatives						
Net Credit Protection / C&I Loans	-0.0063		-0.0058***		-0.0005	
	(0.0230)		(0.0017)		(0.0218)	
Net Credit Protection X Hedging	-0.0269		-0.0005		-0.0265	
	(0.0579)		(0.0053)		(0.0537)	
Credit Protection Bought/ C&I Loans		-0.0308		-0.0075***		-0.0233
		(0.0226)		(0.0017)		(0.0214)
Credit Protection Bought X Hedging		-0.0006		0.0007		-0.0012
		(0.0609)		(0.0056)		(0.0564)
Credit Protection Sold/ C&I Loans		-0.0815**		-0.0002		-0.0814**
		(0.0376)		(0.0024)		(0.0359)
Credit Protection Sold X Hedging		0.0348		-0.0000		0.0348
		(0.0728)		(0.0065)		(0.0675)
Number of Observations	979	979	979	979	979	979
R-Squared	0.132	0.135	0.156	0.158	0.131	0.133
P-value: Credit Derivatives Variable Equal 0?	0.787	0.013	0.000	0.000	0.859	0.018

The dependent variable is the sum of principal amounts of new C&I loans not made under commitment extended by each bank in the sample in each quarter, divided by previous quarter-end C&I loans. Small loans are those with principal amounts of $1 million or less; large loans are those with principal amounts exceeding $1 million. Net credit protection is the notional principal of credit derivatives on which the bank is the beneficiary (credit protection bought) minus the notional principal of credit derivatives on which the bank is the guarantor (credit protection sold), divided by C&I loans. Loan Demand data are from the Federal Reserve's Senior Loan Officers Opinion Survey (SLOOS). Bank characteristics are from the Call Reports, while new loan data is from the Federal Reserve's Survey of Terms of Business Lending (STBL). The sample consists of all banks in both the STBL and SLOOS panels with average real assets greater than $10 billion. Data are from Q2 1997 to Q4 2006. The regression included bank-specific fixed effects and quarterly dummy variables. The symbols ***, **, and * mean that the coefficient is statistically different from zero at the 1%, 5% and 10% levels, respectively.

Table 8: Credit Derivatives and C&I Loans Held on the Balance Sheet

Bank Characteristics	**Loan Growth**		**Loan Levels**	
Log (Asset Size)	-0.0475	-0.0297	0.1083***	0.0865**
	(0.0795)	(0.0915)	(0.0358)	(0.0361)
Log (Asset Size) Squared	0.0034	0.0009	-0.0086**	-0.0058
	(0.0127)	(0.0144)	(0.0040)	(0.0039)
C&I Loans/ Assets	-0.4146***	-0.4220***	0.8026***	0.8392***
	(0.1515)	(0.1514)	(0.0399)	(0.0367)
Unused Commitments/ Assets	0.0294	0.0270	0.0219	0.0189
	(0.0433)	(0.0438)	(0.0137)	(0.0120)
Total Risk-Based Capital Ratio	-0.5036*	-0.5186*	0.0177	-0.0133
	(0.2952)	(0.2963)	(0.0904)	(0.0898)
Risk-Based Assets/ Total Assets	0.0256	0.0232	-0.0037	-0.0116
	(0.0780)	(0.0801)	(0.0269)	(0.0237)
Deposits/ Assets	0.1931	0.1935	0.0053	0.0203
	(0.2178)	(0.2173)	(0.0490)	(0.0396)
Trading Assets/ Assets	-0.2154	-0.1847	-0.1259	-0.1822
	(0.5348)	(0.5368)	(0.1370)	(0.1251)
Nonperforming C&I Loans/ C&I Loans	0.0283	0.0413	-0.0335*	-0.0332*
	(0.0610)	(0.0614)	(0.0176)	(0.0170)
Other Derivatives/ Assets	-0.0023	-0.0028	0.0006	0.0003
	(0.0032)	(0.0033)	(0.0018)	(0.0017)
Hedging Activity	0.0009	-0.0051	-0.0051*	-0.0033
	(0.0082)	(0.0073)	(0.0029)	(0.0021)
Loan Demand				
Demand from Large Borrowers	-0.0127**	-0.0127**	0.0005	-0.0001
	(0.0053)	(0.0053)	(0.0009)	(0.0008)
Demand from Small Borrowers	0.0048	0.0043	-0.0006	-0.0002
	(0.0049)	(0.0049)	(0.0009)	(0.0008)
Credit Derivatives				
Net Credit Protection / C&I Loans	0.0533		0.0256	
	(0.0880)		(0.0180)	
Net Credit Protection X Hedging	0.1961		-0.0140	
	(0.1764)		(0.0342)	
Credit Protection Bought/ C&I Loans		0.0251		0.0231
		(0.0956)		(0.0192)
Credit Protection Bought X Hedging		0.3273*		-0.0120
		(0.1818)		(0.0362)
Credit Protection Sold/ C&I Loans		-0.1212		-0.0257
		(0.1023)		(0.0295)
Credit Protection Sold X Hedging		-0.0123		-0.0025
		(0.2258)		(0.0427)
Number of Observations	1218	1218	1038	1038
R-Squared	0.134	0.136		
P-value: Credit Derivatives Variables Equal 0?	0.261	0.102	0.249	0.619

The dependent variables are the percent change in C&I loans held on the balance sheet (loan growth) and the level of C&I loans held on the balance sheet divided by assets (loan levels). Net credit protection is the notional principal of credit derivatives on which the bank is the beneficiary (credit protection bought) minus the notional principal of credit derivatives on which the bank is the guarantor (credit protection sold), divided by C&I loans. Bank information comes from the Call Reports, and information on loan demand comes from the Senior Loan Officers Opinion Survey (SLOOS). The sample consists of all banks with average real assets greater than $10 billion. Data are from Q2 1997 to Q4 2006. The regression included bank-specific fixed effects and quarterly dummy variables. The symbols ***, **, and * mean that the coefficient is statistically different from zero at the 1%, 5% and 10% levels, respectively.

Table 9: Credit Derivatives and Average Loan Maturity: Commitment Loans

Bank Characteristics	All Loans		Small Loans		Large Loans	
Log (Asset Size)	7.0798	3.0234	8.2191	3.8804	-2.2387	-10.3980
	(12.2651)	(13.0385)	(9.3734)	(9.9330)	(17.8799)	(19.7679)
Log (Asset Size) Squared	-0.5744	-0.0074	-1.5069	-0.9022	1.0745	2.2296
	(1.6269)	(1.7353)	(1.2354)	(1.3141)	(2.3157)	(2.5799)
C&I Loans/ Assets	-4.7023	-7.1102	22.2756*	18.5344	-11.6928	-15.6883
	(16.9621)	(16.9752)	(11.6010)	(11.6157)	(22.5235)	(22.4904)
Unused Commitments/ Assets	-3.7485	-5.3665	-4.8031	-7.8862*	3.0647	2.2169
	(5.7565)	(6.0470)	(4.3850)	(4.3939)	(8.0385)	(8.3387)
Total Risk-Based Capital Ratio	92.7921	94.8835*	121.2012**	123.8245**	-2.9790	4.1471
	(57.2712)	(57.4236)	(53.8471)	(54.0253)	(46.2619)	(46.5014)
Risk-Based Assets/ Total Assets	10.0748	12.2409	-1.2869	1.9488	4.8564	7.8329
	(8.8330)	(9.1156)	(6.6512)	(6.6959)	(11.8730)	(12.0986)
Deposits/ Assets	-7.4932	-8.3515	-21.1082***	-21.2855***	5.6549	3.2049
	(6.5561)	(6.6833)	(5.2250)	(5.3405)	(9.4747)	(9.6791)
Trading Assets/ Assets	-19.5145	-15.6146	9.1286	16.2553	-27.4420	-26.2344
	(33.1236)	(32.9834)	(22.3900)	(22.6468)	(38.8347)	(39.0903)
Nonperforming C&I Loans/ C&I Loans	18.6804	14.7219	-66.6779*	-69.4962*	-17.7860	-32.8531
	(51.0794)	(51.2728)	(38.2638)	(38.3127)	(87.0575)	(88.1953)
Other Derivatives/ Assets	0.4952	0.5028	0.4546*	0.4116	0.7427	0.8379
	(0.4644)	(0.4682)	(0.2581)	(0.2640)	(0.5923)	(0.6075)
Hedging Activity	-0.3488	-0.1576	-1.0914**	-1.4178***	0.1449	1.1435
	(0.7975)	(0.8371)	(0.4766)	(0.4996)	(1.2477)	(1.2818)
Loan Demand						
Demand from Large Borrowers	-0.0448	0.0060	-0.2628	-0.1760	0.1485	0.2093
	(0.5501)	(0.5520)	(0.4378)	(0.4384)	(0.7545)	(0.7573)
Demand from Small Borrowers	0.5026	0.4364	0.6094	0.4663	0.1021	0.0601
	(0.5774)	(0.5827)	(0.4477)	(0.4489)	(0.7012)	(0.7134)
Credit Derivatives						
Net Credit Protection / C&I Loans	-6.0061		-14.1503**		10.4524	
	(7.4474)		(5.5286)		(10.2187)	
Net Credit Protection X Hedging	13.5223		21.0866		5.5268	
	(18.7854)		(14.6840)		(43.6146)	
Credit Protection Bought/ C&I Loans		-8.2126		-20.5032***		11.2033
		(7.8554)		(5.5842)		(11.1411)
Credit Protection Bought X Hedging		10.5524		30.6694**		-13.0553
		(17.5300)		(15.1751)		(42.0725)
Credit Protection Sold/ C&I Loans		-3.8064		-8.0784		-11.9090
		(8.9168)		(7.0568)		(11.4115)
Credit Protection Sold X Hedging		-23.7039		-18.1326		-45.5191
		(25.3219)		(17.7897)		(49.3189)
Number of Observations	964	964	961	961	892	892
R-Squared	0.117	0.119	0.159	0.167	0.075	0.080
P-value: Credit Derivatives Variable Equal 0?	0.665	0.510	0.038	0.000	0.448	0.167

The dependent variable is the weighted average maturity (in months) of new C&I loans made under commitment extended by a bank in each quarter. Loan principal amounts are used as weights. Observations where more than 90% of new loans have no stated maturity are dropped. Net credit protection is the notional principal of credit derivatives on which the bank is the beneficiary (credit protection bought) minus the notional principal of credit derivatives on which the bank is the guarantor (credit protection sold), divided by C&I loans. Loan information comes from the Survey of Terms of Business Lending (STBL), bank information comes from the Call Reports, and information on loan demand comes from the Senior Loan Officers Opinion Survey (SLOOS). The sample consists of all banks in the STBL panel with average real assets greater than $10 billion. Data are from Q2 1997 to Q4 2006. The regression included bank-specific fixed effects and quarterly dummy variables. The symbols ***, **, and * mean that the coefficient is statistically different from zero at the 1%, 5% and 10% levels, respectively.

Table 10: Credit Derivatives and Average Loan Maturity: Term Loans

Bank Characteristics	All Loans		Small Loans		Large Loans	
Log (Asset Size)	-57.1047	-48.1507	-63.2009**	-45.7444	-27.7168	-22.6619
	(35.7623)	(40.4665)	(31.6002)	(35.3828)	(68.4241)	(75.1018)
Log (Asset Size) Squared	7.5117	6.3444	8.5217**	6.2502	4.2847	3.6455
	(4.6751)	(5.2783)	(4.1886)	(4.6738)	(9.1980)	(10.0055)
C&I Loans/ Assets	-72.2650**	-69.0835*	15.8270	24.3664	-57.7401	-53.6524
	(34.9624)	(36.4101)	(34.2385)	(35.2430)	(49.4724)	(51.7954)
Unused Commitments/ Assets	66.2058***	68.2879***	66.5321***	71.0202***	49.2678**	50.3909**
	(18.7823)	(18.7276)	(20.1171)	(19.8526)	(24.0538)	(24.9256)
Total Risk-Based Capital Ratio	-186.1293	-181.4319	-79.1437	-68.0293	-354.2852	-348.7122
	(135.9765)	(138.3766)	(107.1052)	(108.7892)	(238.4258)	(244.9968)
Risk-Based Assets/ Total Assets	-31.7163	-34.7889	-38.0791	-45.0857*	-31.2165	-33.4008
	(26.8271)	(26.5822)	(23.8501)	(23.0318)	(36.4790)	(37.1090)
Deposits/ Assets	83.7664***	85.4813***	78.8472***	81.6333***	102.7455**	102.1701**
	(23.2372)	(23.3663)	(21.3609)	(21.3247)	(42.2026)	(42.4595)
Trading Assets/ Assets	-25.2037	-29.1761	43.8797	34.3291	-10.0732	-13.6519
	(52.2403)	(53.4929)	(45.7044)	(48.9473)	(70.9751)	(71.2307)
Nonperforming C&I Loans/ C&I Loans	-28.6948	-23.9259	55.5207	63.5473	-373.4457	-374.2493
	(158.5378)	(159.6562)	(131.9114)	(131.1738)	(267.5737)	(269.5267)
Other Derivatives/ Assets	0.3938	0.3119	0.2927	0.1472	0.0820	0.0765
	(1.0812)	(1.0860)	(0.8922)	(0.8925)	(2.0627)	(2.0681)
Hedging Activity	0.0552	-0.2634	1.6406	1.2141	-1.6726	-1.7113
	(1.9312)	(2.1268)	(1.6927)	(1.8868)	(4.1808)	(5.8244)
Loan Demand						
Demand from Large Borrowers	-2.7645*	-2.8472*	-2.3355*	-2.5240**	-3.8831*	-3.9178*
	(1.4561)	(1.4557)	(1.1936)	(1.1742)	(2.3524)	(2.3703)
Demand from Small Borrowers	1.0623	1.1853	1.1546	1.4594	-0.2966	-0.2296
	(1.7330)	(1.6886)	(1.5301)	(1.3997)	(2.2438)	(2.2869)
Credit Derivatives						
Net Credit Protection / C&I Loans	-44.4591*		-44.8888**		-22.4773	
	(24.0026)		(18.6274)		(35.8420)	
Net Credit Protection X Hedging	141.3672***		87.9614**		188.9500**	
	(49.0727)		(37.3066)		(93.1472)	
Credit Protection Bought/ C&I Loans		-39.7948		-31.2850		-17.4912
		(31.3128)		(25.7593)		(49.2901)
Credit Protection Bought X Hedging		146.6871**		91.3038**		187.3799*
		(57.1877)		(44.5652)		(112.2652)
Credit Protection Sold/ C&I Loans		58.3403		81.1810**		32.7119
		(35.8463)		(35.2183)		(36.7730)
Credit Protection Sold X Hedging		-122.2727**		-54.1454		-185.3415*
		(51.8411)		(45.8358)		(110.6563)
Number of Observations	766	766	762	762	502	502
R-Squared	0.156	0.157	0.175	0.181	0.168	0.169
P-value: Credit Derivatives Variable Equal 0?	0.015	0.062	0.033	0.049	0.122	0.346

The dependent variable is the weighted average maturity (in months) of new C&I loans not made under commitment extended by a bank in each quarter. Loan principal amounts are used as weights. Observations where more than 90% of new loans have no stated maturity are dropped. Net credit protection is the notional principal of credit derivatives on which the bank is the beneficiary (credit protection bought) minus the notional principal of credit derivatives on which the bank is the guarantor (credit protection sold), divided by C&I loans. Loan information comes from the Survey of Terms of Business Lending (STBL), bank information comes from the Call Reports, and information on loan demand comes from the Senior Loan Officers Opinion Survey (SLOOS). The sample consists of all banks in the STBL panel with average real assets greater than $10 billion. Data are from Q2 1997 to Q4 2006. The regression included bank-specific fixed effects and quarterly dummy variables. The symbols ***, **, and * mean that the coefficient is statistically different from zero at the 1%, 5% and 10% levels, respectively.

Table 11: Credit Derivatives and Loan Spreads: Commitment Loans

	All Loans		Small Loans		Large Loans	
Bank Characteristics						
Log (Asset Size)	1.2273	1.3033	1.1920	1.2617	-0.3003	-0.6526
	(0.9553)	(0.9716)	(0.8787)	(0.8968)	(1.2037)	(1.2599)
Log (Asset Size) Squared	-0.1199	-0.1306	-0.1192	-0.1288	0.0284	0.0787
	(0.0954)	(0.0974)	(0.0876)	(0.0904)	(0.1324)	(0.1422)
C&I Loans/ Assets	-0.8378	-0.7855	-0.6955	-0.6542	1.0080	0.7124
	(1.1890)	(1.1496)	(1.1772)	(1.1509)	(1.0979)	(1.1326)
Unused Commitments/ Assets	-0.9651**	-0.9746**	-0.9988**	-1.0128**	0.0083	-0.0544
	(0.4756)	(0.4707)	(0.4894)	(0.4834)	(0.3791)	(0.3625)
Total Risk-Based Capital Ratio	-1.7904	-1.5972	-1.2991	-1.0636	-3.7350	-3.6862
	(2.2219)	(2.2818)	(2.2364)	(2.3224)	(2.2833)	(2.3450)
Risk-Based Assets/ Total Assets	0.9590*	0.9677*	1.1775**	1.1951**	-1.6429***	-1.5682**
	(0.5682)	(0.5707)	(0.5534)	(0.5607)	(0.6202)	(0.6265)
Deposits/ Assets	1.7969***	1.7688***	1.7605***	1.7327***	1.5769**	1.6826***
	(0.5730)	(0.5671)	(0.5850)	(0.5837)	(0.6011)	(0.5927)
Trading Assets/ Assets	0.4641	0.4255	1.1760	1.1013	-2.8028**	-2.8659**
	(1.4688)	(1.5040)	(1.7306)	(1.8018)	(1.1988)	(1.1561)
Nonperforming C&I Loans/ C&I Loans	-2.2692	-2.0925	-1.5034	-1.3265	-0.3197	-0.5367
	(3.3744)	(3.3803)	(3.7224)	(3.7194)	(4.3569)	(4.1150)
Other Derivatives/ Assets	0.0105	0.0100	0.0159	0.0155	0.0605***	0.0621***
	(0.0162)	(0.0163)	(0.0248)	(0.0250)	(0.0160)	(0.0148)
Hedging Activity	-0.0813**	-0.1022	-0.0877**	-0.1138*	-0.0271	-0.0348
	(0.0329)	(0.0681)	(0.0376)	(0.0664)	(0.0670)	(0.1114)
Loan Characteristics						
Log (Loan Size)	-0.0555	-0.0555	-0.1310	-0.1310	-0.9801***	-0.9769***
	(0.0705)	(0.0705)	(0.1799)	(0.1798)	(0.2789)	(0.2781)
Log (Loan Size) Squared	-0.0082**	-0.0082**	-0.0043	-0.0043	0.0257***	0.0256***
	(0.0035)	(0.0035)	(0.0093)	(0.0092)	(0.0089)	(0.0089)
Unrated	0.9849***	0.9878***	0.9731***	0.9767***	0.8078***	0.8042***
	(0.2173)	(0.2167)	(0.2341)	(0.2332)	(0.1112)	(0.1108)
Risk Rating 2	0.1844	0.1858	0.2201	0.2220	0.1705***	0.1685***
	(0.2101)	(0.2100)	(0.2327)	(0.2327)	(0.0612)	(0.0615)
Risk Rating 3	0.7712***	0.7732***	0.7556***	0.7582***	0.6942***	0.6913***
	(0.2430)	(0.2431)	(0.2757)	(0.2760)	(0.0647)	(0.0649)
Risk Rating 4	0.8543***	0.8564***	0.8164***	0.8191***	1.2077***	1.2043***
	(0.1513)	(0.1502)	(0.1746)	(0.1738)	(0.0806)	(0.0811)
Risk Rating 5	1.4480***	1.4500***	1.4004***	1.4030***	1.7573***	1.7531***
	(0.1412)	(0.1396)	(0.1634)	(0.1620)	(0.1538)	(0.1538)
Secured	0.3379***	0.3376***	0.2735***	0.2733***	0.6656***	0.6677***
	(0.0621)	(0.0622)	(0.0651)	(0.0653)	(0.0673)	(0.0674)
Pre-payment Penalty	-0.0490	-0.0492	0.0610	0.0609	-0.7767***	-0.7787***
	(0.1518)	(0.1520)	(0.1671)	(0.1671)	(0.1294)	(0.1290)
Maturity	0.0090***	0.0090***	0.0076***	0.0076***	0.0138***	0.0138***
	(0.0015)	(0.0015)	(0.0017)	(0.0017)	(0.0015)	(0.0015)
Maturity Squared	-0.0000**	-0.0000**	-0.0000	-0.0000	-0.0000***	-0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)

Table 11 (Continued): Credit Derivatives and Loan Spreads: Commitment Loans

	All Loans		Small Loans		Large Loans	
Loan Demand						
Demand from Large Borrowers	0.0267	0.0256	0.0173	0.0163	0.0475**	0.0492**
	(0.0175)	(0.0168)	(0.0177)	(0.0170)	(0.0186)	(0.0191)
Demand from Small Borrowers	-0.0163	-0.0167	-0.0030	-0.0039	-0.0474*	-0.0515**
	(0.0281)	(0.0283)	(0.0277)	(0.0279)	(0.0253)	(0.0243)
Credit Derivatives						
Net Credit Protection / C&I Loans	-0.2245		-0.2560		-0.3609**	
	(0.2364)		(0.2464)		(0.1603)	
Net Credit Protection X Hedging	1.4077		1.2300		0.5740	
	(0.9495)		(0.9421)		(1.7998)	
Credit Protection Bought/ C&I Loans		-0.2060		-0.2757		-0.8165**
		(0.3128)		(0.3087)		(0.3853)
Credit Protection Bought X Hedging		1.4946		1.4161		2.0551
		(1.0183)		(0.9713)		(2.4926)
Credit Protection Sold/ C&I Loans		0.2847		0.2867		0.0392
		(0.2867)		(0.3026)		(0.1771)
Credit Protection Sold X Hedging		-1.0381		-0.8521		-1.9592
		(1.4262)		(1.4262)		(2.1084)
Number of Observations	502,772	502,772	466,691	466,691	36,081	36,081
R-Squared	0.243	0.243	0.180	0.180	0.361	0.362
P-value: Credit Derivatives Variables Equal 0?	0.338	0.470	0.417	0.539	0.084	0.242

The dependent variable is the effective interest rate on the loan minus the 3-month LIBOR rate. Observations where the calculated spread exceeds 15 percent have been dropped. Net credit protection is the ratio of the notional principal on derivatives contracts where the bank purchases credit protection ("beneficiary") minus the notional amount of contracts on which the bank sells credit protection ("guarantor"), divided by C&I loans. The regressions include bank fixed effects and quarterly dummy variables and are estimated with residuals clustered at the bank level. Data are from Q2 1997 to Q4 2006. Loan information comes from the Survey of Terms of Business Lending (STBL), bank information comes from the Call Reports, and information on loan demand comes from the Senior Loan Officers Opinion Survey (SLOOS). The symbols ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 12: Credit Derivatives and Loan Spreads: Term Loans

	All Loans		Small Loans		Large Loans	
Bank Characteristics						
Log (Asset Size)	0.9997	1.6519	1.3974	2.1347*	1.6304	1.1579
	(1.3174)	(1.1934)	(1.3608)	(1.2384)	(1.3709)	(1.3154)
Log (Asset Size) Squared	-0.1759	-0.2529*	-0.2435	-0.3307**	-0.2644	-0.2137
	(0.1654)	(0.1425)	(0.1743)	(0.1525)	(0.1725)	(0.1702)
C&I Loans/ Assets	-3.4915**	-2.2559	-3.1511	-1.5423	0.8922	0.1699
	(1.7472)	(1.7815)	(2.1899)	(2.4007)	(1.1421)	(1.0212)
Unused Commitments/ Assets	0.7707	0.6652	0.8780	0.8167	0.4014	0.0732
	(1.1423)	(1.0636)	(1.2192)	(1.1174)	(0.6852)	(0.7161)
Total Risk-Based Capital Ratio	-8.2599	-7.2317	-9.1679*	-7.8296*	6.6831	5.3892
	(5.6134)	(4.7795)	(5.4385)	(4.5583)	(4.5832)	(4.4637)
Risk-Based Assets/ Total Assets	0.5481	-0.1777	0.7087	-0.1066	-1.7668*	-1.5450*
	(0.9616)	(0.9645)	(0.9509)	(0.9720)	(0.8954)	(0.8073)
Deposits/ Assets	0.9971	0.9300	0.8575	0.7789	-1.1169*	-1.1315*
	(1.5090)	(1.3409)	(1.5430)	(1.3544)	(0.5903)	(0.5974)
Trading Assets/ Assets	-0.2711	-0.7277	-2.6580	-3.7276	-1.2035	-0.7437
	(1.9003)	(2.1873)	(3.2473)	(3.6681)	(1.4630)	(1.3459)
Nonperforming C&I Loans/ C&I Loans	2.5423	3.7704	2.6008	3.3159	2.3047	5.5994
	(7.2089)	(7.0790)	(8.5342)	(8.4319)	(7.0792)	(7.9568)
Other Derivatives/ Assets	-0.0126	-0.0220	-0.0801	-0.0866	-0.0058	-0.0093
	(0.0619)	(0.0631)	(0.0867)	(0.0928)	(0.0393)	(0.0395)
Hedging Activity	0.4988***	0.2949**	0.5877***	0.3816***	0.2962*	0.2561
	(0.1524)	(0.1273)	(0.1593)	(0.1440)	(0.1532)	(0.1616)
Loan Characteristics						
Log (Loan Size)	-0.3425**	-0.3390**	-0.3180	-0.3155	-0.9342**	-0.8700**
	(0.1318)	(0.1314)	(0.4798)	(0.4784)	(0.3899)	(0.3943)
Log (Loan Size) Squared	-0.0030	-0.0032	-0.0034	-0.0035	0.0257**	0.0236*
	(0.0050)	(0.0050)	(0.0231)	(0.0230)	(0.0121)	(0.0123)
Unrated	0.5084	0.5233	0.4923	0.5135	0.5996***	0.5906***
	(0.3457)	(0.3423)	(0.4701)	(0.4661)	(0.1591)	(0.1576)
Risk Rating 2	-0.0905	-0.0768	-0.1627	-0.1492	0.2115**	0.2101**
	(0.3624)	(0.3582)	(0.4949)	(0.4899)	(0.0915)	(0.0900)
Risk Rating 3	0.3301	0.3406	0.2826	0.2939	0.4128***	0.4124***
	(0.3453)	(0.3414)	(0.4653)	(0.4606)	(0.1257)	(0.1245)
Risk Rating 4	0.3233	0.3393	0.1662	0.1831	1.0097***	1.0145***
	(0.3520)	(0.3478)	(0.4712)	(0.4660)	(0.1630)	(0.1641)
Risk Rating 5	0.7979**	0.8236**	0.6200	0.6476	1.8029***	1.8120***
	(0.3789)	(0.3738)	(0.4834)	(0.4776)	(0.2543)	(0.2508)
Secured	-0.0521	-0.0468	-0.1345	-0.1285	0.6764***	0.6688***
	(0.1339)	(0.1331)	(0.1347)	(0.1342)	(0.0804)	(0.0801)
Pre-payment Penalty	-0.1806**	-0.1931**	-0.1715**	-0.1869**	-0.1769	-0.2076
	(0.0843)	(0.0851)	(0.0703)	(0.0719)	(0.1770)	(0.1844)
Maturity	0.0172***	0.0171***	0.0156***	0.0155***	0.0136***	0.0137***
	(0.0041)	(0.0041)	(0.0041)	(0.0041)	(0.0023)	(0.0023)
Maturity Squared	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0000***	-0.0000***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)

Table 12 (Continued): Credit Derivatives and Loan Spreads: Term Loans

	All Loans		Small Loans		Large Loans	
Loan Demand						
Demand from Large Borrowers	0.0146	0.0228	0.0021	0.0106	0.0148	0.0225
	(0.0445)	(0.0442)	(0.0493)	(0.0482)	(0.0331)	(0.0331)
Demand from Small Borrowers	-0.0040	-0.0121	0.0100	0.0005	-0.0056	-0.0110
	(0.0411)	(0.0425)	(0.0408)	(0.0410)	(0.0239)	(0.0242)
Credit Derivatives						
Net Credit Protection / C&I Loans	-1.0027*		-0.8661		-0.5025	
	(0.5387)		(0.5779)		(0.8024)	
Net Credit Protection X Hedging	1.1019		0.7332		1.7986	
	(1.1418)		(1.2881)		(4.8274)	
Credit Protection Bought/ C&I Loans		-1.9362***		-1.7830**		-2.3001***
		(0.6690)		(0.7892)		(0.8114)
Credit Protection Bought X Hedging		5.2476**		4.9346**		4.0424
		(2.2778)		(2.4553)		(6.4326)
Credit Protection Sold/ C&I Loans		0.8632		0.8620		-0.6301
		(0.8422)		(0.8867)		(0.5714)
Credit Protection Sold X Hedging		0.8397		1.1751		-2.2092
		(0.9361)		(0.9998)		(3.2466)
Number of Observations	34,669	34,669	31,022	31,022	3,647	3,647
R-Squared	0.292	0.294	0.186	0.188	0.390	0.393
P-value: Credit Derivatives Variables Equal 0?	0.162	0.010	0.265	0.009	0.814	0.004

The dependent variable is the effective interest rate on the loan minus the 3-month LIBOR rate. Observations where the calculated spread exceeds 15 percent have been dropped. Net credit protection is the ratio of the notional principal on derivatives contracts where the bank purchases credit protection ("beneficiary") minus the notional amount of contracts on which the bank sells credit protection ("guarantor"), divided by C&I loans. The regressions include bank fixed effects and quarterly dummy variables and are estimated with residuals clustered at the bank level. Data are from Q2 1997 to Q4 2006. Loan information comes from the Survey of Terms of Business Lending (STBL), bank information comes from the Call Reports, and information on loan demand comes from the Senior Loan Officers Opinion Survey (SLOOS). The symbols ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.