CREDIT DERIVATIVES AND LOAN PRICING

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ABSTRACT

Credit derivatives, some of the most significant developments is the financial industry, have experienced significant growth recently. The objective of this study is to examine whether the use of credit derivatives, either buying or selling, has an effect on banks' loan pricing behaviour. Minton et al. (2009) propose that the net buyers of credit protection save capital and thus should be able to make loans at rates that are below the rates offered by competitors who do not utilize credit derivatives. In addition, Hirtle (2009) investigates the relationship between credit derivatives and their effects on bank lending activities. She does not find a strong association between the use of credit derivative and the supply of loans and proposes that banks are using credit derivatives mainly to provide longer maturity and lower spread loans rather than to increase the volume of loans.

In contrast to previous studies, our study investigates the relation between loan prices, measured by the interest and fee income per dollar of loans, and the use of credit derivatives at BHCs. We propose that if BHCs use credit derivatives to hedge credit exposures, they would charge a lower loan rate to the borrowers since CDs enable banks to transfer the credit risk away from the lenders. However, if credit derivatives are used for purposes other than managing credit exposure, these instruments might not have any impact on loan pricing. Another goal of our study is to investigate the relationship between loan prices and the use of credit derivatives for trading purpose. We expect that during the years when BHCs are net sellers of credit derivatives, they take these positions because they have good quality loans and they are willing to take additional risk. In this case, they would report lower income per dollar of loans. However, if banks sell CDs as part of their speculative strategy, their use of credit derivatives might not have any impact on loan prices. Thus, banks would charge a rate that is similar to other banks with the same level of risk. Another goal of our study is to find, for both users and non-users of credit derivatives, how the interest and fee income generated by the BHCs is affected by the risk of default of their clients. We expect that as the risk of default increases, the prices on loans would increase as well. Banks take additional risk in exchange for higher return. Our final goal of this study is to investigate whether the use of CDs affects the

supply of funds or loan rates differently for different types of loans banks hold in their portfolios.

Our findings suggest that the loan prices of users of CDs are significantly less than the loan prices of nonusers. This finding may suggest that users are more efficient, competitive and diversified than nonusers and thus can afford to charge a lower rate to their clients. The result may also suggest that BHCs that are using CDs generally have lower risk loan portfolios and these portfolios are generating lower income per dollar of assets. Among the users group, we observe that as the volume of CDs purchased increases the prices of loans also increase. This suggests additional usage of CDs allows users to accept risky loans that they would not accept in the absence of CDs. They are initiating these high-risk loans to generate higher interest and fee income and at the same time they are using more CDs to hedge these risky loans. Our study also finds a significant and positive relationship between the risk of default and BHCs loan prices.

Our study further investigates the users of credit derivatives during the years when these banks use CDs and the years when they do not use CDs. We find that the loan prices are marginally lower for the years when CDs are used. In particular, we find a significant decrease in prices during the years when these banks are sellers of CDs. However, we do not find any significant impact on loan prices during the years when they buy CDs. This result suggests that CD-active BHCs that buy CD protection are doing so to reduce some excessive risk they have taken without demanding a high rate to compensate for this risk.

Finally, we find that the years when BHCs report both CDs bought and CDs sold, they charge a loan price that is similar to the years when these banks do not report any position in the CDs market. Perhaps the BHCs that report simultaneously CDs bought and CDs sold are selling CDs to generate income and hedging their positions through buying offsetting positions. Our analysis also suggests that the impact of the use of derivatives varies depending on whether the loans are real estate, consumer, commercial and industrial, agricultural, or foreign loans.

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CHAPTER 1
INTRODUCTION AND MOTIVATION

One of the recent developments in the banking industry is the introduction of credit derivatives. The credit default swap, one of the most widely used credit derivatives, is basically a bilateral contract between a buyer and a seller where the seller of the contract requires periodic payments from the buyer and in return the buyer requires protection from the seller if default occurs. Credit derivatives have been promoted on the basis that they are risk management tools. For example, Alan Greenspan, the former United States (US) Federal Reserve Chairman, describes credit derivatives as "the most significant advancement in financial markets in the past ten years" and states that "the largest banks have found these instruments an attractive tool to manage credit exposure in their loan books while allowing them to meet the needs of their largest corporate customers" (Greenspan, 2005). Similarly, Hirtle (2009) describes credit derivatives as an attractive risk management tool and argues that they allow a financial institution to diversify its credit risk enabling it to separate the origination of credit and the funding of credit.

Following their inception, CDs have experienced a rapid growth. Statistics from the International Swaps and Derivatives Association, Inc. (ISDA) reveal that the market for the credit default swaps has increased from the notional principal amount of $918.9 billion at the end of 2001 to $8.42 trillion at the end of 2004. This volume reached $31.22 trillion at the end of June 2009.

The significant growth in the volume of credit derivatives prompted policy makers, academics, and practitioners to wonder about the risks associated with their proliferation and how their use affects lending practices and the availability of credit. In terms of risk, excessive credit derivative usage is a common concern for bank regulators and numerous studies focus on the capital holdings of the users of credit derivative contracts. Sinkey and Carter (2000), Ashraf et al (2005), and Minton et al (2009), argue that banks save capital when they hedge using the derivatives market.

Most previous studies focus on the impact of credit derivatives on the supply of loans. Moser (1998) suggests that in the absence of credit derivatives, a bank can either keep a loan on its books or sell the loan. In contrast, the introduction of credit derivatives allows the bank to keep the loan while transferring the risk to some other party. Thus, credit derivatives allow banks to increase their lending activities and to build a more diversified loan portfolio. Hirtle (2009) discusses the use of credit derivatives and their effects on bank lending activities. She finds a weak association between the use of credit derivative and the supply of loans and proposes that banks are using credit derivatives mainly to provide longer maturity and lower spread loans rather than to increase the volume of loans. Minton et al. (2009) suggest that the use of credit derivatives is limited to hedging loans and argue that the net buyers are more likely to hedge commercial and industrial (C& I) loans and foreign loans. In addition, they propose that the net buyers of credit protection save capital. As a result, these lenders should be able to make loans at rates that are below the rates offered by competitors who do not utilize credit derivatives. However, they stop short of examining their proposition. Jing (2010) argues that credit derivatives allow banks to efficiently manage the credit exposures on large corporate loans, loans to small and medium-sized enterprises, loans to emerging markets, and also manage the counterparty credit risk on over the counter derivatives.

While the focus of these studies is on the impact of credit derivatives on the supply of credit, the objective of this study is to examine whether the use of credit derivatives, either buying or selling, has an effect on banks' loan pricing behaviour. In particular, this study is an attempt to answer the question of whether the buyers of credit derivatives are charging lower loan rates in comparison to credit derivative sellers. Furthermore, we like to know which borrowers, if any, are benefiting from lower rates or suffering from higher rates. We add to the existing literature by considering the impact of credit derivative contracts on loan pricing rather than on the growth of lending activities of the users.

Our analytical approach is similar to that of Angbazo (1997). He examines the relation between the risk (both the default risk and interest rate risk) at commercial banks and the loan and deposit rates. Using the ratio of the net interest margin to average size of earning assets as a measure of banks' profitability, he shows that as banks keep more

risky loans and have higher interest rate risk exposure in their portfolio, they charge a higher loan rate to attain higher net interest margin. Using more recent data on US bank holding companies, we extend the work of Angbazo (1997) on the relation between bank risk and loan rates and in addition we investigate the relation between the use of credit derivatives and loan pricing.

Our results suggest that the prices of loans at users of credit derivatives are significantly lower than the prices of loans at nonusers. Among the users group, we find that as the volume of CDs increases the prices of loans also increase. When we separate the observations of the users group between the years when these banks use credit derivatives and the years when they do not use credit derivatives, we find that the prices of loans are marginally lower for the years when CDs are used. In particular, we find a significant decrease in prices during the years when these banks are sellers of CDs and not buyers. Our analysis also confirms the findings of Angbazo (1997). It suggests a positive relation between the risk of default and the prices of loans. This result holds for users and nonusers of credit derivatives but for user banks the prices of loans are more sensitive to default risk than the prices of loans at non users. In addition, our results suggest that users of CDs charge higher prices for real estate loans, commercial and industrial loans (C& I loans), consumer loans, and agricultural loans. In contrast, the nonusers of CDs charge higher prices for consumer loans and agricultural loans but lower prices for foreign loans.

The remainder of this paper is organized as follows: Chapter 2 describes the market for credit derivatives. Chapter 3 provides an extensive review of past literature on credit derivatives. Chapter 4 lists the hypotheses. Section 5 describes the data, the variables, and the methodology we use in this study. Section 6 summarizes the empirical findings and section 7 provides the conclusion.

CHAPTER 2
THE MARKET FOR CREDIT DERIVATIVES

This chapter defines credit derivatives, highlights the significance and growth in volume of trading in credit derivatives, indicates the regulations that govern the disclosure requirements related to credit derivatives, and discusses the official positions of two large banks which are active in buying, selling, and trading derivative contracts.

2.1 The structure of a credit derivative

Credit derivatives include credit default swaps (CDS), total return swaps, credit-linked notes, credit default swap options, forwards, and futures contracts. We describe the structure of credit default swaps (CDS) below:

A credit default swap contract is an agreement between the default protection buyer and the default protection seller. The buyer makes fixed periodic payments, similar to the premiums of an insurance contract, to the seller in exchange for a promise by the seller to cover the losses of the buyer resulting from any credit event specified in the contract.[1] The losses covered are related to an underlying asset, usually known as the reference asset or the obligation, which would be specified in the contract. The reference asset is usually owned by the buyer and issued as an obligation of a third party known as the reference entity which may be a government, a governmental agency, or a corporation. The CDS contract does not usually involve transferring the reference asset between the buyer and the seller. Figure 1 shows a typical structure of a credit default swap contract.

[Insert Figure 1 here]

A total return swap agreement is also a bilateral contract where one party makes payments to the other party at either a fixed or variable rate. In return, the other party makes payments based on a reference asset such as an equity index, bonds or loans. The total return swap is very commonly used by hedge funds.

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1 Norden et al (2008) define the premium as the price of the CDS, a measure of compensation required by the market for bearing the underlying credit risk of the reference asset.

A credit linked note is one type of funded credit derivative with an embedded credit default swap that allows the issuer of such securities to transfer the credit risk of the reference entity to the buyers of the securities. Buyers receive fixed or floating interest rate payments upon the purchase of the securities. In exchange, the issuer promises par value payment at maturity unless a specified credit event occurs. In case of default, the buyer receives an amount equal to the principal plus the recovery rate.

A credit spread option is another form of credit derivatives which allows the transfer of credit risk from one party to the other. The buyer of a credit spread option pays an initial premium to enter into the contract and in exchange, the seller makes cash payments if a given credit spread changes.

The credit events that may trigger payment from a credit default derivative contract are summarized in Figure 2. It is interesting to note that protection is more comprehensive than a guarantee in that it provides protection from events that may be interpreted as furtherance of a bankruptcy or insolvency event.

[Insert Figure 2 here]

2.2 The market for credit derivatives

The credit derivative market, which is part of the over-the-counter (OTC) derivatives market, has grown dramatically in recent years as shown in Figure 3. The gross notional amount, the total amount of trades that are outstanding, of credit derivative usage rose from 8 trillion in 2004 to over 60 trillion in 2007. However, this dramatic growth was followed by a decrease during 2008 and 2009. The International Swaps and Derivatives Association (2008) states that the looming financial crisis in the first half of 2008 triggered a downturn in the notional volumes as sellers became risk averse. In his comments on ISDA Mid-Year 2008 Market Survey, Robert Pickel, Executive Director and Chief Executive Officer, ISDA, stated "this decrease primarily reflects the industry's efforts to reduce risk by tearing up economically offsetting transactions, and demonstrates the industry's ongoing commitment to reduce risk and enhance operational efficiency. We expect to see more effects of this over time". Based on the Mid-Year 2008 Market Survey, the ISDA reported that the notional amount was approximately $54.6 trillion. The notional amount outstanding fell to about 31 trillion at the end of the year 2009.

[Insert Figure 3 here]

Figure 4 shows market participants of credit derivatives. We can see that banks are major players in credit derivative market. Banks buy and sell protection to hedge their positions and diversify their portfolios. The pie charts for both buyers and sellers of credit protection show that banks have the higher percentage of market shares- 52% as buyers of credit protection and 39% as sellers of credit protection. Insurance companies and reinsurers are mainly sellers of credit protection. Other participants include mutual funds, pension funds, government agencies, and corporations. There are various types of credit derivatives. These include credit default swaps, total return swaps, credit-linked notes, and credit-spread options.

[Insert Figure 4 here]

2.3 Disclosure requirements for credit derivative positions

The disclosure requirements were originally specified by the Financial Accounting Standard Board (FASB) Statement No. 133, *Accounting for Derivative Instruments and Hedging Activities*. FAS 133 was recently (September 12, 2008) amended by a FASB Staff Position (FSP), namely FSP FAS 133-1and FIN 45-4, to require specific disclosures by sellers of credit derivatives, including credit derivatives embedded in a hybrid instrument[1]. The same FSP also amends FASB Interpretation No. 45, *Guarantor's Accounting and Disclosure Requirements for Guarantees, Including Indirect Guarantees of Indebtedness of Others,* to require disclosure about the current status of the payment/performance risk of a guarantee. Overall, FSP FAS 133-1and FIN 45-4 require as mandatory the disclosure of the maximum potential amount of future payments, the related fair value, and the current status of the payment/performance risk for certain guarantees and credit derivatives sold.

[1] Financial Accounting Standard Board (FASB), Financial Accounting Standard (FAS), Financial Stability Plan (FSP)

2.4 Credit derivatives at Citibank

In its 2010 financial statements, Citibank reports that "*The Company uses credit derivatives to help mitigate credit risk in its Corporate and Consumer loan portfolios and other cash positions, to take proprietary trading positions, and to facilitate client transactions*." The company either purchases or writes credit protection on behalf of its clients and for hedging the credit risk of their own accounts. In order to accurately value credit derivatives, Citi uses several valuation techniques such as discounted cash flows, Black-Scholes option pricing model, and Monte Carlo simulation.

As a measure of risk control, Citibank actively monitors the credit risk of its counterparties in the credit derivatives contract. In addition, Citi maintains collateral agreements to cover its gross receivables from counterparties.[2] The collateral required is approximately 85% to 89% of the gross receivables. Banks, financial institutions, and other dealers are the majority of Citi's top 15 counterparties.

2.5 Credit derivatives at Bank of America

The Bank of America states in its financial statement of 2010 that the bank actively manages the credit risk of both funded and unfunded lending commitments through credit derivatives. The Bank of America simultaneously purchases and sells credit protection to obtain the desired level of credit exposures.[3]

As at December 31, 2008 and 2009, the net notional credit default protection purchased by Bank of America to hedge its credit exposure was respectively $9.7 billion and $19.0 billion. According to the 2010 financial statements, the increase is due to the acquisition of Merrill Lynch. The financial report also indicates that the net gain of $993 million in the credit protection in 2008 is followed by a net loss of $2.9 billion in 2009. The gains and losses in fair value of credit derivative instruments are recorded in other income. The average Value-at-Risk

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[2] A collateral agreement is a provision in a risk management agreement that requires one party to provide collateral to guarantee performance under the agreement. The agreement usually includes provisions for marking positions to market, measuring the collateral requirement, moving collateral around, and even providing a physical location for holding the collateral.

[3] The Bank of America states in its financial statements that the majority of its derivatives are over the counter and are traded with large, international financial institutions, including broker/dealers and with a variety of non-financial companies. These derivative transactions are executed on a daily margin basis.

(VaR) for these credit derivative hedges increased from $24 million in 2008 to $76 million in 2009.

Similar to Citibank, Bank of America actively monitors, and manages the credit risk exposure in its credit derivative contracts, and maintains collateral agreements to cover its gross receivables from counterparties. For this purpose, the corporation records the counterparty credit risk valuations on derivative assets. These risk valuations are reassessed periodically and adjusted if the value of the derivative contract, collateral, or creditworthiness of the counterparty changes. If the credit worthiness deteriorates, it can increase the amount of collateral or terminate the transaction with the counterparty. The corporation states in its financial statement that *"At December 31, 2009, the Corporation received cash and securities collateral of $74.6 billion and posted cash and securities collateral of $69.1 billion in the normal course of business under derivative agreements."*

CHAPTER 3
LITERATURE REVIEW

Previous literatures cover various characteristics of financial institutions that use credit derivatives (CDs) for risk management purpose. Our extensive review of past literatures on credit derivatives is described below.

3.1 The use of credit derivatives

Previous literatures investigate the determinants and the extent of credit derivatives use by financial institutions. Minton et al (2009), for example, suggest that although the use of credit derivatives has been increased dramatically in recent years, the use has been limited to only a few banks. The study finds only 23 large banks out of 395 banks in their sample use credit derivatives. However, the amount by which these 23 large banks use credit derivatives exceeds the total amount of loan held by these banks by 20%. In search for the reasons behind the limited use of credit default contracts, studies by Ashraf et al (2005) and Benendo and Bruno (2009) find that the limited use is primarily due to entry barriers, which favor large banks. Since credit derivatives are expensive instruments, Shao and Yeager (2007) state that it is beneficial for only those banks whose activities are more concentrated to large credit exposures. They propose that the large banks are more likely to use credit derivative contracts since they are more likely to bear the fixed cost associated with managing credit derivatives and also the cost related with pricing these instruments, which requires costly expertise. Carter and Sinkey (1998) do not find any evidence to support that bank size is a factor in the extent of derivatives use by banks. However, they find evidence that economies of scale are a factor that motivates more than one type of derivative use by banks. Ashraf et al (2005), Minton et al (2009) and Hirtle (2009) also support the hypothesis that banks that are using credit derivatives also use other forms of derivative products. The limited use of credit derivative is also supported by the fact that they limit banks from using hedge accounting (Minton, 2009 and Shao et.al., 2007).

More recently, financial institutions have increasingly practiced trading activities of derivatives. Numerous previous literatures state that banks are moving away from the traditional risk reduction activities with derivatives and orienting their activities towards fee generating dealer activities. As found by Minton et al (2009), most of the gross amount of credit derivatives banks hold is for dealer activities. Their study on U.S. bank holding companies find that less than 2% of the total amount of credit instrument held by banks is used for hedging purpose. They also conclude that credit derivative used for dealer activities is partially responsible for the recent subprime crisis. Shao and Yeager (2007) demonstrate that the protection buyers or the users of credit derivatives for hedging purpose decrease total risk and increase capital. Nevertheless, the protection sellers are more diverted towards increasing risk and generating additional fee income. They conclude that credit derivative act as a flexible instrument which can increase or decrease risk depending on the way these instruments are used by banks. Ashraf et al (2005) state that credit derivatives allow a profitable trading opportunities and banks that are more oriented towards non-traditional sources of income tend to participate more in the credit derivative market. Mahieu (2007) concludes that banks' increased use of credit derivatives for hedging is positively affected by their involvement in trading activities. In addition, more profitable banks, as measured net interest margin, tend to be using less credit derivative for hedging purpose. Minton et al (2009) and Benendo and Bruno (2009) also find that net buyers of credit protection are less profitable.

3.2 Credit derivatives and bank lending

Minton et al (2009) and Shao and Yeager (2007) examine the type of loan portfolio held by credit protection buyers. Their study finds that the net buyers of credit derivatives are more likely to hedge the C&I loans and foreign loans than any other loans. They indicate that the market for credit derivatives is most liquid for investment grade firms, foreign banks and foreign multinational firms. These corporations are more likely to hold risky C&I loans and foreign loans in their portfolio. Therefore, credit derivatives are more likely used as a protection against risky loans.

Hirtle (2009) addresses the aspects of credit derivative usage on the banks credit supply and do not find any strong evidence to support that the use of credit derivative expands credit supply. She suggests that the benefits of the growth of credit derivatives may be narrow and limited to large borrowers. In addition, she finds that banks that are active hedgers are likely to charge more for the additional amount of credit. However, Godris et al (2006) study banks lending behaviour with the development of credit derivative product. In contrary to Hirtle's (2009) findings, they find that the advancement in the credit risk management technique, measured by the issuance of at least one collateralized loan agreement (CLO) increases the target loan level to approximately 50%. Moreover, Brewer et al (2000) find a positive association between banks' commercial and industrial (C&I) loan growth and interest rate derivative use.

Several studies consider the use of derivatives and its effect on bank capital and they come up with mixed results. While Shao and Yeager (2007) argue that both protection buyers and sellers increase their capital holdings significantly, Minton et al (2009) argue that net protection buyers saves capital by purchasing such credit protection. Ashraf et al (2005) also suggest that the participating banks of credit derivatives hold less capital in their portfolio. Cabenoyan and Strahan (2001) state that banks that use loan sale as a credit risk transfer tool hold less capital. Carter and Sinkey (1998) present a study on the end users of interest rate derivatives and find a strong correlation between the end users of interest rate swaps and bank capital. Previous studies also examined the link between bank capital and loan rates that banks charge to their borrowers. Santos and Winton (2009) find that banks with low capital charge a higher rate to their borrowers with low cash flow, but provide a great discount to their clients with high cash flow.

3.3 Credit risk transfer instruments

Benendo and Bruno (2009) investigate the characteristics of banks using deferent types of credit risk transfer instruments. His study concludes that banks with riskier loan portfolios, liquidity constraints and higher asymmetric information prefer to sell or securitize loans. In addition, large, well-capitalized and internationally active banks with less risky portfolio and

lower profitability have a preference for credit derivative protection. Minton et al (2009) claim that banks that are using other credit risk management tools, such as loan sale and securitization, are also the net buyers of credit derivative protection. Additionally, the paper provides some of the reasons why banks are less active towards loan sales market where they can completely remove the credit risk from their balance sheet. In one side, lemon problem in the loan sale market inspire banks to stay away from the loan sales. On the other hand, relationship banking motivates banks to purchase protection and keep loans on their balance sheet. If loans are sold, the relationship between the originator of the loan and the borrower would be completely shifted to some other party. The author argues that if the relationship is shifted to some other party, the borrower might face difficulty with the lender if the lender has less experience with the borrower. Moreover, the lender might lose some future benefits from the borrower or would lose the implied commitments of relationship based lending. The paper states that the relationship based lending plays an important role in C&I loans, agriculture loans and foreign loans. However, it does not seem to be an important component in small loans like mortgages, retail loans and credit card loans.

When comparing the characteristics between the participants of loans sale market and the net buyers of credit derivative instruments, Benendo and Bruno (2009) find that loan sales or securitization markets are preferable to credit derivative markets when banks suffer from higher credit risk, higher liquidity constraints and contain more loans in their portfolio. However, credit derivative instruments are more favourable for banks with higher capital, more C&I loan and with more involvement in trading activities.

3.4 Users and nonusers of derivatives

Prior Studies have investigated the usage of financial derivatives for hedging purposes and the characteristics of users and nonusers of derivatives (Shanker (1996), Carter and Sinkey (1998)). Shanker (1996) shows that banks are effectively using derivative securities for hedging purposes. Sinkey and Carter (2000) find that users of interest rate contracts, foreign exchange contracts, equity contracts and commodity and other derivatives contracts among US commercial

banks are on average 50 times larger than nonuser commercial banks. These user banks have higher interest rate risk, higher loan charge offs, more notes and debentures but contain less equity capital and have lower net interest margin. Brewer et al (2000) argue that banks that are participants of interest rate derivative market increase commercial and industrial lending more than banks that do not participate. The study also investigates if the use of interest rate derivatives has a relationship with bank failure and do not find any association. This concludes that the interest rate derivative use do not increase banks' risk level. The conclusion also supports the finding by Ahmed et al (1997), who state that the users of interest rate derivatives have lower accounting interest rate risk exposure. Purnanandam (2006) argues that derivative usage reduces the cash flow volatility of banks because the need to adjust lending or borrowing activities is much less for user banks than is for nonuser banks. So, the impact of monitory policy is much less for user banks as opposed to nonuser banks. Minton et al (2009) argue that net buyers of credit protection are less profitable, less likely to hold more capital. Moreover, the paper also suggests that if banks have higher deposit and higher liquid assets they are less likely to be the net buyers. These buyers contain less agricultural loans but they hold more C&I loans in their portfolio.

3.5 Integrated risk management

Numerous studies examine the coordinated risk management activities of banks (Carter and Sinkey (1998), Miller (1998), Drehmann (2008) and Jarrow et al 1998). Among these papers, there is a general conclusion about the necessity for integrated risk management. Using net loan charge off as a proxy for credit risk, Carter and Sinkey (1998) find support for the hypothesis that banks facing significant amount of credit risk in their portfolio use derivatives to manage other risks, particularly interest rate risk. Jarrow et al (2000) use an empirical analysis to look at both Merton's risky debt model and traditional fixed income approach in pricing and hedging corporate debt and finds the need for a newer model which will include both interest rate risk and credit risk for the enterprise wide risk management. Drehmann (2008) provide a general framework to assess the joint impact of interest rate risk and credit risk and also come up with

the same conclusion that it is essential to jointly assess the interest rate and credit risk for a complete risk management.

Numerous researchers have studied the association between banks' risk and net interest margin. Ho and Shunders back in 1981 examine the relationship between interest rate risk and banks' net interest margin. Angbazo (1997) extends the work of Ho and Shunders (1981) and investigates the reflection of default risk and interest rate risk on banks' net interest margin. His study concludes that while default risk significantly affects net interest margin of money centre banks, interest rate risk affects the net interest margin of super regional and regional banks. Wong (1997) shows that the net interest margin reacts positively to operating cost, regulation, interest rate risk and credit risk.

3.6 The Downside of Credit Derivative Use

While many previous studies focus on the characteristics of user banks and their lending behaviours, some other studies focus on the downside of using credit derivatives. As suggested by Morrison (2005), when banks insure themselves by purchasing credit default contracts, they are less likely to monitor borrowers' creditworthiness. Duffee et al (2001) and Minton et al (2009) state that the moral hazard and adverse selection problem related with the credit derivatives corresponds to a limited use of this instrument. In addition, credit derivative market can adversely affect other markets for risk sharing. For example, Duffee and Zhou (2001) state that the introduction of credit derivative market can alter investors' expectation about the quality of loan sold in the loan sale market. So, banks entering into credit derivative market, along with the asymmetric information problem can cause loan sale market to break down. In this case, the credit derivative market might not always be beneficial for financial institutions.

More recently, positive view of the use of credit derivatives has been criticized in many studies (Instefjord, 2005, Duffee and Zhou, 2001, Morrison, 2005) and the improper usage of credit derivative has been blamed for being partially responsible for recent subprime credit crisis (Minton et al, 2009). Instefjord (2005), for example, investigates whether the innovation of credit

derivative market destabilizes banking sectors and concludes that the credit derivative market enhances banks' risk taking behaviour. The paper also suggests that credit derivatives not only enhance risk sharing but also attract further acquisition of risk. Hence, there is a potential treat to banks' stability if the second effect dominates. Wagner (2007) also questions the stability of banking sectors and finds that credit derivative instruments enhance liquidity in normal and crisis times. But, the increase liquidity potential in crisis time reduces banks motivation to avoid a crisis. This encourages banks to take on additional risk, which leads to a higher probability of default. Morrison (2005) states that credit derivative market can reduce welfare by causing disintermediation in the market. He also recommends that the reporting requirement for credit derivatives can overcome this problem. Duffie (2008) argues that when a bank transfers its credit risk exposure it has less incentive to monitor borrower's creditworthiness, to control borrowers risk taking and to exit the relationship with borrowers when needed.

Cebenoyan and Strahan (2001) conclude that credit derivatives, as advanced risk management practices are likely to improve the availability of credit but not to reduce bank risk. Some recent studies explore the impact of credit derivatives on loan pricing. Nordan and Wagner (2008), for example, observe empirically if credit defaults swap (CDS) market has an impact on the rates charged by banks on new loans. There study finds that the credit default swap spread, the price on credit derivative, has a strong positive correlation with the pricing of new syndicated loans and that the CDS spread explains about 25% of subsequent monthly changes in aggregate loan spread between the period 2000 to 2005.Marsh (2006) studies the impact of the announcements of new loans in the equity market when lenders are active in the credit derivative market. He shows that the equity markets react less to the loan announcements when credit derivative is actively used in banks.

CHAPTER 4
HYPOTHESES

There has been a tremendous growth of the market for credit derivatives. Even though the number of BHCs using credit derivatives is small, the notional amount of the usage of CDs by these BHCs is enormous. We propose that some BHCs use credit derivatives to hedge credit risk exposure, while others sell CDs to generate additional fee income. Also, some BHCs actively trade credit derivatives and play the role of market makers. One objective of this study is to examine the loan pricing behaviour of users and nonusers of credit derivatives. In addition, we compare the loan pricing behaviour of the users of credit derivatives during the years when they report CDs and during years when they do not report CDs.

4.1 Determinants of the contractually promised return on loans

According to the loan-pricing model (Saunders et al. (2009)), the determinants of banks' loan rates include loan origination fees, the base-lending rate which serves as a proxy for the cost of funds, compensating balance requirement imposed by the Central Bank, and the credit risk premium. Formally, the gross return on a loan can be expressed by the following equation:

$$1+k = 1+ p_m + [f_a + (B_r +m) / 1-[b(1-R_r)]]$$

where k denotes the contractually promised return on the loan per dollar lent, P_m denotes the profit margin, f_a represents the application and other fees charged to the borrowers, B_r denotes the base-lending rate, m denotes the default risk premium, b represents the compensating balance requirement as a percentage of the loan amount that is noninterest bearing and is kept within the bank, and R_r denotes the reserve requirements imposed by the Central Bank on financial institutions' demand deposits. The base-lending rate, which represents a financial institutions' weighted average cost of capital used in a loan, and m, the default risk premium are the major determinants of loan prices. The credit risk premium is an important factor that affects the promised return on a loan. If the credit risk is high, banks usually charge a higher risk premium or margin (m) in order to compensate for the default risk.

The major goal of this study is to determine the relation between loan prices, measured by the interest and fee income per dollar of loans, and the use of credit derivatives at BHCs. We expect that if all else are equal, BHCs that use credit derivatives for hedging should be able to lower their loan prices, as the default risk component of the expected return on loans would be low. Thus, if the users of credit derivatives are hedging credit risk their risk premiums must be lower in comparison to non-users. However, if these BHCs use credit derivatives to book and hedge higher risk loans that they would not book without CDs then their loan rates and the riskiness of their portfolios will be higher in comparison to the nonusers. In this case, we will find a positive relation between CDs use and loan prices and default risk. Moreover, it is also possible that there will not be any association between the purchase of CDs and BHCs loan pricing. If BHCs purchase CDs protection only to manage the excessive risk they have taken but do not demand a higher loan rate, we would find no significant association between the two.

In contrast, we propose that the relation between loan prices and CDs sold should be negative or insignificant depending on the circumstances of the BHC. A BHC may sell credit derivatives to another BHC if its loan portfolio is low risk. This action is appropriate when the BHC is comfortable with a given level of default risk but, for some reason or another, its loan portfolio's default risk is better than expected. Under this scenario, the average loan rate would be low and the BHC would be trying to increase income from selling protection to BHCs that have high default risk. In this case, the BHC would be reporting high level of CDs sold to others and low income per dollar of loans. On the other hand, a BHC may sell credit derivatives to another BHC as part of a speculative strategy to generate additional income. Under this scenario, the BHC's average loan rate would be similar to the rate observed at other BHC of the same default risk profile. In this case, the BHC would be reporting high level of CDs sold to others and perhaps high return on assets but the income per dollar of loans would not be different from the comparable rate at nonuser BHCs.

Another goal of our study is to find, for both users and non-users of credit derivatives, how the interest and fee income generated by the BHCs is affected by the risk of default of their clients. We hypothesize that when banks make risky loans, they will pass the cost of defaults to the borrowers by increasing the default risk premium on all loans of the same risk class.

A third goal of this study is to investigate whether the use of CDs affects the supply of funds or loan rates differently for different types of loans banks hold in their portfolios.

In summary, our hypothesis may be stated as follows:

Hypothesis 1: The relation between a BHCs interest and fee income per dollar of loans and the level of credit derivatives used for hedging is negative

Hypothesis 2: The relation between a BHCs interest and fee income per dollar of loans and the level of credit derivatives sold is negative

Hypothesis 3: The relation between a BHCs interest and fee income per dollar of loans and the level of default risk in the BHC's portfolio of loans is positive

Hypothesis 4: Credit derivatives allow BHCs to make riskier loans to real estate, consumer, commercial and industrial, agricultural, and foreign loans.

4.2 Determinants of the interest and fee income per dollar of loans

Credit Risk

Credit risk is an important determinant of loan pricing for BHCs. Brewer et al (2000) state that the net loan charge off, a measure of loan quality, is a sign of a bank's financial strength. Previous studies (Brewer et al (2000) and Sharpe and Acharya (1992)) find a significant and negative relationship between C&I loan charge off and C&I loan growth. On the contrary, we look at the association between credit risks, a measure of loan quality, and its effect on the loan pricing. The higher the default risk a bank faces, the higher should be the risk premium a bank would charge to its borrower. So, the price of loans should also be higher.

Credit Derivatives

We are mainly interested to find out whether the use of credit derivatives enables banks to charge a lower rate to their borrowers. Nowadays, banks are able to manage their loan portfolio more efficiently with the use of credit derivatives. Credit derivatives provide a new source for banks to generate fee income by engaging in trading activities and also enable banks to reduce regulatory capital (Shao and Yeager, 2007). According to Minton et al (2009), the net buyer of credit instruments holds more C&I loans and originate foreign-denominated loans. Also suggested by Brewer and Moser (2000), banks experience a greater growth in commercial and industrial (C&I) loan portfolio when they are active participants in the interest rate derivative market. Our objective is to analyze the interest and fee income that banks generate from the loans. Norden and Wagner (2008) state that there is a strong connection between the prices for credit default swap (CDS) and the loan rates charged by banks as they are both driven by credit risk. They argue that since the price of CDS corresponds to the cost of hedging loans, it should directly affect loan rate. However, the paper also mentions about the possibility of an inverse relationship between the two due to the occurrence of relationship banking. We estimate that the users of credit derivatives generate lower interest and fee income per dollar of loan than the banks that are not involved in the credit derivative market. Banks can charge a lower price on loans when they buy credit derivatives and hedge the credit risk. Banks can also generate a lower interest and fee income during the years they sell CDs because banks can only afford to sell CDs when they have low risk in their portfolio. They sell CDs in those years because they are better able to manage the risk of other banks that have a high-risk profile.

Size

Bank size is an important determinant of loan pricing. Large banks can diversify their portfolio in several other activities and thus lower the overall bank risk. If the risk is lower, the risk premium charged on banks' loans should also be lower. Previous literatures find bank size to be a key driver behind the participation in the credit derivative market. The use of credit derivative is more intense for large firms because of the fixed cost involved in the usage. If large banks use more credit derivatives to hedge credit risk exposures from bank loans, banks can

lower the loan rate to their customers in order to compete in the market. In addition, large banks are now active participants in CDs trading. If a big portion of banks' revenue comes from trading activities, banks can afford to charge a lower rate to compete in the market. We expect a negative relationship between the bank size and loan rate.

Non-interest income

Noninterest income has gained popularity in recent years and a significant portion of banks revenue has been achieved through the noninterest income (Rogers, 1998). Previous literatures have focused on the relationship between interest income and noninterest income and find a positive correlation between the growth rates of the two (Stiroh, 2002, Young and Rice, 2004). Stiroh (2002) questions if the reliance on noninterest income leads to lower risk and higher profitability for banks. His results find limited support towards the argument that noninterest income has higher profitability. Moreover, he argues that noninterest income is more volatile than interest income. Trading activities is found to be the most volatile noninterest income and also is the most important factor in driving the profits down. Using the return on asset (ROA) as a measure of profitability of commercial banks in Barbados, Maxwell et al (2005) states that noninterest income has a positive impact on banks' profitability but it also increases earnings volatility. This finding is also consistent with earlier study by (Young and Rice, 2004) who find that the noninterest income has a positive relationship with profitability and earning volatility. The authors also argue that banks that focus more on customer relationship and service quality generate more noninterest income. The positive association between noninterest income and the loan rate suggests that as banks generate more noninterest income by providing more qualitative services and thus are able to maintain a good relation with their customers and thus are able to generate a higher interest income. A negative association would suggest that as banks increase their noninterest income, they provide a cheaper loan rate in order to compete in the market.

Bank Capital

We also investigate the role of bank capital and its influence on loan pricing. Past literatures argue that banks' equity capital level should affect bank's lending behaviour.

According to Boot, Greenbaum and Thakur (1993), banks with low capital tend to make use of their borrowers by sacrificing reputational capital in order to preserve financial capital. In addition, Diamond and Rajan (2000) and Santos and Winton (2009) study how bank capital affects the loan rates that banks charge to their customers and conclude that banks with low capital are more focused on borrowers' cash flow than banks with high capital. The loan rate that these banks charge to their borrowers with low cash flow is relatively high than they charge to borrowers with high cash flow; however low capital banks offer greater discounts to borrowers with higher cash flow. Hubbard, Kuttner and Palia (2002) find that banks with low capital charge higher rates to borrowers with higher switching costs. Consistent with the previous literature, we expect that banks with sufficient capital should offer a lower loan rate and banks with inadequate capital should charge a higher loan rate. Moreover, if the net buyers of CDs lower their capital level, they can pass this additional benefit to customers in terms of lower loan rates.

Interest rate risk and interest rate derivative

Interest rate risk is the most common type of risk that arises in the banking industry. Banks behaviour in lending long and borrowing short exposes them to interest rate risk (Ashraf et al 2005). Interest rate risk and interest rate derivative can also impact the loan pricing. Even though they might not influence loan pricing directly, there can be indirect effect. In recent times, many researchers have looked the interest rate risk and credit risk jointly. This is because the unexpected rise in the interest rate risk can cause borrowers inability to repay the loan. If the interest rate risk increases, the probability of default increases and thus interest income from loan decreases. Thus we expect a negative relationship between interest rate risk and interest income per dollar of loan. Moreover, interest rate derivative is a hedging instrument for interest rate risk. If banks use interest rate derivative to take precaution against interest rate risk, interest rate risk would reduce which would therefore increase the interest income and fee income. Thus, the relationship between interest rate derivative and interest and fee income per dollar of loans is expected to be positive.

CHAPTER 5
DATA, VARIABLE DESCRIPTION AND METHODOLOGY

In this chapter we describe the data collection process, methodology used in our study and how we construct the variables.

5.1. Data:

We collected our data from the Federal Reserve Bank of Chicago website. We use the dataset Consolidated Financial Statements for Bank Holding Companies (FR Y-9C) to calculate bank specific characteristics. Our sample contains data of the BHCs for each of the year from 1997 to 2008. The FRY-9C publishes BHC financial data quarterly, as of the last calendar day of March, June, September and December. In this study, we use the fourth quarter information as it contains the most complete information. The reason we start our study period from 1997 is that the FRY-9C starts to report information on the notional amount of credit derivatives from the year 1997.

We face several challenges while assembling our final data set. First, we find many BHCs containing missing information on asset size. We drop these observations from our sample. Second, we sometimes find that an item number of a particular variable changes from previous years and sometimes the dataset completely stops reporting a variable after several years of reporting it. Third, we come across a situation where we saw that one variable has two different but very similar names in a particular year but contains the same accounting information. When we check the data we find that one has only a few values reported and the rests are reported as zero or missing. However, the other one has almost all values reported. We manage such situations by choosing the variable with the maximum number of values reported.

Credit derivatives information is also obtained from the FRY-9C reports. In general, credit derivative contracts are bilateral contracts between two parties, which allow one party, the beneficiary, to transfer credit risk of a loan or a financial asset to the other party, the guarantor.

Beneficiaries are the protection buyers and the guarantors are the insurers of credit protection. FRY-9C reports the notional amounts of each type of credit derivatives starting in 1997. Starting in 2002, FRY-9C also includes the gross positive or negative fair values of all credit derivatives into the report. Consistent with previous studies we use the notional values. As stated by Shao and Yeager (2007), the notional values are used, as more data is available due to the longer time series. In addition, a significant disadvantage of using fair values is that the contract's value could fluctuate from quarter to quarter, which makes it difficult to identify the original purpose of using the credit derivative.

The FRY-9C reports also separate both the notional amount and fair values of CDs by the way they are used by the BHCs. The notional amounts or the fair values are reported under 'purchased protection' if the BHCs purchases credit protection and under 'sold protection' if the BHCs sells credit protection.[4]

The credit derivatives included are credit default swaps, total return swaps, credit options and other credit derivatives. For the 1997-2005 period, the FRY-9C database reports a single item for the beneficiaries of the notional amounts of all credit derivatives. For these years, we use the single reported item as the total position in CDs. After 2005, the report starts the practice of providing information on the notional amount of each credit derivative separately. For 2006 and later years, we measure the total exposure to CDs as the sum of all individual credit derivatives purchased.

After compiling the final dataset, we end up with 20,240 US BHC observations. Table 1 shows how credit derivatives are used by BHCs over the years. The table provides information on the number of banks using credit derivatives as buyers, sellers, and users of both (buyers and sellers). In addition, the table reports the number of banks not using credit derivatives in each of the years in our sample. In particular, we classify a bank as a CDs buyer in a particular year if for that year the BHC purchases credit derivative protection but do not sell any CDs protection.

[4] In its 2010 financial statements, Citibank states "Citigroup generally has a mismatch between the total notional amounts of protection purchased and sold and it may hold the reference assets directly, rather than entering into offsetting credit derivative contracts as and when desired. The open risk exposures from credit derivative contracts are largely matched after certain cash positions in reference assets are considered and after notional amounts are adjusted, either to a duration-based equivalent basis or to reflect the level of subordination in tranched structures"

Similarly, we classify a BHC as a CDs seller in a particular year if for that year the BHC sells credit derivative protection but do not buy any CDs protection. We classify a BHC as a CDs buyer and seller in a given year if for that year the BHC is reporting a position as seller and simultaneously reporting a position as a buyer. Finally, we classify a BHC as a non-user if this BHC neither buys nor sells credit derivatives.

[Insert Table 1 here]

As previously stated by Minton et al (2009), a small number of banks use credit derivatives. From Table 1, we can see that although the number of banks using credit derivatives has increased over time from 19 banks in 1997 to a total of 35 banks in 2008, the total number is still small. Starting from the year 2000 to 2006, the number of protection buyers is higher than the number of protection sellers. Also, the number of banks that hold positions as both guarantors and beneficiaries is higher than the number of banks holding positions as either guarantors or beneficiaries. We also observe that starting from 2006, there has been a significant drop in the number of user and nonuser banks. This is because of the change in the reporting requirements of FRY 9C. Before 2006, BHCs with total consolidated assets of $150 million or more were required to file the FRY-9C information. Starting from 2006, the total consolidated asset size requirement has been increased to $500 million or more. So, prior to 2001 a large number of smaller banks were exempt from reporting the FRY-9C information. The graphical representations of the number of banks involved in buying, selling and both are shown in figure 5, 6, and 7 respectively.

[Insert figure 5 here]

[Insert figure 6 here]

[Insert figure 7 here]

First, we divide our dataset into two samples. The first sample (non-users group) consists of the group of BHCs that did not use credit derivative in the entire twelve years period. We find 18,942 BHCs observations in twelve years period. From this sample, we separate the largest 100

non-user banks of each year and compile a subsample of total 1200 BHC observations. We use this sample (non-users) for our analysis.

Our second sample includes those BHCs that use credit derivatives at least once in twelve years. These BHCs can use credit derivatives as buyers, as sellers or as buyers and sellers. We call these BHCs CD-active. We get total 815 banks in this sample. We find that a few BHCs in this sample did not use credit derivatives for the first few years and then start to use them in future years. Similarly, few BHCs in that sample use CDs in the first few years but stop using them after a few years. From the available information, it is not possible to find out the reason .To solve this issue, we include observations of each BHCs from the year they start using credit derivatives. After these BHCs gain the capacity to use credit derivatives, they switch their positions from buyers to sellers (or vise versa) and in some years just they do not participate in the CDs market at all. So, we limit our sample to only those banks that achieve the capability to use CDs and yield a total of 518 BHC observations (users group).

Table 2 shows a sample of randomly selected fourteen banks from the users group. We can identify these banks by their entity numbers. The shaded area shows the time from when BHCs gain the capacity to use credit derivatives and thus the area represents the sample of our users group. Also, we can see from the table that after BHCs start using credit derivatives, they often flip their positions.

[Insert Table 2 here]

5.2 Variable Construction

Dependent Variable

We use the interest and fee income from loans divided by total loans as a proxy for loan pricing or for the rate of return per dollar of loans. FRY-9C reports the interest and fee income on loans in two categories. They are interest and fee income on loans 1) in domestic offices and

2) in foreign offices, Edge and Agreement subsidiaries and IBFs. We add these two categories into our calculation and divide it by total loans.

Test Variables

To test for the effect of credit risk on banks' rate of return per dollar of loan, we use five different measurements of credit risk. First, we use the net charge offs (NCO) as a proxy for credit risks. The net charge off is the ratio of the year-end outstanding amount of charge-offs less recoveries divided by total loans. Charge-off on loans and leases represents the amount that is charged off against the allowance and recoveries represent the amount that is credited to the allowance for collections on loans and leases previously charged against the allowance. The charge off (NCO) ratio has been used by previous studies to proxy for credit risk (Bedendo and Bruno, 2009; Angbazo, 1997; Ashraf and Altunbas, 2005; Sinkey and Carter, 2000). Moreover, Angbazo (1997) uses three other measures as indicators of default risk. These are the allowance for loan and lease losses on the balance sheet, non-performing asset, and provision for loan and lease losses on the income statement. Based on his measurement, we use the variable ALL, the ratio of the allowance for loan and lease losses to total loans to proxy for default risk. Each BHC must maintain an allowance for loan and lease losses in their balance sheet to compensate for the credit losses from loans and leases. Another proxy we use for credit risk is NPL, the ratio of non-performing assets to total assets. The BHCs report loans as nonaccrual if the loans (either the principle or interest) are in default for a period of 90 days or more. If the ratios NCO, ALL or NPL are high for a bank, we can say that this bank has a lower quality loan portfolio. Following previous literatures, we also use the ratio RWA, the risk weighted assets divided by total assets, as another alternative measure of credit risk. As suggested by Ashraf et al (2005), if the risk weightings correctly represent the economic risk of asset categories, risk weighted assets should correctly reflect a banks' risk taking behaviour. Finally, we use the variable, LLP, the provisions for loan and lease losses divided by total loans as another proxy for credit risk.

In order to investigate the relation between the amount of credit derivative usage and BHCs loan pricing behaviour, we create a variable, CD_VOL, to measure the amount of credit derivative usage. CD_VOL for a BHC is determined as the difference between the notional

amount of CDs for which the BHC is the buyer of credit protection and the notional amount of CDs for which the BHC is the seller of credit protection, divided by total loans.

We explore the relationship between several loan types and their effect on loan pricing in the presence of CDs. We measure C&ILN, the commercial and industrial lending activities, by adding the C&I lending to US and non US addresses and scaled by total loans. Consumer lending, CNSMRLN, is calculated by adding the credit card loans, all other credit provided by BHCs for household, family and other personal expenditures not accessed by credit cards and all other consumer loans such as student loans, single payment and instalments and scaled by total loans. Real estate loans, RLESTLN is the ratio of loans secured by real estate to total loans. AGLN is the agricultural loans. We take the ratio of loans secured by agricultural production and all other loans to farmers to total loans. FRGNLN is the ratio of loans to foreign governments and official institutions to total loans.

Control Variables

The variable CAP measures the capitalization of banks and is calculated by total equity capital to total asset. We use SIZE to control for bank size. In line with previous studies, we use the log of total asset as a measure of a BHC's size.

The variable GAP12 measures interest rate risk and it is used to examine the effect of interest rate risk on banks' loan rate. Following previous literature, we calculate the dollar value of GAP12 as:

Dollar Gap = Earning assets that are repriceable within 1 year or mature within 1 year

- Interest-bearing deposit liabilities that reprice within 1 year or mature within 1 year
-Long-term debt that reprices within 1 year
- Variable rate preferred stock
-Long-term debt that is scheduled to mature within 1 year
- Foreign office time deposits with a remaining maturity of 1 year or less.

Then, GAP12 is determined as the ratio of Dollar GAP12 to total assets. However, with the available information from FRY-9C, we can only calculate the short-term interest rate risk.

The variable, IRD, which is the ratio of interest rate derivatives used for purposes other than trading to total assets, captures the relationship between interest rate derivatives and loan rates. Interest rate derivatives is reported in FRY-9C as the total gross notional amount of interest rate derivative contracts held for trading and held for purposes other than trading. Following previous studies, we use the item 'contracts held for purposes other than trading' as interest rate derivatives used for hedging purposes. There is no way for us to separate the non-trading activities between hedging and speculation. Until December 2000, the FRY-9C database reports the item derivatives used for non-trading purposes in two subsections: derivatives that have been marked to market and derivatives that have not been marked to market. From the year 2000 and onwards, the above subsections are no longer available and the entire amount is being reported as one item. In order to be as accurate as possible in our measurements, we take the sum of the two subsections of the earlier periods (1997-2000) and treat this sum to be equivalent to the item 'contracts held for purposes other than trading' for the period starting from 2001.We scale the variable interest rate derivatives used for hedging by total assets to calculate the ratio, IRD.

We also measure NONINT, the ratio of non-interest income to total asset in order to capture the effect of non-interest income on banks' rate of return per dollar of loans. Non-interest income includes income from items such as fiduciary activities, trading revenue, investment banking, advisory, brokerage, and underwriting fees and commissions, venture capital revenue, net securitization income, and insurance commissions and fees. Finally, we add year dummies for each of the years from 1998 to 2008, holding 1997 as the base year.
Table 3 shows the definition of each of the variables we use in our study.

[Insert Table 3 here]

5.3 Methodology

We use linear regression to test the relationship between loan pricing and default risk. The model may be stated as:

$Loan\_int_{it}$ =	$\beta_0 + \beta_1 NCO_{it} + \beta_2 SIZE_{it} + \beta_3 NONINT_{it} + \beta_4 GAP12_{it} + \beta_5 INTRD_{it} + \beta_6 CAP_{it} + YEAR_{it} + \varepsilon_{it}$	(1)

Where $Loan\_int_{it}$ = interest and fee income per dollar of loans of bank i at time t

NCO_{it} = net charge off by total loans of bank i at time t

$SIZE_{it}$ = log of total assets

$NONINT_{it}$ = noninterest income by total assets

$GAP12_{it}$ = net short term assets/ total assets

IRD_{it} = interest rate derivative contracts held for purpose other than trading divided by total assets

CAP = total equity capital/ total assets

$YEAR_{it}$ = year dummies for each of the years from 1998 to 2008

We also investigate whether interest and fee income on loans also depends the type of loans banks hold into their portfolio. Shao and Yeager (2007) argue that the protection buyers provide more commercial, real estate, and consumer loans but less mortgage loans. However, protection sellers do not experience significant change in their loan portfolio. Furthermore, Minton et al (2009) argues that the net buyers of credit default contracts hold more C&I loans and foreign loans but hold less agricultural loans. We consider C&I loans, consumer loans, real estate loans, agricultural loans, and foreign loans in our study and explore the relationship between these loan categories and their effect on banks' loan pricing behaviour.

The second model in our study is as follows:

$$Loan\_int_{it} = \beta_0 + \beta_1 NCO_{it} + \beta_2 RLESTLN_{it} + \beta_3 C\&ILN_{it} + \beta_4 CNSMRLN_{it} + \beta_5 FRGNLN_{it} + \beta_6 AGLN_{it} + \beta_7 SIZE_{it} + \beta_8 NONINT_{it} + \beta_9 GAP12_{it} + \beta_{10} INTRD_{it} + \beta_{11} CAP_{it} + YEAR_{it} + \varepsilon_{it} \quad (2)$$

Where $RLESTLN_{it}$ = loans secured by real estate / total loans

$C\&ILN_{it}$ = commercial and industrial loans/ total loans

$CNSMRLN_{it}$ = consumer loans/ total loans

$FRGNLN_{it}$ = foreign loans / total loans

$AGLN_{it}$ = agricultural loans/ total loans

All other variables are as defined in Equation (1).

We test for the relation between the amount of credit derivative usage and interest and fee income per dollar of loans. We apply the following regression model:

$$Loan\_int_{it} = \beta_0 + \beta_1 CD\_VOL_{it} + \beta_2 NCO_{it} + \beta_3 RLEST_{it} + \beta_4 C\&I_{it} + \beta_5 CNSMR_{it} + \beta_6 FRGNL_{it} + \beta_7 AGL_{it} + \beta_8 SIZE_{it} + \beta_9 NINT_{it} + \beta_{10} GAP12_{it} + \beta_{11} INTRD_{it} + \beta_{12} CAP_{it} + \beta_{13} YEAR_{it} + \varepsilon_{it} \quad (3)$$

Where CD_VOL_{it} = (CDs beneficiary – CDs guarantor) / total loans

For all above models, we apply the five different measures of credit risk that are described earlier.

CHAPTER 6
RESULTS

This chapter presents results of the empirical analysis corresponding to the loan pricing behaviour of the users and the non-users of credit derivatives.

6.1 Summary Statistics, t stats and correlations:

Table 4A and 4B present's summary statistics related to the users and non-users groups respectively. Table 5 shows the descriptive statistics for several variables and compares the results between users and non-users. The summary statistics of the users group is based on total 463 Bank Holding Companies fourth quarter observations from the period 1997 to 2008. The total number of BHC observations for the non-users group is 1007. We can see from tables 4A and 4B that on average, interest and fee income per dollar of total loan is higher for the nonusers of credit derivatives than the users. Interest and fee income on loan (loan_int) is on average 6.3% of total loan for the users and 6.9% of total loan for the non-users of credit derivatives. The difference is also statistically significant at 1 percent significant level. The figures tell us that users of credit derivatives have well diversified portfolio and they also generate income from other non-traditional sources. The users BHCs are also significantly higher than the nonusers. In addition, if we observe the loan ratio (total loan/total asset) of the two groups, we see that the nonusers have significantly higher loan ratio than the users. So, nonuser banks are more oriented towards the traditional lending activities. Minton et al (2009) find that net buyers of CDs have significantly lower loan ratio than all other banks that are non-participants of credit derivatives. Benendo et al (2009) also suggest that the net buyers have significantly lower loan ratio than other banks that participate in the loan sale/ securitization process to transfer credit risk. Net charge off (NCO) between the users and nonusers group is not statistically significant. However, we notice that the minimum value for the NCO is negative which suggests that recoveries from previous bad loans are higher than the charge offs in some years. Non-users of credit derivatives also obtain more on balance sheet hedging by holding more allowance for credit losses per dollar of total loans.

[Insert Table 4A here]

[Insert Table 4B here]

As seen from table 5 that on average, users have .85% of total loan in the form of allowance. However, nonusers have on average .98% of total loan in form of allowance. The difference between the average of the two is statistically significant at 1% significance level. The twelve-month maturity mismatch between short term assets and liabilities is not statistically different between the two groups but the interest rate derivative use for purpose other than trading is significantly higher for the users than the non users.

[Insert Table 5 here]

The result supports the argument made by Hirtle (2009) who state that the use of credit derivatives is complementary to other forms of financial derivatives used by banks. The results can also indicate the risk taking behaviour of banks. Since both groups of banks have the similar exposure of interest rate risk but the user banks have a lot more interest rate derivative contracts in their portfolio, they might be using interest rate derivative contracts to speculate. We also find that the users of credit derivatives have significantly lower capital holdings. The capital holding is on average 8.3% of total asset for the users but the average is 9.6% for the non-users. This finding is consistent with the notion that the users of CDs have lower capital requirement. Users substitute the expensive capital with credit derivatives. If we look at the loan categories of the two groups, we observe that both groups have the highest exposure in real estate loans and the lowest exposure in the foreign loans. Consistent with previous studies by Minton et al (2009) and Benendo et al (2009), we also find that users of CDs hold significantly higher commercial & industrial loans and foreign loans in their portfolio. We also find that the non-user banks hold significantly higher consumer loans, real estate loans and agricultural loans. Our finding is consistent with previous literatures that conclude that the credit derivative buyers hold more risky loans since they are better capable of managing these loans.

Table 6A and 6B shows the correlations among all variables used in our study for the user and non-user group respectively. We do not see any concern related to the correlations between several variables.

[Insert Table 6A here]

[Insert Table 6B here]

6.2 Regression results

We present our empirical findings in this section. Our dependent variable is the interest and fee income per dollar of loan (loan_int), which we can also state as loan pricing. Our motive is to analyze the relationship between the use of credit derivatives and its effect on the interest and fee income per dollar of loans.

6.2.1 The relation between interest and fee income per dollar of loans and default risk, and loans to various categories

Table 7A and 7B analyze the relationship between the risk of default, as measured by five risk variables in regression model (1) through model (5), and the price on loans. Overall, the results of table 7A suggest that the users of credit derivatives, after they start using CDs, on average charge a higher price on loans as the risk of default increases. The coefficients for credit risk variables are significant and positive at 1% significant level in all five models. The result explains our third hypothesis that suggests that the interest and fee income per dollar of loans or the loan price is positively related with the risk of default. The relation between loan price and credit risk is positive supporting the fact that the higher the risk associated with banks lending, the higher the risk premium charged to the loan price in order to compensate for the additional risk that the banks carry on their book. After including several loan categories into the regression model in table 7B, the relationship between loan price and the default risk is still unchanged. In table 7B, we also test whether the types of loans user banks make also affects the loan pricing. Throughout all five models we find that, as banks increase their lending in real estate, commercial and industrial (C&I), consumer and agricultural sectors, their interest and fee income also increase. In other words, CDs users banks charge a higher price to real estate, C&I,

consumer and agricultural loans relative to institutional and all other loans. The result explains our final hypothesis.

In both tables, 7A and 7B, size is found to be negative and significantly related to loan price. The results indicate that the smaller banks charge a relatively higher price on loans. As the size of banks increases and thus the portfolio becomes well diversified, banks can afford to charge a lower rate on loans to borrowers. We also find a negative relationship between GAP12 and loan price. On average, we see that the GAP12 is positive (from table 4A). So, if the maturity gap is positive and the relationship between the two is negative, it means that the interest rate decreases over the time period. If interest rate increases but still we find the interest income decreases, that suggests banks use of interest rate derivative for hedging purpose. We find the coefficient for interest rate derivative is positive and significant but we didn't find any significant relationship with banks capital and loan pricing.

[Insert Table 7A here]

[Insert Table 7B here]

In the next two tables, table 8A and 8B, we analyze the group of BHC observations who did not use credit derivatives in the twelve year sample period (non-users). Table 8A presents regression results testing the relationship between interest and fee income per dollar of loans and default risk. We find similar results that we find in the user group. The higher the default risk, the higher the price banks charge to their clients. The positive relationship between the two in both user and non-user groups suggests that banks are risk averse in general when pricing loans. We add the loan categories into our regression models in table 8B (non users group). We find that nonusers charge a significantly higher price to consumer loans (except for model 2 where we use risk weighted asset as a proxy for credit risk) and agricultural loans but charge a significantly lower price to foreign loans (except for model 4 where we use allowance as a measure of default risk). If we look back to table 4B, the bank specific characteristics of the non-users, we notice that this group of banks has the lowest investment in foreign loans. So, it can be possible that they are choosing the safest foreign clients or it is also possible that the cost of funds for these

foreign loans is lower. Finally, noninterest income (NONINT), interest rate risk (GAP12), interest rate derivative (INTRD) and capital do not seem to have a significant impact on bank loan pricing for the non users of credit derivatives.

[Insert Table 8A here]

[Insert Table 8B here]

6.2.2. The effect of CD use on interest and fee income per dollar of loans of default risk and of several loan categories across users and nonusers

Next, we analyze the difference between the loan pricing between the users and non-users of credit derivatives (Table 9A). We create a dummy variable; DUM_USR to separate between the users and nonusers of CDs. DUM_USR variable takes the value of 1 if BHCs are the users of CDs and 0 if they are nonusers. The coefficient of the DUM_USR is negative and significant in all regression models (except in model 4), stating the fact that the users charge a relatively lower price than the nonusers. The benefit of using credit derivatives must be higher than the cost of using CDs. So, the additional benefit is passed on to the borrowers of these user banks. As suggested by previous studies, the buyers of credit derivatives hold less capital. Also seller banks and banks involved in both buying and selling generate fee income by selling or by trading credit derivatives. Moreover, the seller banks have low risks in their portfolio. Size also plays an important role in this matter. The user banks are a lot larger in size than the nonusers. So, user banks are more diversified and generate additional income from other non-traditional sources. So, user banks can afford to charge a lower rate to their borrowers. Table 9B examine the interaction between the risk variables and the dummy variable DUM_USR to see what happens to loan pricing when users increase the risk of default by each additional unit. However, except for model 3, we do not find a significant association behind the fact that user banks increase their loan pricing as they experience additional credit risk.

[Insert Table 9A here]

[Insert Table 9B here]

Table 9C is designed to show how the users of credit derivatives price their various loan categories in relation to the pricing of non-users. The table shows that the interest and fee income per dollar of loans of CD users is on average lower than that of non-users. This result may be interpreted in two ways. It may mean that users of credit derivatives are protecting themselves from the risk of default by passing this risk to the protection sellers and they are passing the savings from the default protection to borrowers. Therefore, they are able to offer loans at lower rates per unit of risk. Alternatively, it may be that CD users are concentrating on lower risk loans hence their income per dollar of loans is lower. Considering the coefficients of the variables that represent the interactions between the user dummy and the loan categories supports the later interpretation. It shows that within the CD user group the presence of real estate, commercial and industrial loans, and consumer loans significantly increases the interest and fee income per dollar of loans. This observation may suggest that the CD users are using CDs to book higher risk and higher yield real estate, industrial and commercial loans, and consumer loans. The impact of CD use on foreign loans is positive but less significant while the impact on agriculture loans is insignificant. Overall, these results may suggest that CDs are increasing the supply of funds for real estate, commercial and industrial, and consumer loans, and perhaps increasing the supply to international borrowers. However, they have no impact on the supply for agriculture loans.

[Insert Table 9C here]

6.2.3 The impact of interest and fee income per dollar of loans for the users during the years they use CDs versus the years when they do not use CDs

Table 10 contains results to examine the impact of the amount of credit derivative use on loan pricing. CD_VOL, measured by the difference between the amount of CDs purchase and the amount of CDs sold, scaled by total loan, proxies the net volume of credit derivative usage. The result of table 10 shows a marginal increase in the price of loans when the volume of CDs uses increase. The result also indicates that the notional amount of CDs purchase is higher than the

notional amount of CDs sold. The coefficients are significant at 10 percent significant level. So, the increase in the amount of credit derivatives usage comes at higher price. So, the cost of using derivatives is actually passed on to borrowers in the form of higher price on loan.

[Insert Table 10 here]

Our next motive is to investigate the loan pricing behaviour of the users of CDs for the years when they use credit derivatives and when they do not use CDs. The user group in our study includes the observations of BHCs from the years they start using credit derivatives. We divide the observations related to the BHCs that are active in the CDs market between four subsets: Subset 0 contains all the BHC observations for which the BHC, although CD-active, do not report a position in CDs, Subset 1 contains all the BHC observations for which the BHC reports a buy-position in CDs, Subset 2 contains all the BHC observations for which the BHC reports a sell-position in CDs, and Subset 3 contains all the BHC observations for which the BHC reports a buy-position as well as a sell-position in CDs. We use a dummy variable, DUM_USR that takes the value of 1 for the years when banks use credit derivatives (either buy or sell or doing both) and 0 for the years when they did not use credit derivatives. The results of table 11A support our previous finding that states that the users charge a marginally lower price during the years when they use CDs. We can conclude that the years when user banks decide to use CDs, they can pass the benefit of using CDs to their clients. The years when banks report CDs, they may hold less risky portfolio and sell more CDs than buying them. So, these BHCs can charge a relatively lower price in those years. The next table (table 11B) highlights the interaction of the default risk and the DUM_USR. In all of the regression models (except for model 2) we find significant and positive coefficient of the interaction variables. The interpretation of the findings suggests that the years when users report CDs increase their loan pricing for additional unit of credit risk. The other interpretation is that banks are risk averse even during the years they participate in the CDs market. Our final concern towards the users group is to see the effect on loan pricing during the years they buy, sell or buy and sell credit derivatives vs. The years when they do not participate in the credit derivative market. Table 11C

presents the regression results. B_DUM is a dummy variable that takes the value of 1 for the years when the users only buy CDs and 0 for the years when they do not participate in the credit derivative market although they are CD active. Similarly, G_DUM is a dummy variable that takes the value of 1 for the years when the users only sell CDs and 0 for the years when they do not participate in the credit derivative market. BOTH_ DUM is a dummy variable that takes the value of 1 for years when they buy and sell CDs and 0 for the years when they do not use CDs. The dummy variable, G_DUM is significant and negative in all five-regression models. We can conclude that the years when users only sell credit derivatives, they hold low risk portfolio. The users pass the benefit of holding low risk portfolio to their clients by charging them lower interest. Another benefit that contributes towards the lower interest is the additional fee income that users generate when they sell credit derivatives. The coefficient for B_DUM is also negative but insignificant. This analysis shows that for the CD-active BHCs the price on loans during years when they report CDs bought is not significantly different from the loan price when they do not report positions in CDs. This result suggests that CD-active BHCs that buy CDs protection are doing so to reduce some excessive risk they have taken without charging a high loan rate to compensate for this risk. They are buying the CDs to manage the additional risk by passing it to the seller of the CDs.

The coefficient of the BOTH_DUM is not significant which indicates that the years when users banks hold both positions in the CDs market charge a price on their loans that is similar to the years when these banks do not report CDs. Perhaps the BHCs that report simultaneously CDs bought and CDs sold are selling CDs to generate income and hedging their positions through buying offsetting positions.

[Insert Table 11A here]

[Insert Table 11B here]

[Insert Table 11C here]

6.2.4. The impact of default risk (with and without the control for loan categories) on CDs bought for hedging, net positive CDs bought and net positive CDs sold

Next, we investigate the relation between CD buying for hedging purposes and the risk of default. We use the notional amount of CDs purchased by only the buyers of credit derivatives and scale it by total loan (CD_BUY). Our dependent variable for this hypothesis is CD_BUY. The results are reported in Tables 12.1 and 12.2. Table 12.1 shows the results when we do not control for loan categories. We find that the amount of CDs bought is negatively and significantly related to the capital ratio (total equity capital divided by total assets). This result indicates that CDs are purchased as protection against default when the capital ratio is lower. We do not find any significant relationship between CD bought for hedging and the risk of default. Table 12.2 shows the results when we control for loan categories. The ratio of total equity capital to total assets continues to be significantly and negatively related to total CDs bought. In addition, we find that the presence of commercial and industrial loans is positively and significantly related to the use of CDs while the presence of foreign loans is negatively and significantly related to CDs bought. These results suggest that CD buyers are hedging commercial and industrial loans while the acquisition of foreign loans seems to be reducing the need to use CDs. This result suggests that foreign loans may be considered as internal hedging instruments or it may be that buyers of CDS are not active in international markets.

[Insert Table 12.1 here]

[Insert Table 12.2 here]

Next, we examine the relationship between net CD purchase and the risk of default. We use only the observations that report net positive difference between the CD bought and CD sold (scaled by total loan) as our dependent variable to see the effect of credit risk on the net buying position of CDs. The results are reported in Tables 13.1 and 13.2. Table 13.1 shows the results when we do not control for loan categories. Similar to our findings in Tables 12.1 and 12.2, we find that the net amount of CDs bought is negatively and significantly related to the capital ratio

(total equity capital divided by total assets). In addition, we find that the net CDs bought is negatively and significantly related to two measures of risk, namely the risk weighted assets (RWA) and the allowance for loan losses (ALL). The result for allowance suggests that as banks increase the on balance sheet hedging, they keep less off-balance sheet hedging in their portfolio. Table 13.2 shows the results when we include loan categories as controls into the regression model. It confirms the negative and significant relation between the net positive position in CD protection and the capital ratio. In addition, we find that the presence of real estate loans, consumer loans, and agriculture loans reduces the size of net positive positions in CDs. It seems that BHC that are engaged in buying and selling CDs are likely to have less real estate, consumer, and agriculture lending. In both table 13.1 and 13.2 we find that the relation between the non-interest income and the net positive position in CDs to be negative and significant. This indicates the BHCs are selling CDs to increase the non-interest income but they are maintaining some hedging positions.

[Insert Table 13.1 here]

[Insert Table 13.2 here]

Tables 14.1 and 14.2 consider the relation between the net CDs sold and the independent variables. The dependent variable here is the positive difference between CD sold and CD purchased which suggests that the observations belong to large BHCs that are actively engaged in buying and selling but they have more protection sold than bought. The two tables show that the net positive CDs sold is positively but not significantly related to the risk measures. Table 14.1, which reports the results in the absence of controls for loan categories, suggests that the net CDs sold is negatively and significantly related to the non-interest income and capital ratio but positively related to the amount of interest rate derivatives held by the BHC. After controlling for loan categories, Table 14.2 shows that the relation between the net CDs sold and the non-interest income and the capital ratio becomes insignificant while the relation with interest rate derivative strengthens. This result suggests that the BHCs that are reporting net CDs sold are using interest rate derivatives to hedge their positions in the CD market or to reduce their interest rate risk to

open room for taking risk in the CD market. Table 14.2 also shows that the relation between net CDs sold is negatively and significantly related to foreign loans and agriculture loans.

[Insert Table 14.1 here]

[Insert Table 14.2 here]

CHAPTER 7
CONCLUSION

This paper investigates for BHCs the relation between the usage of credit derivatives and the income per dollar of loans for the period 1997 to 2008. First, we compare the users and nonusers of CDs. We find that the users report interest and fee income per dollar of assets that is significantly lower than the interest and fee income per dollar of assets reported by nonusers. This finding may suggest that the BHCs that are using CDs generally have lower risk loan portfolios and these portfolios are generating lower income per dollar of assets. In addition, we investigate the relation between loan pricing and default risk for both users and nonusers and we find that this relation is positive and almost equivalent for users and nonusers.

We pursue further our investigation of the relation between loan pricing and the use of CDs. We divide the observations related to the BHCs that are active in the CDs market between four subsets: Subset 0 contains all the BHC observations for which the BHC, although CD-active, does not report a position in CDs, Subset 1 contains all the BHC observations for which the BHC reports a buy-position in CDs, Subset 2 contains all the BHC observations for which the BHC reports a sell-position in CDs, and Subset 4 contains all the BHC observations for which the BHC reports a buy-position as well as a sell-position in CDs. We use Subset 0 as the base subset and examine the differences among the four subsets. This analysis shows that for the CD-active BHCs the income per dollar of loans during years when they report CDs bought is not significantly different from the income per dollar of loans when they do not report positions in CDs. This result suggests that CD-active BHCs that buy CDs protection are doing so to reduce some excessive risk they have taken without demanding a high rate to compensate for this risk. They are buying the CDs to manage the additional risk by passing it to the sellers of the CDs.

In contrast, during the years when CD-active BHCs report CDs sold they also report significantly lower income per dollar of assets. This result suggests that CD-active BHCs usually sell CDs when they feel that their loan portfolios are low risk and they can afford underwriting some risk of default to improve their income. They write CDs to earn fee income.

The observations obtained during years when the CD-active BHCs report both CDs bought and CDs sold are consistent with our conclusions. For these observations, the income per dollar of loans is not significantly different from the income per dollar of loans when they do not report positions in CDs. Perhaps the BHCs that report simultaneously CDs bought and CDs sold are selling CDs to generate income and hedging through buying offsetting positions. This result is also consistent with the propositions of previous studies which suggest that the buyers of CDs are saving capital when they purchase credit protection and they are passing the cost savings to customers. Furthermore, we find that among the users group, as the volume of CDs increases the income per dollar of loans also increases. This suggests additional usage of CDs allows users to accept risky loans that they would not accept in the absence of CDs. They are initiating these high-risk loans to generate higher interest and fee income and at the same time they are using more CDs to hedge these risky loans.

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Table 1: Number of Bank Holding Companies using credit derivatives by year
CD buyers are the group of BHCs who are only buyers of credit derivatives. CD sellers are the group of BHCs who are only sellers of credit derivatives. CD buyers and sellers are the group of BHCs that has both buying and selling positions in credit derivatives.

Year	Non-users	Users			
		CDs buyers	CDs sellers	CDs buyers and sellers	Total Users
1997	1445	3	6	10	19
1998	1469	7	5	11	23
1999	1550	5	9	16	30
2000	1659	11	9	11	31
2001	1796	12	6	18	36
2002	1942	9	8	19	36
2003	2145	11	4	23	38
2004	2257	10	4	29	43
2005	2259	12	7	31	50
2006	949	13	4	20	37
2007	928	7	8	21	36
2008	938	8	4	23	35

Table 2: Switching between buy, sell, or both positions for a sample of credit derivative users
Data in this table is related to a sample of 14 banks randomly selected from the users group. The shaded region represents our sample for the users group. Buy, sell, buy & sell and none denote respectively a year when the BHC is reporting credit derivatives purchased but none sold, a year when the BHC is reporting credit derivative protection sold but none purchased, a year when the BHC is reporting simultaneously credit derivative protection bought and sold and a year when the BHC is not reporting any CDs position.

Entity	Year 1997	Year 1998	Year 1999	Year 2000	Year 2001	Year 2002	Year 2003	Year 2004	Year 2005	Year 2006	Year 2007	Year 2008
1020201			sell	sell	buy & sell	buy & sell	buy & sell	buy & sell	buy & sell			
1020340	sell	sell	sell	sell	sell	Sell	sell	buy & sell	buy & sell	buy & sell	buy & sell	buy & sell
1021075		sell										
1026016	buy & sell											
1027004											sell	sell
1032473	buy & sell	buy & sell	buy & sell	buy	buy	Buy	buy & sell	buy	buy & sell			
1033470			sell	sell	buy & sell	buy & sell	buy & sell	buy & sell	buy & sell	buy		
1033872				buy								
1037115	buy & sell	buy & sell	buy & sell									
1039502	buy & sell	buy & sell	buy & sell	buy & sell	buy & sell	buy & sell	buy & sell	buy & sell	buy & sell	buy & sell	buy & sell	buy & sell
1042351	buy & sell	buy & sell	buy & sell	buy & sell	buy & sell	buy & sell	buy & sell	buy & sell				
1049341											buy	buy & sell
1068025			buy & sell	buy & sell	buy	none	buy & sell	buy & sell	buy & sell	buy & sell	buy & sell	buy & sell
1068762					buy	none	buy	buy	buy	buy		

Table 3: Variable Definition

Variable	Definition
Dependent Variables	
Loan Pricing	
Loan _int	Interest and fee income on loans / total loans = (interest and fee income on loans in domestic offices and in foreign offices, Edge and Agreement subsidiaries, and IBFs)/ total loans
Independent Variables	
Credit derivative use	
CD_VOL	(CDs beneficiary- CDs guarantor)/ total loans = (notional amount of CDs for which BHCs are the buyers of credit protection – notional amount of CDs for which BHCs are the sellers of credit protection)/ total loans
abs(CD_VOL)	Abs(CDs beneficiary - CDs guarantor)/ total loans
Credit Risk	
NCO	Net loan charge offs/total loans = (yearend outstanding amount of charge-offs less recoveries)/ total loans
RWA	Total risk weighted assets/total assets
NPL	Non-performing loans/total assets= total nonaccruals of loans/total assets
ALL	Allowance for credit losses/total loans
LLP	Provision for loan & lease losses/total loans
Interest Rate Risk	
GAP12	Earning assets that are repriceable within one year or mature within one year – [Interest-bearing deposit liabilities that reprice within one year or mature within one year+ Long-term debt that reprices within one year- Variable rate preferred stock + Long-term debt that is scheduled to mature within one year + Foreign office time deposits with a remaining maturity of one year or less] / total assets
INTRD	Interest rate derivatives contract held for purpose other than trading / total assets
Non- Interest Income	
NONINT	Non-interest income/total assets = (income from judiciary activities, trading revenue, investment banking, advisory, brokerage, and underwriting fees and commissions, venture capital revenue, net securitization income and insurance commissions and fees/ total assets
Bank Size SIZE	 log (TA)
Capitalization CAP	 Total equity capital/ total assets
Loan Category	
LNRATIO	Total loans/ total assets
RLESTLN	Loans secured by real estate/total loans
C&ILN	C&I loans(to US and non US addresses)/ total loans
CNSMRLN	Consumer loans/ total loans
FRGNLN	Foreign loans/ total loans
AGLN	Agricultural loans/ total loans

Table 4A: Descriptive Statistics related to the dependent and independent variables of the users of credit derivative (users group)
The variables are compiled from data reported in FRY-9C (Consolidated Financial Statements for Bank Holding Companies). The sample period contains yearly data and covers the years from 1997 to 2008. All variables are defined in Table 3.

Variable	Definition	Mean	Median	Max	Min	Std Dev	N
Dependent Variables							
Loan Pricing							
Loan _int	Interest and fee income on loans / total loans	0.063	0.063	0.143	0.000	0.016	463
Independent Variables							
Credit derivative use							
CD_VOL	(CDs beneficiary- CDs guarantor)/ total loans	0.026	0.000	1.544	-0.587	0.122	463
abs(CD_VOL)	Abs(CDs beneficiary - CDs guarantor)/ total loans	0.042	0.003	1.544	0.000	0.117	463
Credit Risk							
NCO	Net loan charge offs/total loans	0.006	0.004	0.052	-0.003	0.006	463
RWA	Total risk weighted assets/total assets	0.744	0.756	1.222	0.061	0.171	463
NPL	Non-performing loans/total assets	0.006	0.004	0.042	0.000	0.006	463
ALL	Allowance for credit losses/total loans	0.008	0.008	0.037	0.000	0.004	463
LLP	Provision for loan & lease losses/total loans	0.007	0.004	0.068	-0.007	0.008	463
Interest Rate Risk							
GAP12	Difference between short term assets and liabilities/ total assets	0.133	0.122	0.758	-0.414	0.183	463
INTRD	Interest rate derivatives used for hedging/total assets	0.210	0.090	2.252	0.000	0.314	463
Non- Interest Income							
NONINT	Non-interest income/total assets	0.021	0.017	0.126	-0.012	0.018	463
Bank Size							
SIZE	log (TA)	17.418	17.955	21.506	11.984	2.277	463
Capitalization							
CAP	Total equity capital/ total assets	0.082	0.080	0.251	-0.010	0.028	463
Loan Category							
LNRATIO	Total loans/ total assets	0.564	0.616	0.859	0.028	0.187	463
RLESTLN	Loans secured by real estate/total loans	0.534	0.555	1.000	0.000	0.225	463
C&ILN	C&I loans (to US and non US addresses)/ total loans	0.237	0.216	0.886	0.000	0.142	463
CNSMRLN	Consumer loans/ total loans	0.095	0.076	0.458	0.000	0.083	463
FRGNLN	Foreign loans/ total loans	0.001	0.000	0.031	0.000	0.004	463
AGLN	Agricultural loans/ total loans	0.005	0.001	0.109	0.000	0.014	463

Table 4B: Descriptive Statistics of the dependent and Independent variables of the non-users of credit derivative (non-users group)
The variables are compiled from data reported in FRY-9C (Consolidated Financial Statements for Bank Holding Companies). The sample period contains yearly data and covers the year from 1997 to 2008. All variables are defined in Table 3.

Variable	Definition	Mean	Median	Max	Min	Std Dev	N
Dependent Variables							
Loan Pricing							
Loan _int	interest and fee income on loans / total loans	0.069	0.069	0.145	0.002	0.015	1007
Independent Variables							
Credit derivative use							
CD_VOL	(CDs benificiary- CDs guarantor)/ total loans	0.000	0.000	0.000	0.000	0.000	1007
abs(CD_VOL)	Abs(CDs benifciary - CDs guarantor)/ total loans	0.000	0.000	0.000	0.000	0.000	1007
Credit Risk							
NCO	Net loan charge offs/total loans	0.004	0.003	0.091	-0.001	0.007	1007
RWA	Total risk weighted assets/total assets	0.723	0.736	1.139	0.240	0.133	1007
NPL	Non-performing loans/total assets	0.006	0.003	0.183	0.000	0.010	1007
ALL	Allowance for credit losses/total loans	0.009	0.009	0.050	0.000	0.004	1007
LLP	Provision for loan & lease losses/total loans	0.006	0.003	0.143	-0.009	0.009	1007
Interest Rate Risk							
GAP12	Difference between short term assets and liabilities/ total assets	0.131	0.125	0.935	-0.447	0.189	1007
INTRD	Interest rate derivatives used for hedging/total assets	0.067	0.020	4.013	0.000	0.209	1007
Non- Interest Income							
NONINT	Non-interest income/total assets	0.021	0.013	0.672	-0.002	0.046	1007
Bank Size							
SIZE	log (TA)	16.075	15.899	18.927	15.081	0.717	1007
Capitalization							
CAP	Total equity capital/ total assets	0.096	0.087	0.785	0.023	0.060	1007
Loan Category							
LNRATIO	Total loans/ total assets	0.631	0.667	0.938	0.012	0.143	1007
RLESTLN	Loans secured by real estate/total loans	0.627	0.648	1.000	0.000	0.212	1007
C&ILN	C&I loans (to US and non US addresses)/ total loans	0.189	0.165	0.872	0.000	0.140	1007
CNSMRLN	Consumer loans/ total loans	0.109	0.082	0.960	0.000	0.118	1007
FRGNLN	Foreign loans/ total loans	0.000	0.000	0.043	0.000	0.003	1007
AGLN	Agricultural loans/ total loans	0.009	0.002	0.141	0.000	0.019	1007

Table 5: T-tests of the significance of the differences in means of the variables: users versus nonusers

All variables are defined in Table 3. Note: ***, **, and * indicate respectively statistical significance at the 0.01, 0.05, and 0.10 level respectively

Variable	Definition	CD_USERS Mean	CD_NON-USERS Mean	t-stats	
Dependent Variables					
Loan Pricing					
Loan _int	interest and fee income on loans / total loans	0.0637	0.0713	-8.5909	***
Profitability					
ROA	Net income/ total assets	0.0089	0.0110	-3.9935	***
Independent Variables					
Credit Risk					
NCO	Net loan charge offs/total loans	0.0059	0.0053	1.6090	
RWA	Total risk weighted assets/total assets	0.6653	0.6083	3.8126	***
NPL	Non-performing loans/total assets	0.0056	0.0054	0.3467	
ALL	Allowance for credit losses/total loans	0.0085	0.0098	-5.047	***
LLP	Provision for loan & lease losses/total loans	0.0069	0.0064	1.0061	
Interest Rate Risk					
GAP12	Difference between short term assets and liabilities/ total assets	0.1398	0.1348	0.516	
intRD	Interest rate derivatives used for hedging/total assets	0.2278	0.0749	9.094	***
Non- Interest Income					
NONINT	Non-interest income/total assets	0.021	0.022	-0.294	
Bank Size					
SIZE	log (TA)	17.5672	16.1110	14.527	***
Capitalization					
CAP	Total equity capital/ total assets	0.083	0.096	-6.2820	***
Loan Category					
LNRATIO	Total loans/ total assets	0.5714	0.6335	-6.8983	***
RLESTLN	Loans secured by real estate/total loans	0.5255	0.6119	-7.548	***
C&ILN	C&I loans (to US and non US addresses)/ total loans	0.2416	0.1842	7.8563	***
CNSMRLN	Consumer loans/ total loans	0.1000	0.1244	-4.444	***
FRGNLN	Foreign loans/ total loans	0.0014	0.0003	6.356	***
AGLN	Agricultural loans/ total loans	0.0055	0.0082	-3.434	***

Table 6A: Correlations among variables of the CD users group

All the variables except size are expressed as ratios. Loan_int is the ratio interest and fee income on loans to total loans. NCO represents net loan charge off scaled by total loans. RWA equals the ratio of risk-weighted assets scaled by total assets. LLP is provision for loan and lease losses by total loans. ALL is the allowance for credit losses scaled by total loans. NPL measures non-performing loans by total assets.CAP equals the ratio of total equity capital by total assets. GAP12 represents the difference between short-term assets and liabilities and scaled by total assets. INTRD equals the interest rate derivatives for non-trading purpose scaled by total assets. NONINT is the ratio of non-interest income to total assets. Several loan categories include 1) RLESTLN (real estate loans/TL), AGLN (agricultural loans/TL), C&ILN (commercial and industrial loans/TL), CNSMRLN (consumer loans/TL) and FRGNLN (foreign loans/ TL)

	LOAN_INT	NCO	RWA	LLP	NPL	ALL	CAP	GAP12	INTRD	NONINT	SIZE	RLESTLN	AGLN	C&ILN	CNSMRLN	FRGNLN
LOAN_INT	1.00															
NCO	0.20	1.00														
RWA	0.21	-0.02	1.00													
LLP	0.18	0.91	0.00	1.00												
NPL	0.13	0.49	0.14	0.58	1.00											
ALL	0.30	0.50	0.52	0.57	0.56	1.00										
CAP	-0.01	-0.13	0.34	-0.09	0.04	0.20	1.00									
GAP12	-0.10	0.13	-0.05	0.10	-0.01	-0.10	-0.19	1.00								
INTRD	0.12	0.05	0.09	0.01	-0.02	0.04	-0.11	0.16	1.00							
NONINT	0.01	0.12	0.06	0.03	-0.15	-0.16	0.02	0.19	0.21	1.00						
SIZE	-0.07	0.36	-0.01	0.27	-0.04	-0.01	-0.25	0.24	0.36	0.32	1.00					
LNRATIO	0.23	-0.07	0.75	0.00	0.25	0.55	0.40	-0.11	0.06	-0.30	-0.35					
RLESTLN	0.03	-0.28	0.00	-0.14	0.08	-0.05	0.25	-0.12	-0.01	-0.26	-0.48	1.00				
AGLN	0.13	-0.09	-0.01	-0.07	-0.08	-0.01	0.00	-0.20	-0.07	-0.17	-0.34	0.08	1.00			
C&ILN	0.11	0.07	0.34	0.01	-0.01	0.26	-0.06	-0.05	0.08	0.06	0.15	-0.65	-0.04	1.00		
CNSMRLN	0.18	0.40	-0.10	0.35	0.01	0.22	-0.03	0.02	0.01	-0.01	0.41	-0.13	-0.05	-0.21	1.00	
FRGNLN	0.06	0.09	-0.12	-0.01	-0.06	-0.07	-0.10	-0.21	0.13	0.16	0.31	-0.36	-0.10	0.20	0.07	1.00

Table 6B: Correlations among variables of the CDs non-users group

All variables except size are expressed as ratios. Loan_int is the ratio interest and fee income on loans to total loans. NCO represents net loan charge off scaled by total loans. RWA equals the ratio of risk-weighted assets scaled by total assets. LLP is provision for loan and lease losses by total loans. ALL is the allowance for credit losses scaled by total loans. NPL measures non-performing loans by total assets. CAP equals the ratio of total equity capital by total assets. GAP12 represents the difference between short-term assets and liabilities and scaled by total assets. INTRD equals the interest rate derivatives for non-trading purpose scaled by total assets. NONINT equals non-interest income to total assets. Several loan categories are examined including 1) RLESTLN (real estate loans/TL), AGLN (agricultural loans/TL), C&ILN (commercial and industrial loans/TL), CNSMRLN (consumer loans/TL) and FRGNLN (foreign loans/ TL)

	LOAN_INT	NCO	RWA	LLP	NPL	ALL	CAP	GAP12	INTRD	NONINT	SIZE	RLESTLN	AGLN	C&ILN	CNSMRLN	FRGNLN
LOAN_INT	1.00															
NCO	0.31	1.00														
RWA	0.15	0.24	1.00													
LLP	0.27	0.94	0.20	1.00												
NPL	-0.01	0.57	0.12	0.64	1.00											
ALL	0.20	0.58	0.54	0.59	0.50	1.00										
CAP	0.08	0.09	-0.06	0.12	-0.08	-0.13	1.00									
GAP12	-0.05	-0.01	0.08	-0.01	-0.07	0.00	0.10	1.00								
INTRD	0.03	0.07	0.17	0.06	0.03	0.06	-0.05	0.09	1.00							
NONINT	0.20	0.17	-0.05	0.18	-0.09	-0.14	0.86	0.18	0.04	1.00						
SIZE	-0.06	0.14	0.24	0.10	-0.02	0.05	0.09	0.17	0.06	0.11	1.00					
RLESTLN	-0.24	-0.19	-0.10	-0.13	0.18	-0.06	-0.23	-0.31	-0.06	-0.37	-0.17	1.00				
AGLN	0.12	0.05	0.09	0.02	-0.04	0.08	-0.07	0.04	-0.06	-0.03	-0.09	-0.14	1.00			
C&ILN	0.05	0.01	0.22	0.01	-0.06	0.18	-0.06	0.19	0.09	-0.07	0.00	-0.56	0.06	1.00		
CNSMRLN	0.23	0.27	0.05	0.19	-0.12	0.11	0.34	-0.03	-0.02	0.44	0.13	-0.51	0.06	-0.07	1.00	
FRGNLN	-0.03	-0.03	-0.13	-0.05	-0.04	-0.08	-0.05	-0.04	0.01	-0.02	-0.06	-0.03	-0.03	0.08	-0.07	1.00

Table 7A: The relation between interest and fee income per dollar of loans and default risk (User group)
The table presents the coefficients of multiple regressions of the ratio of total interest and fee income on loans to total loans (loan_int) on net loan charge offs/TL (NCO, model 1), risk weighted assets/TA (RWA, model 2), non performing loans/ TL (NPL, model 3), allowance for credit losses/TL (ALL, model 4), and provision for loan and lease losses/TL (LLP, model 5). All variables are defined in Table 3. YR dummy is included for each year from 1998 to 2008 to capture the time dependence variation of loan pricing [a,]

	Independent Variables	(M1)	(M2)	(M3)	(M4)	(M5)
Test Variables	NCO	1.032				
		(5.447) ***				
	RWA		0.014			
			(3.318) ***			
	NPL			0.691		
				(4.329) ***		
	ALL				1.199	
					(7.134) ***	
	LLP					0.720
						(4.879) ***
Control Variables	SIZE	-0.002	-0.001	-0.001	-0.001	-0.002
		(-5.782) ***	(-3.550) ***	(-3.017) ***	(-3.908) ***	(-5.248) ***
	NONINT	0.004	0.006	0.038	0.071	0.019
		(0.064)	(0.093)	(0.622)	(1.163)	(0.322)
	GAP12	-0.010	-0.007	-0.011	-0.008	-0.011
		(-2.778) ***	(-1.656) *	(-2.586) ***	(-2.210) **	(-2.983) ***
	INTRD	0.007	0.006	0.005	0.004	0.006
		(3.673) ***	(3.379) ***	(2.529) **	(2.260) **	(3.547) ***
	CAP	0.015	-0.026	0.000	-0.045	0.009
		(0.429)	(-0.763)	(-0.013)	(-1.446)	(0.265)
	C	0.112	0.094	0.097	0.094	0.108
		(19.609) ***	(15.838) ***	(17.143) ***	(18.327) ***	(19.448) ***
	Fixed Year Effect	Yes	Yes	Yes	Yes	Yes
	Included Observations	518	467	518	518	518
	R-squared	0.52	0.412	0.455	0.491	0.5
	Adjusted R-squared	0.504	0.39	0.436	0.473	0.483
	F-statistic	31.894	18.532	24.508	28.34	29.454
	Prob(F-statistic)	0	0	0	0	0

[a] all figures in parenthesis are t-stats and asterisks are given if the regression coefficients are significantly different from zero at the 10(*),5(**) and 1(***) % level.

Table 7B: The relation between interest and fee income per dollar of loans, default risk, and loans to various industries (User group)

The table presents the coefficients of multiple regressions of the ratio of total interest and fee income on loans to total loans (loan_int) on net loan charge off/TL (NCO, model 1), risk weighted assets/TA (RWA, model 2), non performing loans/ TL (NPL, model 3), allowance for credit losses/TL (ALL, model 4), and provision for loan and lease losses/TL (LLP, model 5). All variables are defined in Table 3. YR dummy is included for each year from 1998 to 2008 to capture the time dependence variation of loan pricing [a]

	Independent Variables	(M1)	(M2)	(M3)	(M4)	(M5)
Test Variables	NCO	0.894				
		(5.480) ***				
	RWA		0.014			
			(3.347) ***			
	NPL			0.653		
				(5.372) ***		
	ALL				0.920	
					(5.099) ***	
	LLP					0.544
						(4.675) ***
	RLESTLN	0.030	0.022	0.026	0.023	0.026
		(5.912) ***	(4.475) ***	(5.211) ***	(4.436) ***	(5.086)***
	C&ILN	0.028	0.018	0.027	0.016	0.026
		(4.169) ***	(2.569) **	(4.031) ***	(2.162) **	(3.763) ***
	CNSMRLN	0.054	0.074	0.073	0.058	0.059
		(4.751) ***	(6.502) ***	(6.603) ***	(4.444) ***	(5.210) ***
	FRGNLN	0.064	0.062	0.023	0.144	0.095
		(0.314)	(0.275)	(0.105)	(0.658)	(0.443)
	AGLN	0.073	0.077	0.101	0.083	0.070
		(2.426) **	(2.543) **	(3.359) ***	(2.728) ***	(2.321)**
Control Variables	SIZE	-0.002	-0.002	-0.001	-0.001	-0.002
		(-5.467) ***	(-5.065) ***	(-3.887) ***	(-3.862) ***	(-5.093) **
	NONINT	0.100	0.099	0.142	0.142	0.110
		(1.724) *	(1.564)	(2.193) **	(2.224) **	(1.760) *
	GAP12	-0.006	-0.003	-0.006	-0.005	-0.007
		(-1.765) *	(-0.793)	(-1.550)	(-1.255)	(-1.821) *
	INTRD	0.004	0.005	0.003	0.002	0.004
		(2.199) **	(2.715) ***	(1.645)	(1.340)	(2.260) **
	CAP	-0.029	-0.064	-0.043	-0.068	-0.031
		(-0.849)	(-1.972) **	(-1.315)	(-2.211) **	(-0.924)
	C	0.083	0.081	0.078	0.079	0.085
		(10.801) ***	(10.578) ***	(10.019) ***	(10.207) ***	(10.677) **
	Fixed Year Effect	Yes	Yes	Yes	Yes	Yes
	Included Observations	518	518	518	518	518
	R-squared	0.605	0.534	0.571	0.572	0.580
	Adjusted R-squared	0.588	0.511	0.551	0.553	0.561
	F-statistic	34.489	23.091	29.895	30.109	31.018
	Prob(F-statistic)	0.000	0.000	0.000	0.000	0.000

[a] all figures in parenthesis are t-stats and asterisks are given if the regression coefficients are significantly different from zero at the 10(*),5(**) and 1(***) % level.

Table 8A: The relationship between interest and fee income per dollar of loans and default risk (Non- User group)
The table presents the coefficients of multiple regressions of the ratio of total interest and fee income on loans to total loans (loan_int) on net loan charge off/TL (NCO, model 1), risk weighted assets/TA (RWA, model 2), non performing loans/ TL (NPL, model 3), allowance for credit losses/TL (ALL, model 4), and provision for loan and lease losses/TL (LLP, model 5). All variables are defined in Table 3. YR dummy is included for each year from 1998 to 2008 to capture the time dependence variation of loan pricing [a]

	Independent Variables	(M1)	(M2)	(M3)	(M4)	(M5)
Test Variables	NCO	1.198				
		(8.517) ***				
	RWA		0.009			
			(3.307) ***			
	NPL			0.185		
				(3.677) ***		
	ALL				1.260	
					(7.425) ***	
	LLP					0.919
						(5.875) ***
Control Variables	SIZE	-0.002	-0.001	0.001	-0.001	-0.002
		(-4.112) ***	(-2.351) **	(1.145)	(-1.934) *	(-2.764) ***
	NONINT	-0.012	0.122	0.057	0.058	0.001
		(-0.451)	(3.054) ***	(1.524)	(1.773) *	(0.031)
	GAP12	0.001	-0.003	-0.004	-0.003	0.000
		(0.318)	(-1.096)	(-1.727) *	(-1.258)	(-0.063)
	INTRD	-0.003	0.001	0.000	-0.002	-0.003
		(-1.311)	(0.777)	(0.179)	(-1.087)	(-1.339)
	CAP	0.038	-0.039	0.020	0.016	0.027
		(2.075) **	(-1.922) *	(0.866)	(0.836)	(1.470)
	C	0.111	0.099	0.070	0.086	0.103
		(13.202) ***	(10.653) ***	(6.818) ***	(10.155) ***	(11.199) ***
	Fixed Year Effect	Yes	Yes	Yes	Yes	Yes
	Included Observations	1200	1031	1200	1200	1200
	R-squared	0.605	0.529	0.376	0.533	0.571
	Adjusted R-squared	0.600	0.521	0.367	0.526	0.565
	F-statistic	106.625	66.901	41.974	79.288	92.711
	Prob(F-statistic)	0.000	0.000	0.000	0.000	0.000

[a] all figures in parenthesis are t-stats and asterisks are given if the regression coefficients are significantly different from zero at the 10(*),5(**) and 1(***) % level.

Table 8B: The relation between interest and fee income per dollar of loans, default risk, and loans to various industries (Non-User group)

The table presents the coefficients of multiple regressions of the ratio of total interest and fee income on loans to total loans (loan_int) on net loan charge off/TL (NCO, model 1), risk weighted assets/TA (RWA, model 2), non performing loans/ TL (NPL, model 3), allowance for credit losses/TL (ALL, model 4), and provision for loan and lease losses/TL (LLP, model 5). All variables are defined in Table 3. YR dummy is included for each year from 1998 to 2008 to capture the time dependence variation of loan pricing [a]

	Independent Variables	(M1)	(M2)	(M3)	(M4)	(M5)
Test Variables	NCO	1.039				
		(7.387) ***				
	RWA		0.009			
			(3.119) ***			
	NPL			0.231		
				(3.978) ***		
	ALL				0.984	
					(6.530) ***	
	LLP					0.764
						(5.292) ***
	RLESTLN	0.002	-0.004	-0.010	-0.005	-0.001
		(0.395)	(-0.515)	(-1.386)	(-0.831)	(-0.115)
	C&ILN	0.001	-0.003	-0.011	-0.010	-0.003
		(0.137)	(-0.398)	(-1.483)	(-1.465)	(-0.396)
	CNSMRLN	0.022	0.012	0.042	0.024	0.027
		(3.101) ***	(1.527)	(4.862) ***	(3.148) ***	(3.574) ***
	FRGNLN	-0.150	-0.241	-0.141	-0.071	-0.103
		(-2.731) ***	(-3.888) ***	(-2.235) **	(-1.211)	(-1.938) **
	AGLN	0.054	0.068	0.044	0.047	0.057
Control Variables		(3.199) ***	(3.106) ***	(1.880) *	(2.193) **	(3.102) ***
	SIZE	-0.002	-0.001	-0.001	-0.002	-0.002
		(-4.866) ***	(-3.103) ***	(-2.359) **	(-3.382) ***	(-4.240) ***
	NONINT	-0.026	0.089	-0.022	0.010	-0.026
		(-0.861)	(2.099) **	(-0.602)	(0.295)	(-0.875)
	GAP12	0.002	-0.002	-0.001	-0.001	0.001
		(0.880)	(-0.977)	(-0.279)	(-0.350)	(0.643)
	INTRD	-0.001	0.003	0.004	0.001	0.000
		(-0.281)	(1.352)	(2.146) **	(0.472)	(-0.070)
	CAP	0.034	-0.029	0.027	0.021	0.027
		(1.876) *	(-1.388)	(1.325)	(1.088)	(1.478)
	C	0.109	0.103	0.103	0.101	0.109
		(10.787) ***	(8.723) ***	(8.370) ***	(9.007) ***	(10.373) ***
	Fixed Year Effect	Yes	Yes	Yes	Yes	Yes
	Included Observations	1200	1031	1200	1200	1200
	R-squared	0.625	0.554	0.502	0.570	0.606
	Adjusted R-squared	0.618	0.544	0.493	0.562	0.599
	F-statistic	89.245	56.822	54.025	70.904	82.417
	Prob(F-statistic)	0.000	0.000	0.000	0.000	0.000

[a] all figures in parenthesis are t-stats and asterisks are given if the regression coefficients are significantly different from zero at the 10(*),5(**) and 1(***) % level.

Table 9A: The difference between interest and fee income per dollar of loan across users and nonusers

The table presents the coefficients of multiple regressions of the ratio of total interest and fee income on loans to total loans (loan_int) on net loan charge off/TL (NCO, model 1), risk weighted assets/TA (RWA, model 2), non performing loans/ TL (NPL, model 3), allowance for credit losses/TL (ALL, model 4), and provision for loan and lease losses/TL (LLP, model 5). DUM_USR variable takes the value 1 if BHCs are users of CDs and 0 if they are non-users. All other variables are defined in Table 3. YR dummy is included for each year from 1998 to 2008 to capture the time dependence variation of loan pricing [a]

	Independent Variables	(M1)	(M2)	(M3)	(M4)	(M5)
Test Variables	DUM_USR	-0.002	-0.002	-0.002	-0.001	-0.002
		(-2.387) **	(-2.910) ***	(-2.738) ***	(-1.481)	(-2.497) **
	NCO	0.990				
		(8.525) ***				
	RWA		0.010			
			(4.087) ***			
	NPL			0.254		
				(4.072) ***		
	ALL				0.970	
					(7.894) ***	
	LLP					0.713
						(6.388) ***
	RLESTLN	0.012	0.008	0.002	0.004	0.008
		(2.684) ***	(1.417)	(0.315)	(0.955)	(1.874) *
	C&ILN	0.009	0.005	0.000	-0.002	0.006
		(1.824) *	(0.778)	(0.062)	(-0.407)	(1.194)
	CNSMRLN	0.032	0.030	0.052	0.033	0.036
		(5.162) ***	(4.587) ***	(7.344) ***	(5.294) ***	(5.563) ***
	FRGNLN	-0.034	-0.135	-0.093	0.019	0.010
		(-0.383)	(-1.344)	(-0.937)	(0.194)	(0.110)
	AGLN	0.067	0.080	0.057	0.061	0.068
		(4.562) ***	(4.168) ***	(2.795) ***	(3.261) ***	(4.234) ***
Control Variables	SIZE	-0.002	-0.001	-0.001	-0.001	-0.002
		(-8.673) ***	(-5.306) ***	(-6.116) ***	(-5.818) ***	(-7.949) ***
	NONINT	0.005	0.086	0.012	0.045	0.004
		(0.165)	(2.459) **	(0.358)	(1.475)	(0.154)
	GAP12	0.000	-0.001	-0.002	-0.001	0.000
		(0.153)	(-0.576)	(-0.774)	(-0.590)	(-0.201)
	INTRD	0.003	0.004	0.005	0.003	0.003
		(2.431) **	(2.850) ***	(3.544) ***	(2.193) **	(2.601) ***
	CAP	0.018	-0.028	0.010	-0.002	0.011
		(1.089)	(-1.595)	(0.597)	(-0.121)	(0.699)
	C	0.094	0.089	0.097	0.087	0.096
		(15.734) ***	(11.712) ***	(13.328) ***	(13.616) ***	(15.551) ***
	Fixed Year Effect	Yes	Yes	Yes	Yes	Yes
	Included Observations	1718	1498	1718	1718	1718
	R-squared	0.616	0.534	0.516	0.573	0.597
	Adjusted R-squared	0.611	0.527	0.510	0.567	0.592
	F-statistic	118.284	73.406	78.623	98.660	109.245
	Prob(F-statistic)	0.000	0.000	0.000	0.000	0.000

[a] all figures in parenthesis are t-stats and asterisks are given if the regression coefficients are significantly different from zero at the 10(*),5(**) and 1(***) % level.

Table 9B: The impact of default risk on interest and fee income per dollar of loans to total loans across the users and nonusers of CDs

The table presents the coefficients of multiple regressions of the ratio of total interest and fee income on loans to total loans (loan_int) on net loan charge off/TL (NCO, model 1), risk weighted assets/TA (RWA, model 2), non performing loans/ TL (NPL, model 3), allowance for credit losses/TL (ALL, model 4), and provision for loan and lease losses/TL (LLP, model 5). DUM_USR variable takes the value 1 if BHCs are users of CDs and 0 if they are non-users. All other variables are defined in Table 3. YR dummy is included for each year from 1998 to 2008 to capture the time dependence variation of loan pricing [a]

	Independent Variables	(M1) RV=NCO		(M2) RV=RWA		(M3) RV=NPL		(M4) RV=ALL		(M5) RV=LLP	
Test Variables	DUM_USR	-0.001		-0.007		-0.004		-0.001		-0.001	
		(-0.987)		(-1.815)	*	(-3.957)	***	(-0.692)		(-0.766)	
	RV	1.009		0.008		0.220		0.961		0.740	
		(7.634)	***	(2.741)	***	(4.069)	***	(6.814)	***	(5.518)	***
	DUM_USR*RV	-0.103		0.006		0.368		0.053		-0.133	
		(-0.549)		(1.358)		(3.204)	***	(0.270)		(-0.857)	
	RLESTLN	0.012		0.008		0.002		0.004		0.009	
		(2.686)	***	(1.365)		(0.330)		(0.915)		(1.910)	*
	C&ILN	0.009		0.005		0.000		-0.002		0.006	
		(1.849)	*	(0.704)		(0.073)		-0.438		(1.243)	
	CNSMRLN	0.032		0.030		0.051		0.033		0.036	
		(5.176)	***	(4.597)	***	(7.252)	***	(5.289)	***	(5.552)	***
	FRGNLN	-0.031		-0.130		-0.093		0.019		0.011	
		(-0.335)		(-1.298)		(-0.953)		(0.200)		(0.114)	
	AGLN	0.068		0.081		0.059		0.060		0.069	
		(4.613)	***	(4.203)	***	(2.909)	***	(3.257)	***	(4.298)	***
Control Variables	SIZE	-0.002		-0.001		-0.001		-0.001		-0.002	
		(-7.410)	***	(-5.272)	***	(-5.970)	***	(-5.833)	***	(-7.188)	***
	NONINT	0.004		0.087		0.015		0.046		0.004	
		(0.163)		(2.469)	**	(0.441)		(1.479)		(0.145)	
	GAP12	0.000		-0.001		-0.002		-0.001		0.000	
		(0.177)		(-0.514)		(-0.835)		(-0.585)		(-0.131)	
	INTRD	0.002		0.004		0.005		0.003		0.003	
		(2.303)	**	(3.000)	***	(3.540)	***	(2.189)	**	(2.353)	**
	CAP	0.017		-0.029		0.008		-0.002		0.011	
		(1.076)		(-1.686)	*	(0.489)		(-0.149)		(0.670)	
	C	0.093		0.090		0.097		0.087		0.094	
		(14.149)	***	(11.347)	***	(13.363)	***	(13.108)	***	(14.289)	***
	Fixed Year Effect	Yes		Yes		Yes		Yes		Yes	
	Included Observations	1718		1498		1718		1718		1718	
	R-squared	0.617		0.535		0.519		0.573		0.598	
	Adjusted R-squared	0.611		0.527		0.513		0.567		0.592	
	F-statistic	113.418		70.604		76.258		94.507		104.967	
	Prob(F-statistic)	0.000		0.000		0.000		0.000		0.000	

[a] all figures in parenthesis are t-stats and asterisks are given if the regression coefficients are significantly different from zero at the 10(*),5(**) and 1(***) % level.

Table 9C: The effect of CD use on interest and fee income per dollar of loans of several loan categories

The table presents coefficients estimates of multiple regressions of the ratio of total interest and fee income on loans to total loans (loan_int) on net loan charge off/TL (NCO, model 1), risk weighted assets/TA(RWA, model 2), non performing loans/ TL (NPL, model 3), allowance for credit losses/TL(ALL, model 4),and provision for loan and lease losses/TL(LLP, model 5). Bank lending activities are classified by several loan categories to see the impact of bank lending on loan pricing. DUM_USR variable takes the value 1 if BHCs are users of CDs and 0 if they are non-users. All variables used for the regression models are defined in table 2. YR dummy is included for each year from 1998 to 2008 to capture the time dependence variation of loan pricing [a]

	Independent Variables	(M1) RV=NCO		(M2) RV=RWA		(M3) RV= NPL		(M4) RV= ALL		(M5) RV= LLP	
Test Variables	DUM_U	-0.023		-0.029		-0.030		-0.020		-0.023	
		(-3.579)	***	(-4.058)	***	(-4.307)	***	(-2.941)	***	(-3.440)	***
	Risk Variable (RV)	0.978		0.010		0.257		0.947		0.700	
		(8.547)	***	(4.219)	***	(4.085)	***	(7.522)	***	(6.373)	***
	REALESTATELN	0.004		-0.003		-0.008		-0.003		0.001	
		(0.742)		(-0.457)		(-1.209)		(-0.424)		(0.187)	
	REALESTATELN*DUM_U	0.024		0.026		0.030		0.020		0.023	
		(3.476)	***	(3.482)	***	(4.080)	***	(2.882)	***	(3.266)	***
	C_ILN	0.003		-0.003		-0.009		-0.007		-0.001	
		(0.432)		(-0.396)		(-1.243)		(-1.116)		(-0.120)	
	C_ILN*DUM_U	0.024		0.025		0.033		0.019		0.025	
		(2.871)	***	(2.780)	***	(3.810)	***	(2.135)	**	(2.933)	***
	CONSUMERLN	0.024		0.013		0.043		0.026		0.029	
		(3.497)	***	(1.635)		(5.028)	***	(3.512)	***	(3.985)	***
	CONSUMERLN*DUM_U	0.023		0.059	***	0.026		0.025		0.020	
		(1.996)	**	(4.618)		(2.051)	**	(2.030)	**	(1.697)	*
	FORIEGNLN	-0.142		-0.233		-0.145		-0.073		-0.106	
		(-2.377)	**	(-3.725)	***	(-2.312)	**	(-1.256)		(-1.857)	*
	FORIEGNLN*DUM_U	0.394		0.318		0.300		0.324		0.408	
		(1.869)	*	(1.397)		(1.329)		(1.473)		(1.873)	*
	AGLOAN	0.058		0.068		0.045		0.050		0.060	
		(3.539)	***	(3.137)	***	(1.963)	*	(2.373)	**	(3.335)	***
	AGLOAN*DUM_U	0.025		0.020		0.041		0.032		0.020	
Control Variables		(0.831)		(0.648)		(1.262)		(0.982)		(0.640)	
	SIZE	-0.002		-0.001		-0.001		-0.001		-0.002	
		(-6.718)	***	(-5.707)	***	(-4.396)	***	(-4.552)	***	(-6.140)	***
	NONINT	0.006		0.098		0.013		0.047		0.005	
		(0.231)		(2.821)	***	(0.397)		(1.548)		(0.195)	
	GAP12	0.000		-0.002		-0.002		-0.002		0.000	
		(0.058)		(-1.139)		(-0.873)		(-0.725)		(-0.235)	
	INTRD	0.002		0.003		0.004		0.002		0.002	
		(1.531)		(2.756)	***	(2.851)	***	(1.493)		(1.872)	*
	CAP	0.012		-0.036		0.004		-0.007		0.006	
		(0.762)		(-2.162)	**	(0.217)		(-0.410)		(0.380)	
	C	0.098		0.102		0.101		0.092		0.100	
		(14.854)	***	(12.278)	***	(12.695)	***	(12.424)	***	(14.602)	***
	Fixed Year Effect	Yes		Yes		Yes		Yes		Yes	
	Included Observations	1718		1498		1718		1718		1718	
	R-squared	0.624		0.556		0.527		0.578		0.604	
	Adjusted R-squared	0.617		0.548		0.519		0.571		0.597	
	F-statistic	99.932		65.774		67.260		82.781		92.016	
	Prob(F-statistic)	0.000		0.000		0.000		0.000		0.000	

[a] all figures in parenthesis are t-stats and asterisks are given if the regression coefficients are significantly different from zero at the 10(*),5(**) and 1(***) % level.

Table 10: The relationship between the amount of CDs used and interest and fee income per dollar of loans (user group)

The table presents the coefficients of the multiple regressions of the ratio of total interest and fee income on loans to total loans (loan_int) on the net amount of CDs use (CD_VOL), net loan charge off/TL (NCO, model 1), risk weighted assets/TA(RWA, model 2), non performing loans/ TL (NPL, model 3), allowance for credit losses/TL (ALL, model 4), and provision for loan and lease losses/TL (LLP, model 5). All other variables are defined in Table 3. YR dummy is included for each year from 1998 to 2008 to capture the time dependence variation of loan pricing [a]

	Independent Variables	(M1)		(M2)		(M3)		(M4)		(M5)	
Test Variables	CD_VOL	0.008		0.008		0.007		0.010		0.009	
		(1.734)	*	(1.715)	*	(1.769)	*	(2.255)	**	(1.902)	*
	NCO	0.903									
		(5.512)	***								
	RWA			0.015							
				(3.528)	***						
	NPL					0.666					
						(5.359)	***				
	ALL							0.978			
								(5.325)	***		
	LLP									0.559	
										(4.697)	***
	RLESTLN	0.031		0.022		0.027		0.024		0.027	
		(6.360)	***	(4.783)	***	(5.598)	***	(4.829)	***	(5.496)	***
	C&ILN	0.029		0.019		0.028		0.016		0.027	
		(4.410)	***	(2.661)	***	(4.253)	***	(2.280)	**	(3.995)	***
	CNSMRLN	0.056		0.075		0.074		0.059		0.060	
		(4.846)	***	(6.582)	***	(6.692)	***	(4.497)	***	(5.297)	***
	FRGNLN	0.048		0.050		0.006		0.128		0.078	
		(0.228)		(0.215)		(0.027)		(0.574)		(0.356)	
	AGLN	0.070		0.073		0.098		0.078		0.066	
		(2.344)	**	(2.431)	**	(3.308)	***	(2.650)	***	(2.221)	**
Control Variables	SIZE	-0.002		-0.002		-0.001		-0.001		-0.002	
		(-5.481)	***	(-5.100)	***	(-3.913)	***	(-3.924)	***	(-5.104)	***
	NONINT	0.103		0.100		0.145		0.147		0.113	
		(1.757)	*	(1.581)		(2.221)	**	(2.278)	**	(1.789)	*
	GAP12	-0.007		-0.004		-0.007		-0.006		-0.008	
		(-1.968)	**	(-0.983)		(-1.723)	*	(-1.465)		(-2.054)	**
	INTRD	0.004		0.005		0.003		0.002		0.004	
		(2.191)	**	(2.755)	***	(1.624)		(1.273)		(2.257)	**
	CAP	-0.024		-0.061		-0.039		-0.064		-0.027	
		(-0.713)		(-1.867)	*	(-1.181)		(-2.078)	**	(-0.770)	
	C	0.083		0.080		0.077		0.078		0.084	
		(10.764)	***	(10.484)	***	(10.012)	***	(10.088)	***	(10.619)	***
	Fixed Year Effect	Yes		Yes		Yes		Yes		Yes	
	Included Observations	518		467		518		518		518	
	R-squared	0.608		0.536		0.573		0.577		0.583	
	Adjusted R-squared	0.590		0.512		0.553		0.558		0.564	
	F-statistic	33.297		22.277		28.835		29.327		30.024	
	Prob(F-statistic)	0.000		0.000		0.000		0.000		0.000	

[a] all figures in parenthesis are t-stats and asterisks are given if the regression coefficients are significantly different from zero at the 10(*),5(**) and 1(***) % level.

Table 11A: The difference between interest and fee income per dollar of loans earned by users of CDs during years when they report CDs use versus years when they do not report CDs use

The table presents the coefficients of multiple regressions of the ratio of total interest and fee income on loans to total loans (loan_int) on net loan charge off/TL (NCO, model 1), risk weighted assets/TA(RWA, model 2), non performing loans/ TL (NPL, model 3), allowance for credit losses/TL(ALL, model 4),and provision for loan and lease losses/TL(LLP, model 5). DUM_USR is a dummy variable that takes the value 1 for years when BHCs use CDs and 0 for years they do not use CDs. All other variables are defined in Table 3. YR dummy is included for each year from 1998 to 2008 to capture the time dependence variation of loan pricing [a]

	Independent Variables	(M1)	(M2)	(M3)	(M4)	(M5)
Test Variables	DUM_USR	-0.002	-0.003	-0.003	-0.003	-0.003
		(-1.660) *	(-1.885) *	(-1.945) *	(-1.835) *	(-1.805) *
	NCO	0.878				
		(5.444) ***				
	RWA		0.013			
			(3.166) ***			
	NPL			0.635		
				(5.308) ***		
	ALL				0.890	
					(4.835) ***	
	LLP					0.529
						(4.605) ***
	RLESTLN	0.029	0.021	0.025	0.022	0.025
		(5.707) ***	(4.278) ***	(4.964) ***	(4.262) ***	(4.889) ***
	C&ILN	0.028	0.019	0.028	0.017	0.027
		(4.223) ***	(2.645) ***	(4.098) ***	(2.266) **	(3.830) ***
	CNSMRLN	0.055	0.074	0.073	0.059	0.060
		(4.824) ***	(6.523) ***	(6.638) ***	(4.513) ***	(5.294) ***
	FRGNLN	0.055	0.049	0.012	0.130	0.084
		(0.268)	(0.215)	(0.056)	(0.600)	(0.391)
	AGLN	0.078	0.082	0.105	0.087	0.075
		(2.456) **	(2.600) ***	(3.377) ***	(2.786) ***	(2.365) **
Control Variables	SIZE	-0.002	-0.001	-0.001	-0.001	-0.001
		(-4.149) ***	(-3.720) ***	(-2.711) ***	(-2.868) ***	(-3.795) ***
	NONINT	0.104	0.103	0.146	0.146	0.114
		(1.782) *	(1.629)	(2.245) **	(2.270) **	(1.817) *
	GAP12	-0.006	-0.003	-0.006	-0.005	-0.006
		(-1.681) *	(-0.712)	(-1.455)	(-1.179)	(-1.729) *
	INTRD	0.004	0.005	0.003	0.002	0.004
		(2.161) **	(2.644) ***	(1.603)	(1.307)	(2.212) **
	CAP	-0.027	-0.060	-0.040	-0.065	-0.029
		(-0.758)	(-1.749) *	(-1.176)	(-2.000) **	(-0.824)
	C	0.082	0.080	0.076	0.078	0.083
		(10.079) ***	(9.891) ***	(9.294) ***	(9.607) ***	(9.960) ***
	Fixed Year Effect	Yes	Yes	Yes	Yes	Yes
	Included Observations	518	467	518	518	518
	R-squared	0.607	0.537	0.574	0.575	0.582
	Adjusted R-squared	0.589	0.513	0.554	0.555	0.563
	F-statistic	33.224	22.315	28.913	29.049	29.931
	Prob(F-statistic)	0.000	0.000	0.000	0.000	0.000

[a] all figures in parenthesis are t-stats and asterisks are given if the regression coefficients are significantly different from zero at the 10(*),5(**) and 1(***) % level.

Table 11B: The relation between interest and fee income per dollar of loans and default risk: the years when BHCs report CDs use versus the years when they do not report CDs use

The table presents the coefficients of multiple regressions of the ratio of total interest and fee income on loans to total loans (loan_int) on net loan charge off/TL (NCO, model 1), risk weighted assets/TA (RWA, model 2), non performing loans/ TL (NPL, model 3), allowance for credit losses/TL (ALL, model 4), and provision for loan and lease losses/TL (LLP, model 5). DUM_USR is a dummy variable that takes the value 1 for years when BHCs use CDs and 0 for years they do not use CDs. All other variables are defined in Table 3. YR dummy is included for each year from 1998 to 2008 to capture the time dependence variation of loan pricing [a]

	Independent Variables	(M1) RV= NCO	(M2) RV= RWA	(M3) RV=NPL	(M4) RV=ALL	(M5) RV=LLP
Test Variables	DUM_USR	-0.005	-0.006	-0.006	-0.008	-0.005
		(-2.705) ***	(-0.870)	(-3.148) ***	(-2.204) **	(-2.771) ***
	Risk Variable (RV)	0.324	0.010	0.294	0.402	0.182
		(2.006) **	(1.317)	(2.517) **	(1.351)	(1.585)
	DUM_USR*RV	0.613	0.004	0.498	0.570	0.401
		(3.002) ***	(0.481)	(2.797) ***	(1.923) *	(2.796) ***
	RLESTLN	0.029	0.021	0.025	0.021	0.025
		(5.723) ***	(4.283) ***	(4.910) ***	(4.179) ***	(4.902) ***
	C&ILN	0.029	0.019	0.028	0.016	0.027
		(4.376) ***	(2.644) ***	(4.061) ***	(2.182) **	(3.943) ***
	CNSMRLN	0.055	0.074	0.072	0.057	0.059
		(4.858) ***	(6.388) ***	(6.530) ***	(4.355) ***	(5.230) ***
	FRGNLN	0.030	0.052	-0.008	0.134	0.070
		0.147	(0.229)	(-0.037)	(0.617)	(0.329)
	AGLN	0.077	0.080	0.097	0.086	0.073
Control Variables		2.392 **	(2.629) ***	(3.076) ***	(2.733) ***	(2.298) **
	SIZE	-0.001	-0.001	-0.001	-0.001	-0.001
		(-3.983) ***	(-3.629) ***	(-2.568) **	(-2.709) ***	(-3.648) ***
	NONINT	0.111	0.103	0.154	0.148	0.123
		(1.930) **	(1.627)	(2.351) **	(2.296) **	(1.967) **
	GAP12	-0.006	-0.003	-0.006	-0.004	-0.007
		(-1.744) *	(-0.684)	(-1.607)	(-1.133)	(-1.800) *
	INTRD	0.004	0.005	0.003	0.002	0.004
		(2.210) **	(2.651) ***	(1.629)	(1.249)	(2.266) **
	CAP	-0.028	-0.061	-0.043	-0.067	-0.031
		(-0.790)	(-1.768) *	(-1.260)	(-2.032) **	(-0.858)
	C	0.083	0.082	0.079	0.082	0.084
		(10.160) ***	(10.782) ***	(9.587) ***	(10.705) ***	(10.019) ***
	Fixed Year Effect	Yes	Yes	Yes	Yes	Yes
	Included Observations	518	467	518	518	518
	R-squared	0.613	0.537	0.579	0.577	0.587
	Adjusted R-squared	0.594	0.512	0.559	0.556	0.567
	F-statistic	32.507	21.349	28.289	28.026	29.206
	Prob(F-statistic)	0.000	0.000	0.000	0.000	0.000

[a] all figures in parenthesis are t-stats and asterisks are given if the regression coefficients are significantly different from zero at the 10(*),5(**) and 1(***) % level.

Table 11C: The relation between interest and fee income per dollar of loans and the use of CDs by buyers, sellers, and both buyers and sellers)

This table presents the coefficients of multiple regressions of the ratio of total interest and fee income on loans (loan_int) on net loan charge off/TL (NCO, model 1), risk weighted asset/TA(RWA, model 2), non performing loans/ TL (NPL, model 3), allowance for credit losses/TL(ALL, model 4), and provision for loan and lease losses/TL (LLP, model 5). B_DUM is a dummy variable that takes the value 1 for years when BHCs only use CD and 0 for years they do not use CD. G_DUM is a dummy variable that take the value 1 for years when the BHCs only sell CD and 0 for years when they do not use CD. BOTH_DUM is also a dummy variable that take the value 1 for years when the BHCs buy and sell CD and 0 for years when they do not use CDs. All other variables are defined in Table 3. YR dummy is included for each year from 1998 to 2008 to capture the time dependence variation of loan pricing [a]

	Independent Variables	(M1) RV=NCO		(M2) RV =RWA		(M3) RV= NPL		(M4) RV= ALL		(M5) RV = LLP	
Test Variables	B_DUM	-0.002		-0.003		-0.003		-0.002		-0.002	
		(-1.252)		(-1.437)		(-1.512)		(-1.205)		(-1.361)	
	G_DUM	-0.004		-0.004		-0.005		-0.005		-0.005	
		(-2.432)	**	(-2.279)	**	(-2.682)	***	(-2.538)	**	(-2.519)	**
	BOTH_DUM	0.000		-0.001		0.000		-0.001		0.000	
		(-0.034)		(-0.519)		(-0.215)		(-0.531)		(-0.175)	
	Risk Variable (RV)	0.875		0.012		0.638		0.871		0.527	
		(5.412)	***	(2.849)	***	(5.301)	***	(4.812)	***	(4.575)	***
	RLESTLN	0.029		0.022		0.025		0.023		0.026	
		(5.952)	***	(4.647)	***	(5.221)	***	(4.564)	***	(5.136)	***
	C&ILN	0.031		0.022		0.030		0.019		0.029	
		(4.582)	***	(2.999)	***	(4.463)	***	(2.639)	***	(4.181)	***
	CNSMRLN	0.053		0.072		0.071		0.058		0.058	
		(4.627)	***	(6.304)	***	(6.377)	***	(4.439)	***	(5.089)	***
	FRGNLN	0.002		-0.005		-0.046		0.095		0.031	
		(0.007)		(-0.020)		(-0.211)		(0.430)		(0.145)	
	AGLN	0.075		0.080		0.102		0.086		0.072	
		(2.347)	**	(2.585)	***	(3.294)	***	(2.802)	***	(2.263)	**
Control Variables	SIZE	-0.002		-0.002		-0.001		-0.001		-0.002	
		(-4.385)	***	(-3.777)	***	(-3.240)	***	(-3.017)	***	(-4.048)	***
	NONINT	0.104		0.104		0.146		0.142		0.114	
		(1.792)	*	(1.649)	***	(2.269)	**	(2.235)	**	(1.824)	*
	GAP12	-0.006		-0.003		-0.006		-0.005		-0.007	
		(-0.006)		(-0.003)		(-0.006)		(-0.005)		(-0.007)	
	INTRD	0.004		0.004		0.003		0.002		0.004	
		(2.034)	**	(2.449)	**	(1.497)		(1.204)		(2.078)	**
	CAP	-0.032		-0.062		-0.046		-0.068		-0.034	
		(-0.918)		(-1.790)	*	(-1.356)		(-2.132)	**	(-0.983)	
	C	0.087		0.084		0.082		0.081		0.088	
		(9.799)	***	(9.445)	***	(9.326)	***	(9.289)	***	(9.678)	***
	Fixed Year Effect	Yes		Yes		Yes		Yes		Yes	
	Included Observations	518		467		518		518		518	
	R-squared	0.612		0.540		0.579		0.579		0.587	
	Adjusted R-squared	0.593		0.514		0.558		0.557		0.566	
	F-statistic	31.105		20.696		27.120		27.026		28.015	
	Prob(F-statistic)	0.000		0.000		0.000		0.000		0.000	

[a] all figures in parenthesis are t-stats and asterisks are given if the regression coefficients are significantly different from zero at the 10(*),5(**) and 1(***) % level.

Table 12.1: The relation between CD bought for hedging and the risk of default

The table presents the coefficients of multiple regressions of the amount of CD purchased for hedging by only the buyers of CDs scaled by total loans (CD_BUY) on net loan charge off/TL (NCO, model 1), risk weighted assets/TA (RWA, model 2), non performing loans/ TL (NPL, model 3), allowance for credit losses/TL (ALL, model 4), and provision for loan and lease losses/TL (LLP, model 5). All other variables are defined in Table 3. YR dummy is included for each year from 1998 to 2008 to capture the time dependence variation of loan pricing [a]

	Independent Variables	(M1)		(M2)		(M3)		(M4)		(M5)	
Test Variables	NCO	0.874									
		(1.263)									
	RWA			0.105							
				(1.438)							
	NPL					1.116					
						(0.917)					
	LLP							0.224			
								(0.410)			
	ALL									-1.276	
										(-0.545)	
Control Variables	SIZE	-0.008		-0.007		-0.007		-0.007		-0.007	
		(-1.696)	*	(-1.551)		(-1.610)		(-1.581)		(-1.594)	
	NONINT	0.238		0.265		0.293		0.250		0.191	
		(0.861)		(0.944)		(1.036)		(0.914)		(0.615)	
	GAP12	0.047		0.096		0.045		0.052		0.056	
		(1.494)		(2.627)	**	(1.398)		(1.640)		(1.798)	*
	INTRD	-0.003		-0.011		-0.007		-0.003		-0.001	
		(-0.141)		(-0.546)		(-0.366)		(-0.182)		(-0.038)	
	CAP	-1.371		-1.548		-1.389		-1.372		-1.300	
		(-4.283)	***	(-3.776)	***	(-4.344)	***	(-4.282)	***	(-3.470)	***
	C	0.285		0.214		0.272		0.278		0.285	
		(2.787)	***	(2.214)	**	(2.752)	***	(2.724)	***	(2.966)	***
	Fixed Year Effect	Yes		Yes		Yes		Yes		Yes	
	Included Observations	108		99		108		108		108	
	R-squared	0.392		0.420		0.394		0.389		0.390	
	Adjusted R-squared	0.277		0.298		0.280		0.273		0.275	
	F-statistic	3.414		3.447		3.447		3.364		3.391	
	Prob(F-statistic)	0.000		0.000		0.000		0.000		0.000	

[a] all figures in parenthesis are t-stats and asterisks are given if the regression coefficients are significantly different from zero at the 10(*),5(**) and 1(***) % level.

Table 12.2: The relation between CD bought for hedging and the risk of default with control for loan categories

The table presents the coefficients of multiple regressions of the amount of CD purchased for hedging by only the buyers of CDs scaled by total loans (CD_BUY) on net loan charge off/TL (NCO, model 1), risk weighted assets/TA (RWA, model 2), non performing loans/ TL (NPL, model 3), allowance for credit losses/TL (ALL, model 4), and provision for loan and lease losses/TL (LLP, model 5). All other variables are defined in Table 3. YR dummy is included for each year from 1998 to 2008 to capture the time dependence variation of loan pricing [a]

	Independent Variables	(M1)		(M2)		(M3)		(M4)		(M5)	
Test Variables	NCO	-0.588									
		(-0.652)									
	RWA			-0.007							
				(-0.111)							
	NPL					0.944					
						(0.640)					
	ALL							-4.290			
								(-1.269)			
	LLP									-0.721	
										(-1.050)	
	RLESTLN	0.022		0.028		0.023		0.032		0.022	
		(0.520)		(0.664)		(0.551)		(0.736)		(0.516)	
	C&ILN	0.154		0.156		0.152		0.187		0.157	
		(2.361)	**	(2.108)	**	(2.357)	**	(2.593)	**	(2.429)	**
	CNSMRLN	-0.224		-0.226		-0.198		-0.167		-0.218	
		(-1.563)		(-1.575)		(-1.339)		(-1.157)		(-1.528)	
	FRGNLN	-9.951		-9.276		-9.418		-10.743		-9.967	
		(-3.580)	***	(-3.437)	***	(-3.906)	***	(-3.959)	***	(-3.840)	***
	AGLN	0.955		1.145		1.009		1.131		0.951	
		(1.006)		(1.062)		(1.102)		(1.030)		(0.996)	
Control Variables	SIZE	-0.005		-0.004		-0.005		-0.005		-0.005	
		(-0.924)		(-0.737)		(-1.093)		(-1.024)		(-0.963)	
	NONINT	0.391		0.377		0.423		0.216		-0.028	
		(1.398)		(1.333)		(1.441)		(0.688)		-(1.472)	
	GAP12	0.037		0.043		0.026		0.038		0.039	
		(1.218)		(1.184)		0.794		1.372		1.318	
	INTRD	-0.028		-0.025		-0.030		-0.020		-0.028	
		(-1.455)		(-1.293)		(-1.582)		(-1.129)		(-1.472)	
	CAP	-1.230		-1.147		-1.246		-0.986		-1.217	
		(-5.568)	***	(-3.713)	***	(-5.595)	***	(-3.122)	***	(-5.468)	***
	C	0.227		0.204		0.223		0.233		0.226	
		(2.163)	**	(1.891)	**	(2.275)	**	(2.306)	**	(2.157)	**
	Fixed Year Effect	Yes		Yes		Yes		Yes		Yes	
	Included Observations	108		99		108		108		108	
	R-squared	0.532		0.534		0.535		0.534		0.552	
	Adjusted R-squared	0.411		0.400		0.414		0.413		0.436	
	F-statistic	4.392		3.964		4.438		4.428		4.766	
	Prob(F-statistic)	0.000		0.000		0.000		0.000		0.000	

[a] all figures in parenthesis are t-stats and asterisks are given if the regression coefficients are significantly different from zero at the 10(*),5(**) and 1(***) % level.

Table 13.1: The relation between the net positive CDs bought and the risk of default

The table presents the coefficients of multiple regressions of the net positive difference between CD purchase and CD sold scaled by total loans on net loan charge off/TL (NCO, model 1), risk weighted assets/TA (RWA, model 2), non performing loans/ TL (NPL, model 3), allowance for credit losses/TL (ALL, model 4), and provision for loan and lease losses/TL (LLP, model 5). All other variables are defined in Table 3. YR dummy is included for each year from 1998 to 2008 to capture the time dependence variation of loan pricing [a]

	Independent Variables	(M1)		(M2)		(M3)		(M4)		(M5)	
Test Variables	NCO	-1.176									
		(-0.344)									
	RWA			-0.177							
				(-2.834)	***						
	NPL					-8.650					
						(-1.547)					
	LLP							-4.708			
								(-1.256)			
	ALL									-11.035	
										(-2.454)	**
Control Variables	SIZE	0.041		0.027		0.038		0.043		0.038	
		(1.761)	*	(1.085)		(1.658)		(1.789)	*	(1.615)	
	NONINT	-1.780		-1.888		-2.119		-2.252		-2.653	
		(-1.798)	*	(-1.900)	*	(-1.990)	**	(-1.954)	**	(-2.428)	**
	GAP12	-0.003		-0.009		-0.018		-0.050		-0.050	
		(-0.026)		(-0.085)		(-0.197)		(-0.465)		(-0.515)	
	INTRD	-0.026		-0.034		-0.029		-0.031		-0.018	
		(-1.037)		(-1.104)		(-1.145)		(-1.239)		(-0.712)	
	CAP	-1.788		-0.982		-1.558		-1.828		-1.042	
		(-2.316)	**	(-1.091)		(-2.144)	**	(-2.443)	**	(-1.498)	
	C	-0.500		-0.138		-0.419		-0.512		-0.368	
		(-1.043)		(-0.274)		(-0.888)		(-1.038)		(-0.753)	
	Fixed Year Effect	Yes		Yes		Yes		Yes		Yes	
	Included Observations	142		119		142		142		142	
	R-squared	0.205		0.222		0.220		0.220		0.242	
	Adjusted R-squared	0.096		0.091		0.113		0.113		0.138	
	F-statistic	1.883		1.695		2.053		2.062		2.327	
	Prob(F-statistic)	0.025		0.056		0.013		0.012		0.004	

[a] all figures in parenthesis are t-stats and asterisks are given if the regression coefficients are significantly different from zero at the 10(*),5(**) and 1(***) % level.

Table 13.2: The relation between net positive CDs bought and the risk of default with control for loan categories
The table presents the coefficients of multiple regressions of the net positive difference between CD purchase and CD sold scaled by total loans on net loan charge off/TL (NCO, model 1), risk weighted assets/TA (RWA, model 2), non performing loans/ TL (NPL, model 3), allowance for credit losses/TL (ALL, model 4), and provision for loan and lease losses/TL (LLP, model 5). All other variables are defined in Table 3. YR dummy is included for each year from 1998 to 2008 to capture the time dependence variation of loan pricing [a]

	Independent Variables	(M1)		(M2)		(M3)		(M4)		(M5)	
Test Variables	NCO	-0.058									
		(-0.019)									
	RWA			-0.184							
				-1.665	*						
	NPL					-10.784					
						-(1.940)	*				
	ALL							-11.605			
								-2.234	*		
	LLP									-3.429	
										(-1.026)	
	RLESTLN	-0.219		-0.153		-0.248		-0.204		-0.220	
		(-2.172)	**	(-1.247)		(-2.724)	***	(-2.322)	**	(-2.505)	**
	C&ILN	-0.041		0.184		0.043		0.162		-0.040	
		(-0.220)		0.686		0.210		(0.699)		(-0.221)	
	CNSMRLN	-0.410		-0.356		-0.266		-0.273		-0.266	
		(-1.869)	*	(-1.847)	*	(-1.531)	*	(-1.484)		(-1.531)	
	FRGNLN	-1.712		-2.980		-3.488		-4.356		-2.440	
		(-0.569)		(-0.958)		(-1.139)		(-1.558)		(-0.846)	
	AGLN	-5.549		-3.937		-6.238		-3.541		-6.061	
		(-2.638)	**	(-1.336)		(-2.968)	***	(-1.413)		(-2.834)	***
Control Variables	SIZE	0.053		0.043		0.051		0.050		0.053	
		(0.037)	**	(0.113)		(2.059)	**	(2.005)	**	(2.077)	**
	NONINT	-2.886		-2.690		-3.089		-3.032		-2.910	
		(-2.509)	**	(-2.113)	**	(-2.741)	***	(-2.661)	**	(-2.565)	**
	GAP12	-0.055		-0.103		-0.090		-0.116		-0.075	
		(-0.522)		(-0.947)		(-0.885)		(-1.074)		(-0.723)	
	INTRD	0.039		0.009		0.041		0.033		0.037	
		(0.201)		(0.851)		(0.164)		1.131		1.225	
	CAP	-1.232		-0.766		-0.993		-0.760		-1.269	
		(-1.901)	*	(-0.853)		(-1.528)		-(1.215)		(-1.903)	*
	C	-0.635		-0.396		-0.578		-0.558		-0.607	
		(-1.223)		(-0.752)		(-1.135)		(-1.084)		(-1.172)	
	Fixed Year Effect	Yes		Yes		Yes		Yes		Yes	
	Included Observations	142		119		142		142		142	
	R-squared	0.251		0.266		0.272		0.280		0.257	
	Adjusted R-squared	0.113		0.098		0.137		0.147		0.120	
	F-statistic	1.813		1.582		2.017		2.108		1.871	
	Prob(F-statistic)	0.023		0.067		0.009		0.006		0.017	

[a] all figures in parenthesis are t-stats and asterisks are given if the regression coefficients are significantly different from zero at the 10(*),5(**) and 1(***) % level.

Table 14.1: The relation between the net CDs sold and the risk of default

The table presents the coefficients of multiple regressions of the net positive difference between CD sold and CD buy scaled by total loans on net loan charge off/TL (NCO, model 1), risk weighted assets/TA (RWA, model 2), non performing loans/ TL (NPL, model 3), allowance for credit losses/TL (ALL, model 4), and provision for loan and lease losses/TL (LLP, model 5). All other variables are defined in Table 3. YR dummy is included for each year from 1998 to 2008 to capture the time dependence variation of loan pricing [a]

	Independent Variables	(M1)		(M2)		(M3)		(M4)		(M5)	
Test Variables	NCO	1.379									
		(1.278)									
	RWA			-0.015							
				(-0.362)							
	NPL					0.689					
						(0.380)					
	LLP							1.228			
								(1.554)			
	ALL									0.748	
										(0.486)	
Control Variables	SIZE	0.010		0.012		0.013		0.010		0.013	
		(1.683)	*	(2.151)	**	(2.086)	**	(1.713)	*	(2.222)	**
	NONINT	-1.526		-1.269		-1.487		-1.508		-1.498	
		(-2.747)	***	(-2.412)	**	(-2.482)	**	(-2.738)	***	(-2.567)	**
	GAP12	-0.189		-0.187		-0.191		-0.190		-0.193	
		(-2.191)	**	(-2.244)	**	(-2.235)	**	(-2.218)	**	(-2.348)	**
	INTRD	0.051		0.064		0.048		0.052		0.048	
		(1.947)	*	(1.851)	*	(1.870)	*	(2.013)	**	(1.825)	*
	CAP	-1.123		-1.043		-1.206		-1.083		-1.207	
		(-3.418)	***	(-3.197)	***	(-3.686)	***	(-3.262)	***	(-3.699)	***
	C	-0.047		-0.095		-0.098		-0.040		-0.101	
		(-0.476)		(-0.903)		(-0.930)		(-0.424)		(-1.016)	
	Fixed Year Effect	Yes		Yes		Yes		Yes		Yes	
	Included Observations	86		74		86		86		86	
	R-squared	0.453		0.500		0.446		0.457		0.446	
	Adjusted R-squared	0.317		0.349		0.307		0.321		0.308	
	F-statistic	3.318		3.299		3.218		3.362		3.224	
	Prob(F-statistic)	0.000		0.000		0.000		0.000		0.000	

[a] all figures in parenthesis are t-stats and asterisks are given if the regression coefficients are significantly different from zero at the 10(*),5(**) and 1(***) % level.

Table 14.2: The relation between the net CDs sold and the risk of default with control for loan categories

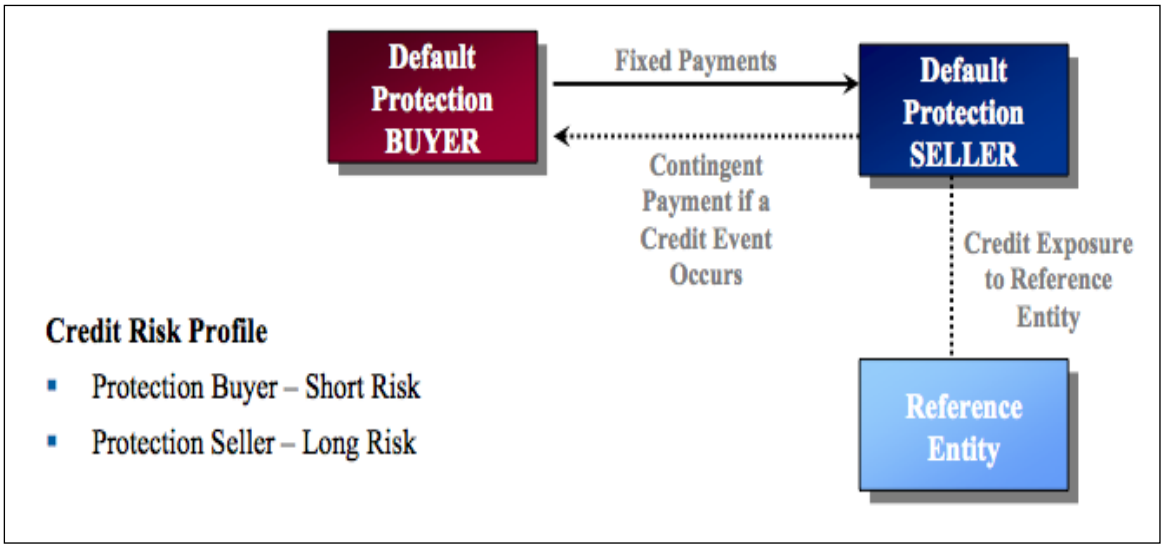
The table presents the coefficients of multiple regressions of the net positive difference between CD sold and CD buy scaled by total loans on net loan charge off/TL (NCO, model 1), risk weighted assets/TA (RWA, model 2), non performing loans/ TL (NPL, model 3), allowance for credit losses/TL (ALL, model 4), and provision for loan and lease losses/TL (LLP, model 5). All other variables are defined in Table 3. YR dummy is included for each year from 1998 to 2008 to capture the time dependence variation of loan pricing [a]

	Independent Variables	(M1)		(M2)		(M3)		(M4)		(M5)	
Test Variables	NCO	-0.215									
		(-0.142)									
	RWA			0.033							
				(0.699)							
	NPL					0.065					
						(0.062)					
	ALL							-0.835			
								(-0.362)			
	LLP									-1.349	
										(-0.511)	
	RLESTLN	-0.116		-0.131		-0.116		-0.110		-0.091	
		(-0.618)		(-0.719)		(-0.631)		(-0.581)		(-0.473)	
	C&ILN	-0.158		-0.195		-0.160		-0.141		-0.116	
		(-0.717)		(-0.895)		(-0.739)		(-0.624)		(-0.497)	
	CNSMRLN	0.103		0.085		0.088		0.130		0.148	
		(0.503)		(0.484)		(0.464)		(0.604)		(0.692)	
	FRGNLN	-4.641		-4.477		-4.615		-4.825		-4.417	
		(-1.871)	*	(-1.708)	*	(-1.794)	*	(-1.807)	*	(-1.886)	*
	AGLN	-9.293		-8.779		-9.167		-9.216		-9.491	
		(-2.368)	**	(-2.199)	**	(-2.319)	**	(-2.488)	**	(-2.369)	**
Control Variables	SIZE	-0.003		-0.004		-0.004		-0.003		-0.003	
		(-0.392)		(-0.492)		(-0.416)		(-0.389)		(-0.368)	
	NONINT	-0.751		-0.734		-0.789		-0.715		-0.673	
		(-0.938)		(-1.010)		-(1.024)		(-0.900)		(-0.854)	
	GAP12	-0.197		-0.204		-0.195		-0.197		-0.196	
		(-2.185)	**	(-2.206)	**	(-2.159)	**	(-2.184)	**	(-2.250)	**
	INTRD	0.111		0.125		0.111		0.112		0.113	
		(2.193)	**	(2.100)	**	(2.177)	**	(2.175)	**	(2.187)	**
	CAP	-1.290		-1.153		-1.265		-1.290		-1.306	
		(-2.976)		(-2.882)		(-2.898)		(-3.131)		(-3.105)	
	C	0.335		0.310		0.337		0.329		0.304	
		(1.194)	*	(1.137)	*	(1.212)	*	(1.182)	*	(1.110)	*
	Fixed Year Effect	Yes		Yes		Yes		Yes		Yes	
	Included Observations	86		74		86		86		86	
	R-squared	0.529		0.567		0.529		0.530		0.531	
	Adjusted R-squared	0.365		0.380		0.365		0.366		0.368	
	F-statistic	3.219		3.037		3.218		3.232		3.247	
	Prob(F-statistic)	0.000		0.001		0.000		0.000		0.000	

[a] all figures in parenthesis are t-stats and asterisks are given if the regression coefficients are significantly different from zero at the 10(*),5(**) and 1(***) % level.

Figure 1: Typical structure of a credit default contract

Credit default swaps are bilateral contracts between two parties, protection buyer and protection seller. These bilateral derivative contracts allow investors to buy or sell the credit risk of a reference entity without transferring the underlying asset to the counterparty. Under the agreement, the default protection buyer makes fixed periodic payments to the default protection seller, and in return, the protection seller covers the losses to the buyer in any credit event that occurs to the reference assets.



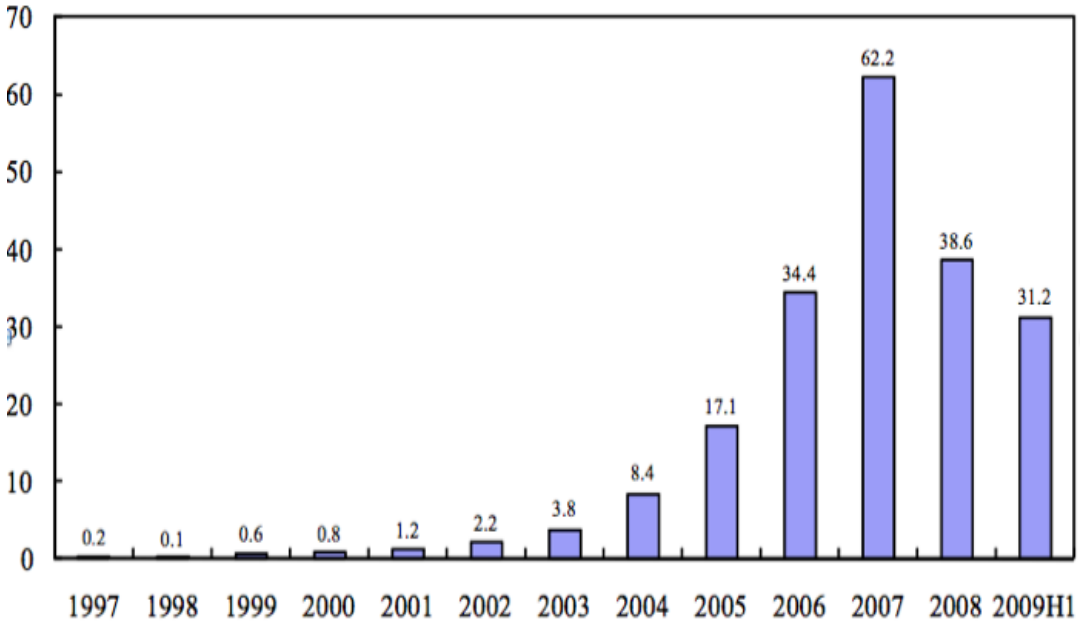
Source: International Energy Credit Association

Figure 2: Credit events that may activate a credit derivative contract

	Event	Definition
1	Bankruptcy	Includes events of bankruptcy or insolvency as defined by English, New York, or other laws as well as any events that may be interpreted as furtherance of a bankruptcy or insolvency event
2	Obligation Acceleration	This event covers situations where the relevant obligation becomes due and payable as a result of a default by the reference entity before the time when such obligation would otherwise have been due and payable
3	Obligation Default	Covers the situation, other than a Failure to Pay, where the relevant obligation becomes capable of being declared due and payable as a result of a default by the reference entity before the time when such obligation would otherwise have been capable of being so declared.
4	Failure to Pay	Failure of the reference entity to make, when and where due, any payments under one or more obligations
5	Repudiation/ Moratorium	Deals with the situation where the reference entity or a governmental authority disaffirms, disclaims or otherwise challenges the validity of the relevant obligation.
6	Restructuring	Events a result of which the terms governing the relevant obligation, as agreed by the reference entity and the holders of the relevant obligation, have become less favourable to the holders. These events include a reduction in the principal amount or interest payable under the obligation, a postponement of payment, a change in ranking in priority of payment or any other composition of payment. For the purposes of the credit default contracts only events that lead to a deterioration in the creditworthiness or financial condition of the reference entity count as restructuring events

Source: International Swaps and Derivatives Association (ISDA) definitions of credit events (http://www.credit-deriv.com/isdadefinitions.htm)

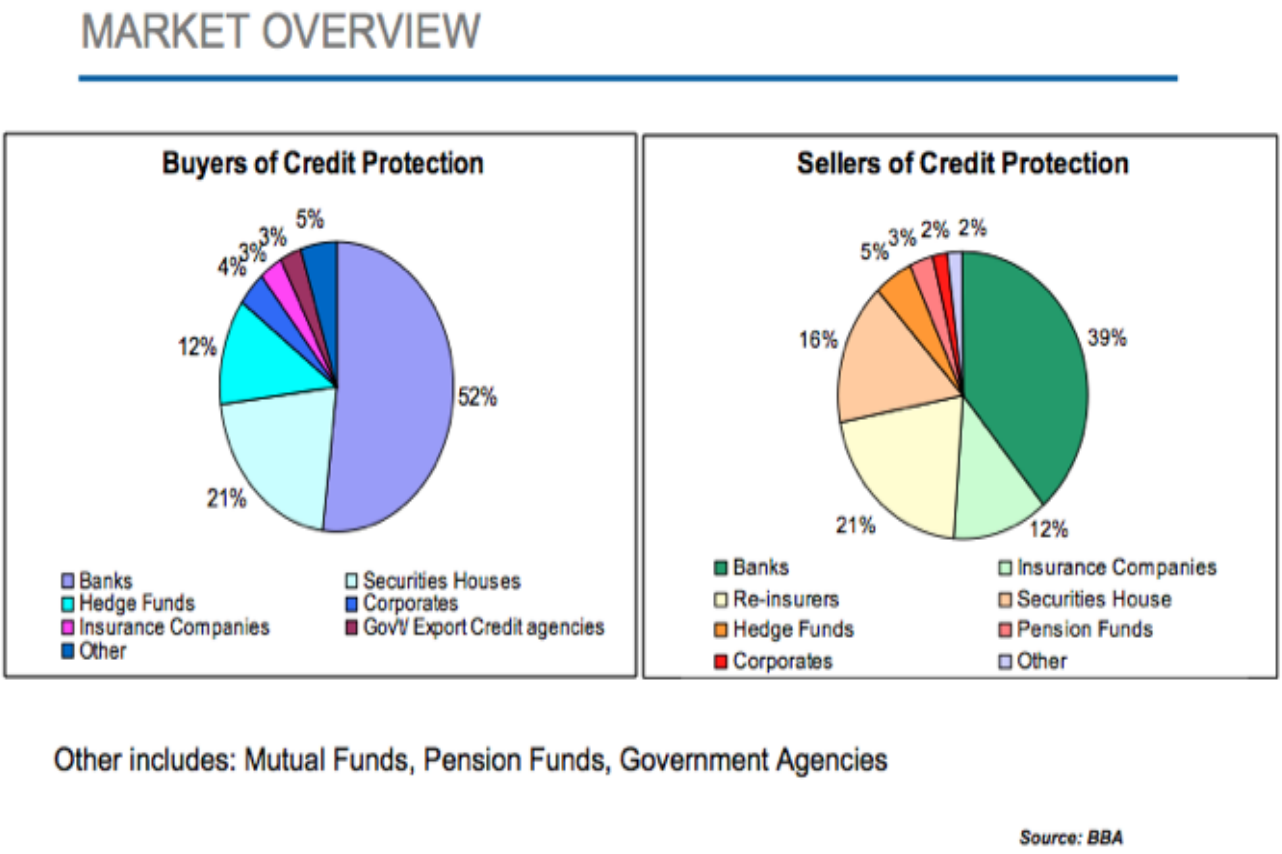
Figure 3: Growth of credit derivatives[1]



Sources: BBA, International Swaps and Derivatives Association (ISDA), Bank of International Settlements (BIS), and Risk Magazine

[1] The figure is taken from the International Monetary Fund (IMF) working paper.

Figure 4: Market participants of credit derivatives



Source: International Energy Credit Association

Figure 5: The figure shows the number of BHCs holding only buying positions (CD BUYERS) in the credit derivative market in each of the year from 1997 to 2008

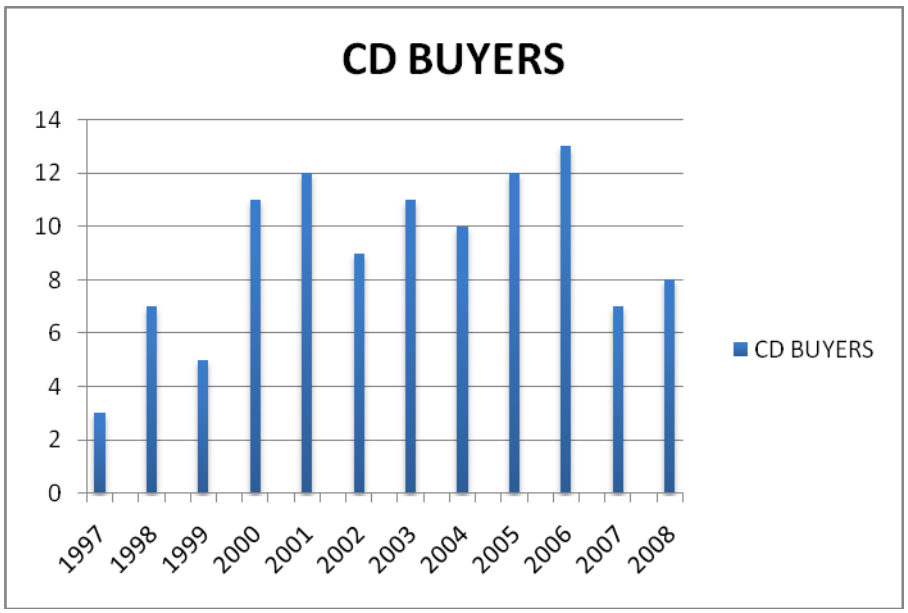


Figure 6: The figure shows the number of BHCs holding only selling positions (CD SELLERS) in the credit derivative market in each of the year from 1997 to 2008

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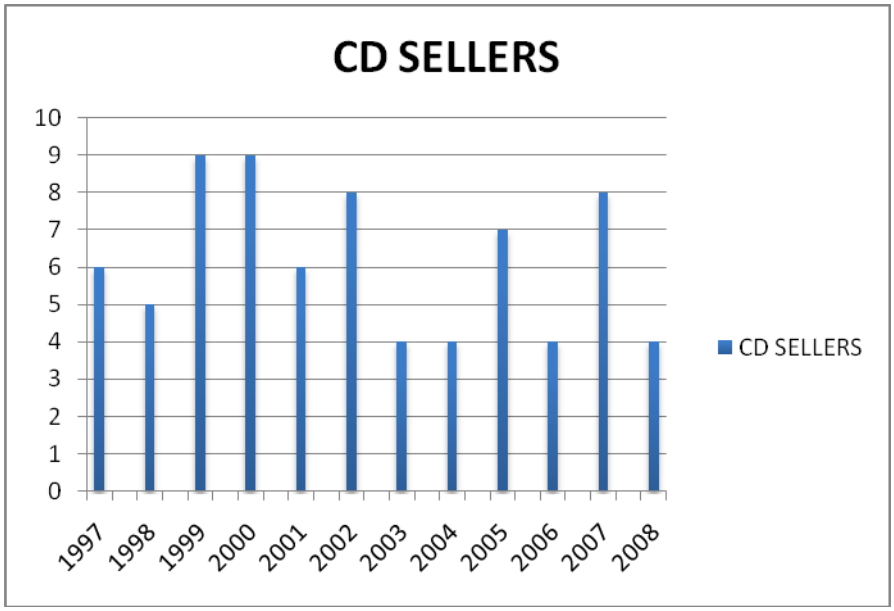

Figure 7: The figure shows the number of BHCs holding both buying and selling positions (CD BUYERS & SELLERS) in the credit derivative market in each of the year from 1997 to 2008