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Off-Balance Sheet Banking

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Commercial loan sales and the issuance of Standby Letters of Credit (SLCs) involve the separation of many of the services associated with lending, such as credit risk evaluation and underwriting, from the funding of a loan. These activities are shown to provide banks a way of issuing collateralized debt claims. This ability can induce banks to undertake profitable loan opportunities they would not undertake if restricted to deposit financing. Moreover, the incentives to issue collateralized claims increase when capital requirements are raised. Empirical evidence suggests that loan sales and SLCs are not important determinants of bank risk.

Over the past decade, there has been a dramatic increase in what is called "off-balance sheet" banking. Examples include the issuance of Standby Letters of Credit (SLCs) and commercial loan sales. These activities have the common feature of separating many of the services associated with lending, such as credit risk evaluation and underwriting, from the funding of a loan. By separating the funding of a loan from these other activities, a bank earns fee income without putting an asset or corresponding liability on its balance sheet.

This paper examines two questions pertaining to commercial loan sales and the issuance of SLCs. The first concerns the regulatory and other economic factors that induce a bank to separate the funding of a loan from the other services associated with lending. The most frequently cited explanation for the growth of these activities is that they provide banks a way of avoiding reserve requirements and bank capital adequacy requirements.

While these regulations may provide incentives to go "off-balance sheet," nonregulatory factors are also important. In particular, as Benveniste and Berger (1986) show, SLC-backed loans and commercial loan sales have payoff characteristics that are similar to secured or collateralized debt. This observation suggests that the incentive banks have to sell loans or to issue SLCs may be similar to the incentives other financial as well as nonfinancial firms have to issue secured debt. How bank regulation affects the incentives to issue collateralized debt and the linkage between capital requirements and off-balance activities are also explored.

A second and related question concerns the effect of loan sales and SLC issues on the default risk of deposits (borne by uninsured depositors and/or the FDIC). The effects of off-balance sheet activities on the risk of deposits depends on the reasons banks undertake those activities. For example, one explanation for the growth of off-balance sheet banking is that it is a manifestation of a moral hazard problem that is endemic to a system of fixed rate deposit insurance pricing. Because SLCs and certain loan sales are not subject to capital requirements, these contingent liabilities provide a way for a bank to increase leverage. By increasing leverage, a bank can generate or enhance subsidies arising from deposit insurance. This argument implies that off-balance sheet activities increase the risk of deposits.

An alternative explanation, examined in this paper, is that loan sales and SLC issues permit banks to engage in lending that they would find unprofitable to undertake if they were restricted to funding loans through deposit financing. This argument implies that off-balance sheet activities may enhance bank profitability and reduce bank risk.

The effect of loan sales and SLC issues on bank risk therefore is an empirical issue. To address this

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issue, the relation between the interest rate paid on bank large CDs (greater than $100,000) and bank asset risk, financial leverage, the volume of SLCs, and loan sales is examined. The results reveal that the risk premium of large CDs increases with asset risk and financial leverage. However, no significant relation is found between the rate paid on CDs and either the volume of SLCs issued or loans sold. This suggests that SLCs and loan sales are not an important determinant of bank risk as perceived and priced by large depositors.

The paper is organized as follows. In Section I, I describe the market for SLCs and commercial loan sales. In Section II, the reasons for the use and growth of SLCs and loan sales are discussed. In Section III, the effects of loan sales and SLCs on bank risk are examined empirically. Section IV provides a summary.

I. The Market for Commercial Loan Sales and SLCs

Commercial loan sales involve the sale of newly originated commercial loans. Most commercial loan sales are structured contractually as participations so that the selling bank maintains a creditor-debtor relationship with the borrower.[1] This means that the selling bank continues to be responsible for servicing the loan, enforcing covenants, monitoring the financial condition of the borrower, and handling workouts and other problems that might arise in the event of default. In exchange for performing these services, the selling bank is compensated through a "spread." The spread represents the difference between the rate paid by the borrower to the bank and the return promised the purchaser of the loan. An average spread of 15 basis points was reported on commercial loan sales in the June 1, 1987 Senior Loan Officer Lending Practices Survey (LPS).

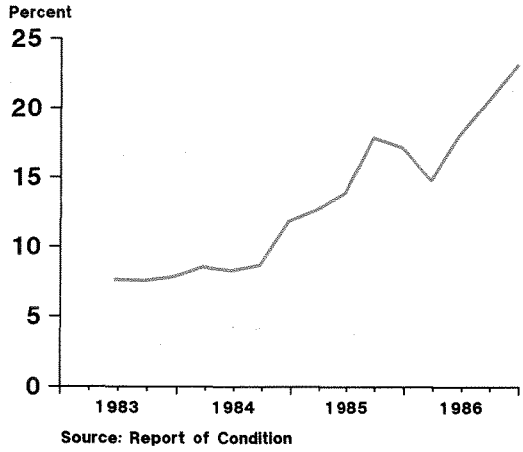
Current bank regulations require that loans sold with recourse (that is, with an issuing bank's guarantee against default) be treated as assets when calculating capital requirements. Moreover, the proceeds of loans sold with recourse are subject to reserve requirements. As a result of these regulations, commercial loans are rarely sold with recourse.[3]

While loans sold without recourse avoid reserve requirements and capital requirements, they raise concerns with the purchaser regarding both the quality of loans sold (an adverse selection problem) and the diligence with which the selling bank will monitor the borrower after a sale (a moral hazard problem). One technique used to provide the purchaser a credible assurance of quality is for the selling bank to maintain or fund a portion of the loan sold. A second technique involves selling short-term "strips" of longer term loans. While the buyer of the strip is exposed to default risk in the short-run, before the maturity date of the strip, the originating bank retains exposure to default in the longer run if it is committed to re-financing the loan. Finally, because most commercial loans sold are short-term and selling banks return repeatedly to the market, "reputational" capital (that is, the value of future earnings, which depend on honest dealing) may provide a mechanism for assuring quality (Gorton and Haubrich, 1987, make this argument).

Information on the volume of commercial loans sold indicates a dramatic increase in sales over the past few years. Information on the volume of loan sales comes primarily from two sources: Schedule L of the Call Report and periodic Senior Loan Officer Opinion Surveys on bank lending practices (LPS) conducted by the Federal Reserve System. Information from the Call Report indicates total loans sold increased from $23 billion in 1983 to $111 billion in 1986; an increase of 326 percent. A similar pattern of growth is observable in the LPS survey data. In November 1984, LPS respondents reported less than $5 billion in sales. By March 1987, sales of 37.5 billion were reported. Chart 1 shows the growth in loan sales (as reported in the Call Report) relative to commercial and industrial (C&I) loans outstanding over the 1984 through 1986 period. Loan sales have grown from about 7 percent of C&I loan volume to almost 25 percent of C&I loan volume over this period.

Chart 1

Commercial Loan Sales Have Grown as a Percent of Total C & I Loans



Source: Report of Condition

The SLC Market

SLCs are similar to loan sales in that they also involve a separation of many of the services associated with a commercial loan from the funding of the loan. An SLC is a guarantee by a bank to pay one party (called the beneficiary) if the bank's customer (called the account party) fails to repay a loan or perform some other contractual obligation (for a description of the SLC market see Bennett, 1986, or Koppenhaver, 1987). Because the bank's obligation is contingent on the default or nonperformance of the account party, most SLCs expire unused. For example, a special survey conducted by the staff of the Federal Reserve Board found that defaults by account parties constituted only 2.03 percent of SLCs outstanding in 1978. (Bank losses were much smaller because 98 percent of payments made were recovered from account parties.)

The majority of SLC issues are used to back financial contracts such as commercial paper, municipal bonds and direct loans. Because the issuing bank assumes the credit risk associated with an SLC-backed loan, the bank has the same incentive to evaluate and monitor the credit risk of the borrower as if it had funded the loan. SLCs therefore provide a bank the opportunity to realize its comparative advantage in obtaining and processing credit information without funding the loan.

As discussed in the next section, the payoff or cash flow characteristics of an SLC-backed loan are identical to a loan sale with full recourse. However, unlike loan sales, SLCs are not, under current capital regulation, considered when calculating capital requirements. Under risk-based capital standards recently proposed by the Federal Reserve Board however, SLCs would be treated the same as loans sold with recourse when calculating capital adequacy requirements.[4]

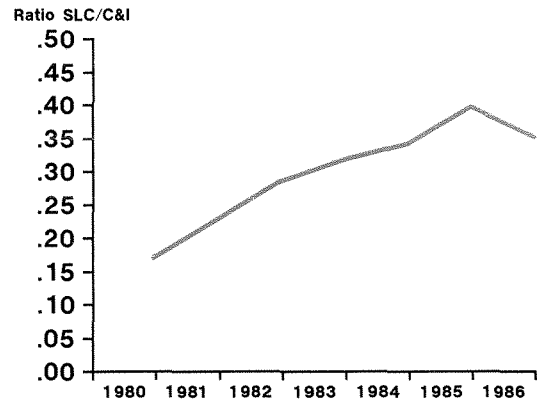
Like the commercial loan sales market, the volume of SLCs has grown rapidly in recent years. For example, since 1980, SLCs outstanding have grown at an annual rate of 20 percent, from $47 billion to $169 billion in 1986. Chart 2 shows the growth of SLCs relative to C&I loans over the 1980 through 1986 period. As Chart 2 reveals, SLCs have grown faster than C&I loans during the 1980s.

Payoff Characteristics

It is useful when analyzing the reasons for loan sales and SLC issues to begin by evaluating the payoff or cash flow characteristics of these activities because they determine when a bank will undertake those activities. Specifically, the focus is on factors that affect the cash flows received by the purchaser of a loan or the beneficiary (lender) in an SLC-

Chart 2

SLCs Have Grown Faster Than C & I Loans



Source: Report of Condition

backed loan. The promised rate the purchaser or beneficiary will require depends on the expected cash flows, and determines the profitability of a loan sale or SLC issue for the bank.

The payoff characteristics of SLC loans and loan sales with recourse, as Benveniste and Berger (1986) have shown, are similar to the cash flow characteristics of secured or collateralized debt.[5] Consider first a loan sale made with recourse. (The effect of removing the recourse provision on the cash flows will be discussed later.) The loan sold is the primary source of cash flows to the purchaser. In the event of a default on the loan, the purchaser still receives the contracted payment as long as the selling bank does not fail. SLC-backed loans operate in a similar fashion. The primary source of cash flows is the loan funded. The lender receives less than the contracted rate on the loan only when the borrower defaults *and* the bank fails. If the bank could issue uninsured deposits secured by a specific loan, precisely the same factors would determine cash flows to secured depositors. Specifically, the secured depositor would receive less than the contracted payment only when the bank failed and the cash flows on the loan serving as collateral were less than the contracted payment due on the debt.

Loans sales with recourse and SLC-backed loans are therefore functionally equivalent to secured debt and should have the same expected rate of return in a competitive market. The payoff characteristics of loan sales without recourse depend solely on the cash flows of the underlying loan because the selling bank issues no guarantee in the event of default. Because banks are generally prohibited from issuing collateralized deposits or debt, loan sales and SLCs provide effective substitutes.[6]

II. Reasons for SLCs and Loan Sales

The reasons for the growth and use of loan sales and SLCs can be divided into two groups: regulatory and non-regulatory explanations (although the explanations are not mutually exclusive). Regulatory explanations focus primarily on the incentives capital adequacy requirements, reserve requirements, and deposit insurances provide for issuing SLCs or selling loans. The nonregulatory explanations focus on why these activities might take place even in the absence of bank regulation and deposit insurance. Both sets of explanations explain why banks have begun increasingly to unbundle funding from other lending activities.

Regulatory Motives

Two hypotheses have been made concerning how regulation affects off-balance sheet banking: the *regulatory tax hypothesis* and the *moral hazard hypothesis*.

The *regulatory tax hypothesis* (see Pennacchi, 1987, and Pavel and Phillis, 1987), argues that loan sales and SLCs are responses to burdensome regulatory taxes. In particular, it says that the cost of holding noninterest-earning reserves, the need to meet capital requirements, and the level of deposit insurance premiums raise the cost of funds for a bank above what nonbank institutions must pay. Therefore, while a bank may have a comparative advantage in originating and servicing loans, regulatory taxes prevent it from profitably funding certain types of loans.

This argument implies that the cost of bank regulation exceeds the benefits banks receive from access to deposit guarantees and the Federal Reserve's discount window, that is, that deposit insurance is overpriced when regulatory taxes are considered.

While reserve requirements unambiguously increase the cost of bank funds, the effect of capital requirements is not well understood. In a world without taxes and transaction and agency costs (the costs of controlling potential conflicts between bondholders and stockholders as well as between managers and outside investors), the cost of financing a loan would be independent of a bank's capital structure (the mixture of debt and equity used). This is the famous Modigliani and Miller (1958) proposition concerning corporate capital structure. Introducing agency costs, personal and corporate taxes have been shown to yield an optimal capital structure (see, for example, Miller, 1977, and Barnea, Haugen and Senbet, 1981).

Given these costs, if the maximum debt to equity ratio set by the regulators is below what banks would hold in the absence of regulation (and deposit insurance), then capital requirements might serve to raise the cost of bank financing above that of nonbank institutions. However, because the debt to equity ratio for banks generally exceeds that of other financial institutions (and nonfinancial firms), it is unclear in what way capital requirements impose a tax on banks.

An alternative hypothesis concerning how regulation and deposit insurance influence off-balance sheet activities is the *moral hazard hypothesis*. This hypothesis focuses on the incentives a bank has to increase asset risk and financial leverage when deposit insurance is provided at a fixed price. By increasing leverage or the risk of its assets, a bank can generate or enhance the subsidies associated with fixed rate deposit guarantees. Under existing regulation SLCs are excluded from capital requirements. Therefore, by issuing SLCs, a bank can increase its financial leverage and enhance whatever subsidies it receives from the deposit insurer.

As Pyle (1985) and others have argued, fixed rate deposit insurance together with capital requirements provide incentives to undertake "off-balance sheet" activities that increase financial leverage. Moreover, by selling relatively low risk loans and maintaining riskier loans in its portfolio, a bank can increase risk and therefore raise the subsidy deposit insurance provides. The moral hazard hypothesis predicts that off-balance sheet activities will increase bank risk.

While regulation may enhance incentives for a bank to engage in off-balance sheet activities, it is unlikely that bank regulation is solely responsible. Several institutional facts support this conjecture. First, nonbank financial institutions, which are not subject to the same regulatory taxes and do not issue insured deposits, are active participants in the loan sales and financial guarantee markets. For example, General Motors Acceptance Corporation (GMAC) sold over $7 billion in loans during 1986.[8] In addition, insurance companies issue financial guarantees that compete directly with bank-issued SLCs. The volume of these guarantees, according to Hirtle (1987), has grown at approximately the same rate as bank-issued SLCs (that is, 20 percent per year since 1980).

Moreover, according to recent LPS surveys, a significant portion of loans sold are purchased by other commercial banks. For example, in 1985, approximately half of the loans sold were purchased by other domestic commercial banks (and 36.5 percent were purchased by banks with assets of over $1 billion). The 1987 Survey indicates that 35 percent of commercial loans sold were purchased by other domestic banks. Because most banks (and all banks over $1 billion in assets) are subject to the same marginal reserve requirement on deposits and money center banks (the primary sellers of loans) generally hold less capital than do other banks, it is unclear why the regulatory tax burden should be higher for financing the *same* loan for money center banks than for regionals.[9]

Nonregulatory Motives

Nonregulatory motives may also provide incentives for separating funding from other lending activities. SLC issues and loan sales facilitate interest rate risk management and loan portfolio diversification (see, for example, Pavel and Phillis, 1987, and Koppenhaver, 1987). SLCs permit banks to separate the interest rate risk from the credit risk associated with a loan. With an SLC issue, a bank can underwrite the credit risk while the beneficiary or purchaser bears the risk of any change in the value of the loan caused by unanticipated changes in interest rates. Loan sales also permit banks to invest in and diversify across a different set of loans than they originate and service.

A problem with this set of explanations is that it is unclear why bank stockholders would reward bank management for these activities when presumably they can diversify their own portfolios or hedge interest rate risk themselves.[10]

Collateralization as a Motive

A second set of nonregulatory explanations for loan sales and SLC issues is that such activities permit banks to issue a collateralized claim. As shown in Section II, loan sales and SLC-backed loans have payoff characteristics similar to secured debt. Therefore, banks may sell loans and issue

SLCs for the same reasons nonfinancial as well as nonbank financial corporations issue collateralized claims. Moreover, as discussed later, fixed price deposit insurance and capital requirements can increase the incentives for banks to issue collateralized claims.

Stulz and Johnson (1985) have analyzed the economic rationale for secured debt issues by nonfinancial firms. One hypothesis they studied argues that firms can effect a wealth transfer from unsecured debtholders to the firms' shareholders by increasing the default risk of unsecured debt. This shift occurs when a firm unexpectedly issues secured debt using existing assets as collateral. By providing secured debtholders a higher priority claim to the cash flows from some of the firm's *existing* assets, the remaining unsecured claimants are worse off. (This is similar to the moral hazard hypothesis discussed earlier.) As Stulz and Johnson point out, if this were the primary reason secured debt is used, unsecured debt would contain convenants prohibiting secured debt issues.[11]

An alternative hypothesis, referred to by Stulz and Johnson as the *underinvestment hypothesis*, is that the ability to issue secured debt can affect a firm's investment policy and therefore the size of the firm's cash flows as well as how cash flows are distributed among claimants. In particular, the ability to issue collateralized debt may enable a firm to undertake profitable *new* investment opportunities that it would pass up if constrained to issue unsecured debt. This can occur when the firm has risky debt outstanding that pays a contractually fixed rate of interest. The promised payment on *new* unsecured debt will reflect the uncertainty concerning the cash flows associated with the firm's existing assets as well as the newly acquired asset. However, if secured debt were used to finance a new project, the contracted rate would primarily reflect the uncertainty concerning the cash flows associated with the *new* investment opportunity. If the new investment were relatively low risk, the cost of secured debt would also be lower than the cost of unsecured debt. Therefore, the firm may undertake a project using secured debt that it would pass up if constrained to issue unsecured claims.

A similar argument can be made for the use of off-balance sheet activities by commercial banks. To determine when a bank will find it advantageous to engage in off-balance sheet activities requires knowledge of when the cost of financing a new loan will be less using a loan sale or an SLC than using deposits. In addition, to determine how off-balance sheet activities affect the risk of bank deposits requires examining how these activities affect the types of loans a bank will make.

To abstract from the effects of bank regulation and deposit insurance, these questions are examined first in the context of a deregulated environment without deposit insurance; examination of the effects of insurance and regulation follows.

Cost of Financing

The effects of collateralization on the cost of financing is analyzed in the context of a two-period model. A bank makes a new loan at time $t=0$ and realizes cash flows at time $t=1$. The new loan has payoffs denoted as $a_2(s)$, that is, cash flows are contingent on the state of the world, "s", at time $t=1$. For simplicity, the new loan is assumed to have a face value of $1. The bank is also assumed to have "booked" loans with payoffs at time $t=1$ of $a_1(s)$. Booked loans have been financed with a mixture of deposits and equity.

If the new loan were financed by issuing deposits promising a payment of r_d at time $t=1$, then the realized payment to new depositors in any state would be

$$\min \{r_d, \frac{r_d}{L_d} [a_1(s) + a_2(s)]\} \quad (1)$$

where L_d equals the sum of contracted payments to depositors. New depositors will receive the contracted payment, r_d, if the bank does not default; in the event of default, they receive a proportion of the cash flows from the bank's assets.

Suppose that instead of deposit financing, the new loan is sold with recourse. The contracted or promised payment to the purchaser of the loan is r_{sr} (this represents 1 plus the contracted interest rate). This contracted payment will generally be less than the rate the bank charges on the loan sold — the difference representing the bank's "spread." The realized payments to the purchaser of the loan will

depend on the promised rate or r_{sr} and the payments the purchaser receives in the event of default on the loan sold and the selling bank's failure. Denoting the cash flows associated with the underlying loan sold as $a_2(s)$, the realized payoff to the loan purchaser for a given state is

$$\min \left[r_{sr}, a_2(s) + a_1(s) \frac{r_{sr}}{L_{sr}}\right] \quad (2)$$

where L_{sr} equals the sum of the contracted payments to the loan purchaser and depositors. In words, when no default occurs, the loan purchaser receives the contracted payment r_{sr}. In the event of the bank's failure, the purchaser receives r_{sr} when the cash flows from the loan are sufficient to meet the contracted payment. When not, the purchaser receives the cash flows from the loan sold, $a_2(s)$, plus a proportion of the cash flows from the bank's other assets. As discussed in Section II, expression 2 also describes the cash flows to the lender in the case of an SLC-backed loan and the cash flow characteristics of a secured deposit claim.

The expression for the realized cash flows for a loan sold with partial recourse is more complex. Let α represent the proportion of the loss guaranteed. The realized cash flow to the purchaser is

$$\min \left[r_{sr}, a_2(s) + \min \left\{\alpha[r_{sr} - a_2(s)], \alpha \frac{r_{sr} - a_2(s)}{L_{sr}} a_1(s)\right\}\right] \quad (3)$$

In words, the purchaser receives either the contracted payment r_{sr} or, in the event of default, the cash flows from the loan plus either reimbursement for losses or a proportional claim on the bank's other assets. When no recourse is provided, α equals zero and the realized cash flows become simply

$$\min [r_{sr}, a_2(s)] \quad (4)$$

In this case, the rate paid by the purchaser depends solely on the characteristics of the new loan sold.

By comparing the payoff characteristics of new deposits (expression 1) to the payoff characteristics of a loan sale or SLC-backed loan (expressions 2 or 3), one can determine when the rate paid on collateralized debt will be less than the rate on deposits. Specifically, when investors are risk neutral, r_{sr} will be less than r_d if and only if (1) there is some positive probability of bank failure with deposit financing (that is, deposits are risky) and (2) in the event of default, the cash flows collateralized debtholders receive are larger than the cash flow new depositors would receive in the event of bankruptcy. That is,

$$\min \left[r_{sr}, a_2(s) + a_1(s) \frac{r_{sr}}{L_{sr}}\right] > \frac{r_d}{L_d} [a_1(s) + a_2(s)] \quad (5)$$

or, for a nonrecourse loan sale:[12]

$$\min [r_{sr}, a_2(s)] > \frac{r_d}{L_d} [a_1(s) + a_2(s)] \quad (6)$$

The left hand side of expression 5 is what secured depositors receive, and the right hand side is what uninsured depositors would receive in the event of default. Intuitively, if investors were risk-neutral, the *expected return* on deposits and secured debt must be equal. For the contracted rate on collateralized debt (that is, the promised payments investors receive when default does not occur) to be less than the rate paid on deposits, collateralized debtholders (or loan purchasers) must expect higher payments in the event the bank fails. This condition is expressed in 5 or 6.

Note that the above discussion suggests that the difference between r_{sr} and r_d will be greater the higher the probability of bank failure (that is, the riskier a bank's deposits) and the lower the risk of the collateral (that is, the default risk of the new loan). This suggests that collateralization provides the greatest benefit for high-risk banks investing in low-risk loans (that is, investment grade credits).

Types of Loans

How does issuing SLCs or selling loans affect a bank's investment policy, that is, the types of loans it will make? The effect can be illustrated by the following example. Suppose a bank has a portfolio of risky loans and has risky deposits outstanding (deposits with a positive probability of default). Ignore deposit insurance for the moment. The con-

tracted rate the bank must pay on deposits will reflect the risk of default.

Assume that the bank has an opportunity to invest in a new loan that has a positive net present value and yields a safe or certain return. If the new loan were financed by issuing additional deposits, investing in the loan would reduce the risk of existing deposits (since they receive a proportional claim in the cash flows of the new loan). If the existing deposits pay a contractually fixed interest rate, the market value of the deposits would increase because the new loan lowers the likelihood of bankruptcy and increases the level of the bank's cash flows. This outcome implies that old or existing depositors gain. Moreover, these depositors' gain lowers the return bank shareholders receive from making the new loan. The lower return to shareholders reduces their incentives to make new relatively low risk loans. This transfer is illustrated numerically in the box (Case 1).

Selling loans or issuing SLCs provides a bank an incentive to undertake low risk loans by reducing this transfer. Recall that the promised rate on collateralized debt, r_{sr} (or loan sales and SLC-backed loans), will be lower than the rate paid on new deposits when the payoffs to secured debtholders are larger in the event of bank failure (that is, expression 5 or 6 holds). However, this implies that, in the event of failure, existing depositors would receive less than if new deposit claims were issued. Therefore, if the contracted rate on secured debt is less than the rate on deposits (that is, expression 5 holds), the gain existing depositors realize is less, and the return to shareholders is larger when secured debt is

Box 1

Numerical Example of the Underinvestment Problem and the Effect of Collateralization

A bank with risky deposits outstanding may pass up profitable new investment opportunities in what has been termed an *underinvestment problem*. The following example is intended to show how secured debt, loan sales or SLC issues can alleviate this problem. In the example, deposit insurance and bank regulation are ignored. In addition, all investors are assumed to be risk-neutral, and the risk-free rate is assumed to be 10 percent.

A bank currently (at time $t=0$) has "booked" loans that pay off in one period (time $t=1$). The loans are risky in that their cash flows depend upon the state of the world at time $t=1$. The cash flow characteristics of the "booked loan" are provided below:

Cash Flow of "Booked Loan"

State	Payoff
1	$ 0
2	$ 0
3	$10

Only three states are possible and each is assumed to be equally likely to occur. If the promised payment to depositors in each state is $9.00, then the market value of deposits is $2.73 at $t=0$ ($9.00 × .333 ÷ 1.1), and the market value of equity is $.30.

Now suppose the bank has an opportunity to invest a new loan at time $t=0$ *after* it invested in the "booked" loan and issued deposits. Assume that the new loan has the following cash flow characteristics;

Cash Flow of New Loan

State	Payoff
1	$10
2	$10
3	$10

The market value of the new loan is $9.09. Suppose because of luck, an established customer relationship, or some other fortuitous circumstance, the loan can be acquired for only $8.00. In other words, the loan is a positive net present value investment.

Case 1: New Deposits Are Issued

If new deposits were issued to finance the loan, they must yield an *expected* return of 10 percent. If $8.00 of new deposits were issued to finance the loan, the bank must *promise* payments (in the absence of deposit insurance) of $17.47 to new depositors for the *expected* return on deposits to be 10 percent*. The realized payoffs to "new" depositors and existing or "old" depositors and the market value of the payments are provided below.

Notice that the value of existing deposits increases when the new loan is undertaken (from $2.70 to $4.12) but that *all* cash flows now are divided among depositors. As a result, the value of equity drops to zero. The bank therefore will not finance this loan with deposits even though it has a positive net present value.

Realized Payoffs — New Deposits

State	Total Cash Flow	Payoff "New" Depositors	Payoff "Old" Depositors
1	$10.00	$ 6.60	$3.40
2	$10.00	$ 6.60	$3.40
3	$20.00	$13.20	$6.80
Market Value at t=0	$12.12	$ 8.00	$4.12

Case 2: Collateralized Debt Is Issued

A bank could also finance the new loan by issuing debt secured by the cash flows from the new loan. Because the cash flows associated with the new loan are riskless, the promised payment to secured debtholders will be $8.80 (to yield an expected return of 10 percent). The payoffs to the various bank claimants are given below:

Notice that by issuing secured debt to finance the loan, the value of equity increases. The bank would therefore make the loan. In addition, notice that the value of existing deposits also increases. In this example, issuing secured debt makes both depositors and shareholders better off.**

Realized Payoffs — Collateralized Debt

State	Total Cash Flows	Payoff Secured Debt Holders	Payoff Depositors	Payoff Stockholders
1	$10.00	$8.80	$1.20	0
2	$10.00	$8.80	$1.20	0
3	$20.00	$8.80	$9.00	$2.20
Market Value at time t=0	$12.12	$8.00	$3.45	$ .67

* The contracted payment of $17.47 is computed by using Expression (1) in the text.

** When deposits are insured or partially insured, a portion of the benefits accrue to the FDIC. In this example, as long as the bank must pay a contracted rate that exceeds the risk-free rate, it will prefer issuing secured debt or selling loans to new deposits as the means of financing new loans.

issued. Case 2 in the Box provides a numerical illustration.

An alternative and perhaps more intuitive explanation for how issuing collateralized claims affects investment policy is that the rate on an SLC-backed loan or loan sale will reflect primarily the risk of the new loan (in the case of a nonrecourse loan sale, the rate reflects only the risk of the new loan). The rate paid on uninsured deposits will reflect the average risk of the bank's loan portfolio. Therefore, the cost of financing a relatively low risk loan will be less with loan sales or SLCs than with deposit claims.

Deposit Insurance

The above discussion is intended to show why a bank might issue SLCs and sell loans even in the absence of regulation and deposit insurance. Introducing deposit insurance does not affect the basic conclusions as long as the rate paid on deposits, including insurance premiums and regulatory taxes, exceeds the risk-free rate. With fixed rate deposit insurance, the rate on existing deposits will not adjust fully to reflect the marginal contribution of the new loan to the overall risk of the bank. Indeed, with complete, that is, 100 percent, insurance, the cost of deposits does not adjust at all to changes in asset risk. Therefore, a bank with risky deposits outstanding will tend to *underinvest* in relatively low risk loans and *overinvest* in high risk loans. This phenomena is referred to as the underinvestment problem (see Myers, 1977).

It is important to point out that capital requirements can exacerbate the underinvestment problem and enhance incentives to go "off balance sheet." By increasing the amount of equity required to finance new loans, the gain both existing uninsured depositors and the FDIC receive from a bank that undertakes a new low risk loan increases (because increased capital requirements lowers the risk of new loans to depositors). Therefore, as capital requirements are raised (as they were in 1981) loan sales and SLC issues would be expected to increase.

Implications

The collateralization argument points out an important aspect of off-balance sheet activities and restrictions on bank financial policy generally: The financing techniques available to a bank affect its investment policy and therefore its overall profitability. This implication is similar to an implication of the regulatory tax hypothesis in that both imply that off-balance sheet activities may permit banks to engage in investment opportunities that they might pass up if constrained to use deposit financing.

Moreover, unlike the moral hazard hypothesis which predicts off-balance sheet activities increase bank risk, the collateralization hypothesis implies that the risk of deposits does *not* necessarily increase with off-balance sheet activities because even though leverage may increase, profitable loan opportunities of lower risk are undertaken[13]. In addition, while the collateralization hypothesis is consistent with the regulatory tax hypothesis discussed earlier, it suggests that even if regulatory taxes were eliminated (or extended to off-balance sheet activities), banks would still have an incentive (albeit reduced) to engage in loan sales or to issue SLCs.

The collateralization hypothesis yields important implications concerning the types of loans sold or backed by SLCs and the effect of off-balance sheet activities on the default risk of bank deposits. First, the collateralized debt argument suggests that relatively low-risk loans will be sold or backed by an SLC. LPS surveys on loan sales indicate that currently loan sales are concentrated primarily in loans to investment-grade credits. For example, the 1986 LPS survey indicated that two-thirds of the loans sold by respondents were obligations of investment-grade borrowing. Second, the riskier a bank's existing deposits (and therefore the higher the rate the bank must pay on new uninsured deposits), the more likely it will be to engage in off-balance sheet activities. Finally, the collateralization hypothesis indicates that SLC and loan sales may not adversely affect the risk of deposits (the same reasoning explains why unsecured creditors of nonfinancial firms permit secured debt issues).

III. Empirical Evidence

The various explanations for why banks issue SLCs and sell loans have different implications for the effect of these activities on bank risk. The moral hazard hypothesis predicts loan sales and SLCs increase bank risk, while the regulatory tax and collateralization hypotheses predict that these activities do not necessarily increase bank risk.

Ideally, to determine the effect of these activities on the risk of deposits one would examine the relation between the risk exposure of the FDIC and uninsured depositors and a bank's use of SLCs and loan sales. While the FDIC's risk exposure is not directly observable, one can obtain a measure of the risk premium on a bank's uninsured (or partially insured) deposits. Assuming uninsured depositors behave as if they are not implicitly fully insured, as recent evidence by Hannan and Hanweck (1987) suggests, the moral hazard hypothesis predicts a positive relation between the risk premium on uninsured CDs and the volume of SLCs and loan sales. However, if one motive for loan sales or SLC is to avoid an underinvestment problem or regulatory taxes, existing depositors as well as bank stockholders may be better off given SLCs and loan sales. Therefore, finding no significant relation (or a negative relation) between the risk premium on bank CDs and the volume of SLCs and/or loan sales is consistent with the collateralization hypothesis and inconsistent with the moral hazard hypothesis.

To examine the effect of SLCs and loan sales on bank risk the relation between the interest cost on large CDs (deposits in excess of $100,000), the volume of SLCs and loan sales, and a set of variables designed to act as proxy for other factors affecting bank risk is examined.

The interest cost of large CDs is estimated from information contained in the Consolidated Report of Condition and Income. The average rate paid on CDs is estimated by dividing the total interest paid on large domestic CDs during a quarter by the average dollar value of domestic CDs outstanding during the quarter. A problem with this measure, noted by previous researchers (see Baer and Brewer, 1986) is that it fails to account for differences in the maturities of CDs outstanding.[14] However, the large bank supplement to the Report of Condition contains information on the maturity structure of CDs outstanding. From this information, a weighted average maturity of a bank's CDs can be computed.[15]

The interest cost on large CDs in a quarter is assumed to be a function of several factors: (1) the average maturity of the CDs outstanding, (2) the general level of interest rates as measured by average yield on ninety day Treasury bills over the quarter, (3) the leverage of the bank, (4) the default or credit risk of the bank's loan portfolio, and (5) the interest rate risk of the bank.

Month-end quotes for the yield on 90-day Treasury bills in the secondary markets are used to calculate the average yield on Treasury bills during each quarter. Financial leverage is estimated as the ratio of total assets of the bank (or bank holding company) to the market value of total bank capital. The total market value of capital is estimated as the sum of the book value of subordinated debt and preferred stock of the bank or bank holding company and the market value of common stock of the bank or bank holding company. The market value of common stock outstanding is calculated by multiplying the number of shares outstanding at the beginning of the quarter by the price of the bank's stock at the beginning of the quarter.

Two variables are used to measure the risk of a bank's asset portfolio. The first measure is the provision for loan and lease losses in each quarter divided by the end of the quarter total of loans and leases outstanding. A second measure is the variance of the bank's or bank holding company's monthly common stock returns for the twelve months prior to the end of each quarter. The variance in stock returns is multiplied by the square of the ratio of the asset to market value of equity. This adjusted variance measure provides an estimate of the variance of the bank's asset returns.[16]

The interest rate risk of the bank is measured by the maturity mismatch between the bank's assets and liabilities. A measure of maturity mismatch, identical to the one used in Flannery and James (1984), is constructed from the Call Report. This

measure, denoted as "Short" represents the absolute value of the difference between dollar value of assets subject to repricing within one year and the dollar value of liabilities subject to repricing within the same period, divided by the book value of equity.[17]

Data

The empirical analysis is based on a sample of fifty-eight banks. Banks were included in the sample if they met the following criterion: (1) information for the bank or bank holding company was contained in the Compustat Quarterly Bank File during the period 1984 through 1986, and (2) a lead bank was identifiable in the case of a multibank holding company.

Only banks contained in the Compustat Quarterly Bank File were included because Compustat is used to obtain monthly stock prices and balance sheet information for the bank holding companies. Only bank holding companies with an identifiable lead bank were included in the sample so balance sheet items obtained from the lead bank's Call Report will adequately reflect the holding company's balance sheet. (Only bank holding companies with the lead bank constituting 75 percent or more of the holding companies' assets in 1986 were included in the sample. For the holding companies in the sample, the assets of the lead bank averaged 90 percent of the holding company assets.)

Quarterly data over the period 1984 through 1986 were used to test the model. This period was chosen because the first full year loan sales were reported in the Call Report is 1984.

Empirical Results

Table 1 provides descriptive statistics for the banks in the sample. It is interesting to note that SLCs and loan sales constitute a sizable proportion of the total capital of the bank holding company. Total SLCs, (the sum of SLCs issued from foreign and domestic offices) average 95 percent of total capital, with a maximum value of 12 times total capital. The average ratio of loan sales to total capital is 24 percent.

Because the empirical analysis is based on an assumption that the rate paid on CDs reflects a

TABLE 1

Summary Statistics for Fifty-Eight Commercial Banks

(1984-1986, quarterly data)

Characteristics	Mean	Maximum	Minimum
Assets of Holding Company (millions)	$18,292	$196,124	$1,196
Assets of Lead Bank (millions)	$16,288	$153,293	$551
Market Value of Total Capital/Assets*	.072	.220	.012
Book Value of Total Capital/Assets**	.061	.114	.036
Loan Loss/Total Loans	.0022	.0487	−.0004
Absolute Value of Ratio Net Short-Term Assets to Book Value of Equity	4.69	11.99	.006
Average Maturity of CDs (months)	8.03	39.33	1.04
Interest Cost of CDs	.087	.195	.024
SLCs/Market Value Total Capital	.948	12.54	.000
Loan Sales/Market Value Total Capital	.239	4.07	.000

* Market value of total capital equals the market value of common stock plus the book value of preferred stock and subordinated debt for the holding company. Assets refer to assets of holding company.

** Book value of total capital equals the book value of common stock plus the book value of preferred stock and subordinated debt for the lead bank. Assets refer to the assets of the lead bank.

default risk premium, the first step was to investigate the relation between average CD rates and the measures of bank leverage and asset risk described in the previous section. Two models were estimated. One model relates the average rate paid on CDs to balance sheet measures of credit risk, interest rate risk, and financial leverage. The second model relates CD rates to the adjusted variance in the bank's stock returns over the preceeding 12 months (which should reflect both interest rate risk and credit risk) as well as financial leverage.

The results of this analysis are reported in Table 2. The first column of Table 2 contains the results of an OLS regression relating the rate paid on CDs to Treasury bill rates, the average maturity of the bank's CDs and balance sheet measures of risk. The second column presents the results of an OLS regression in which the adjusted variance in the monthly return on the bank's common stock is used as proxy for asset risk.

The results in Table 2 are generally consistent with the hypothesis that CD rates reflect a default risk premium. With both models, a positive and statistically significant relation is found between the interest cost on CDs and the ratio of assets to total capital of the holding company. Moreover, the coefficients on the loan loss variable and on Short (which measures interest rate risk) are positive and statistically significant. This result is consistent with the view that CD rates reflect both the credit risk and interest rate risk of the issuing bank. In the second column, the coefficient on the adjusted variance in monthly stock returns is positive and statistically significant.[18]

To investigate whether "off-balance sheet" activities affect the risk premium on large CDs, the

TABLE 2

Pooled Cross-Section Time Series Regression Relating Interest Cost of Large CDs to the Risk of the Issuing Bank*

(t-statistics in parentheses)

	Dependent Variable = Interest Cost on Large CDs	
Independent Variables	**(1)**	**(2)**
Intercept	.0147 (5.238)	.0189 (7.803)
T-Bill Rate	.8402 (28.67)	.8224 (28.17)
Average Maturity CDs	.0004 (6.049)	.0005 (7.803)
Assets/Market Value Total Capital**	6.220×10^{-5} (5.494)	6.427×10^{-5} (5.625)
Adjusted Variance in Monthly Stock Returns		1.633×10^{-5} (2.812)
Loan Loss Provision/Total Loans	.7252 (4.646)	
Short	.0004 (1.706)	
R^2	.58	.57
Number of Observations	679	679

* Analysis based on quarterly data for 58 bank holding companies over the period 1984 through 1986.

** Market value of total capital equals the sum of the market value of the holding companies common stock, the book value of preferred stock and subordinated debt.

regressions reported in Table 2 were re-estimated with two additional independent variables: (1) the ratio of SLCs outstanding to total market value of capital and (2) the ratio of loan sales to total market value of capital. If the volume of SLCs outstanding or loans sales relative to total capital were to increase the risk borne by uninsured depositors (and the FDIC), a positive relation would be expected between CD rates and SLCs outstanding as well as loan sales. No significant relation would be expected under the underinvestment or regulatory tax hypothesis.

The results of this analysis are reported in Table 3. No statistically significant relation is found between the rate paid on CDs and either SLCs outstanding or loan sales during the quarter. Moreover, using an F-test, one cannot reject at the .10 level the hypothesis that the coefficients on SLCs and loan sales are jointly equal to zero in either model. The results presented in Table 3 are therefore inconsistent with the moral hazard hypothesis that SLCs and loan sales increase bank risk.

Summary and Conclusion

The growth of loan sales and SLCs in recent years has raised concerns over the effect of these off-balance sheet activities on bank risk. How these activities affect bank risk depends on the reasons banks undertake them.

TABLE 3

Pooled Cross-Section Time Series Regression Relating Interest Cost of CDs to the Risk of the Issuing Bank and the Volume of SCLs and Loan Sales*

(t-statistics in parentheses)

	Dependent Variable = Interest Cost on Large CDs	
Independent Variables	**(1)**	**(2)**
Intercept	.0142	.0180
	(4.954)	(7.783)
T-Bill Rate	.8396	.8207
	(28.35)	(27.73)
Average Maturity CDs	.0004	.0005
	(5.890)	(6.208)
Assets/Market Value Total Capital**	6.145×10^{-5}	6.386×10^{-5}
	(5.387)	(5.555)
Adjusted Variance in Monthly Stock Returns		1.588×10^{-5}
		(2.670)
Loan Loss Provision/Total Loans	.7055	
	(4.401)	
Short	.0004	
	(1.861)	
SLC/Total Market Value Capital	−.0002	−.0001
	(−.4921)	(−.3733)
Loans Sales/Total Market Value Capital	−.0004	−.0001
	(−.3892)	(−.1048)
R^2	.57	.57
Number of Observations	679	679

* Analysis based on quarterly data for 58 bank holding companies over the period 1984 through 1986.

** Market value of total capital equals the sum of the market value of the holding companies common stock, the book value of preferred stock and subordinated debt.

In this paper, I show that one motive for selling loans and issuing SLCs is that they permit banks to make relatively low-risk loans that would be unprofitable to finance with deposits. This suggests that off-balance sheet activities are not motivated solely by the incentives created by deposit insurance to increase leverage or asset risk through "off balance" sheet activities.

The empirical evidence from the CD market is consistent with this conclusion. Specifically, loan sales and SLCs do not appear to be important determinants of bank risk as perceived and priced by large uninsured depositors.

FOOTNOTES

1. Loan sales structured as participations differ from what has traditionally been referred to as a participation in the banking literature. The older form of participation is better described as a syndication or assignment, and involves a lead bank negotiating for each bank in the syndicate. However, each of the banks in the syndicate make a separate loan to the borrowing firm. Recent loan sales, structured as participations, involve the creation of a new contract between the bank and the purchaser of the loan. The purchaser's contract is with the originating bank and not with the bank's loan customer. See Gorton and Haubrick (1987) for a discussion of the contractual aspects of loan participations.

2. See Melvin (1986) for a description of the regulatory treatment of loan sales. If a depository institution sells a loan and agrees to be responsible for 75 percent or less of the losses from the loan, then under present regulations, the proceeds from the sale are not reservable.

3. Information on loan sales with recourse is difficult to obtain. Available evidence suggests that loans sold with full recourse are rare. The 1985 LPS Survey indicated 13 percent of loans sold had a put option, allowing the purchaser to sell back the loan. In addition, loans sold with full recourse were reported to be only $11 million while nonrecourse loan sales totaled $26 billion.

4. Under the Federal Reserve Board's guidelines, released for comment February 12, 1986, capital requirements for SLCs would vary depending on the account party and use of the SLC. For SLCs backing commercial paper or loans to nongovernment entities, the capital requirements proposed are identical to those that apply to "booked" loans and loans sold with recourse.

5. The payoff characteristics of collateralized debt as well as the effect of collateralized debt issues on a bank's investment policy are derived formally in James (1987).

6. Under Federal law and regulation (12 USC 90 and 12 CRF 7.7410) national banks may pledge assets against public deposits. However, in 1934, the U.S. Supreme Court ruled that national banks may not pledge assets against private deposits. (Texas and Pacific Ry Co. vs. Portorff, 291, U.S. 245, 1934).

7. The regulatory tax hypothesis is based on the proposition that deposit insurance is overpriced (when regulatory taxes are included). The results of empirical studies on the under- or overpricing of deposit guarantees are mixed. For example, Marcus and Shaked (1984) find that for large banks, guarantees are overpriced. Ronn and Verma (1986) show that this result is quite sensitive to the assumptions concerning forebearance (that is, closure rules) of the FDIC.

8. See Leonard Sloane, "New Securities Tied to Assets", *New York Times*, July 20, 1985, and Lowell Bryan, "The Selling of American Loans", *Wall Street Journal*, October 20, 1986.

9. Money center banks hold less capital relative to assets than most regional or smaller banks. Therefore, it is unclear why the cost of financing the same loan should be *lower* for regional and small banks who are the primary purchasers of loans. An explanation for this pattern is provided below when the motives for collateralization are discussed.

10. Another explanation for the use of SLCs and loan sales with recourse is provided by Benveniste and Berger (1986). They show that the ability to issue securitized claims can improve the allocation of risk-sharing among a bank's debtholders and depositors. In particular, securitization provides some bank claimants a senior claim to certain assets. If investors were to vary in their degree of risk-aversion, securitization may result in a lower cost of funds by providing richer risk-sharing opportunities. Benveniste and Berger's model is based on an assumption that investors' risk-sharing opportunities outside the bank are limited. Their model does, however, yield implications similar to the model developed in this paper.

11. A similar argument can be made for banks with uninsured deposits and subordinated debt outstanding. Moreover, the largest issuers of SLCs and sellers of loans are money center and large regional banks with the largest proportion of uninsured (or partially insured) deposits.

12. See James (1987) for a formal proof of this proposition.

13. Selling loans or issuing collateralized debt can of course increase the risk of deposits. This will occur when *existing* assets are sold or collateralized (that is, when cash flows to depositors are reduced) or when new loans are sold when the activity would have been profitable with deposit-financing.

14. Another problem with using the average interest cost of large CDs calculated from the Call Report data as a proxy for the rate paid on newly issued CDs is that the average interest cost reflects rates paid on CDs issued in previous quarters as well as newly issued CDs. To determine whether the average interest cost of CDs is a reasonable proxy for the rate offered on CDs in a given quarter, I obtained the Innerline survey of rates paid on newly issued

CDs by 300 banks for the first quarter of 1985. Thirty-nine of the banks in my sample reported rates to Innerline. The average rate reported by these banks in the Innerline survey was 9.28 percent. The average interest cost of CDs from the Call Report is 9.12 percent for that quarter. The difference in rates is not significantly different from zero. Moreover, the correlation between the two series is .60.

15. The dollar volume of time deposits of $100,000 or more is reported for six maturity categories: one day, 3 months or less, over 3 months to 6 months, over 6 months to 12 months, over 1 year to 5 years, and over 5 years. The weighted average maturity is calculated in months, with deposits with a maturity of 3 months or less assigned a maturity of one month. For the remaining categories, the maturity of CDs is assumed to be the longest maturity in that category. For deposits over 5 years, a maturity of 60 months was assigned.

16. This calculation is based on a simplifying assumption that the variance of the return on debt is zero.

17. A larger value of Short implies a greater maturity mismatch between bank assets and liabilities. The absolute value of the difference between short term assets and liabilities is used to account for the fact that earnings variability induced from interest rate changes can arise through either short-term assets exceeding short-term liabilities or the converse. Reporting requirements necessitated using a one-year dividing line between Short and long-term assets. See Flannery and James (1984) for a description of how Short is constructed.

18. The coefficient on the T-bill rate variable of less than one may appear puzzling. However, note that for this sample of banks the average maturity of CDs outstanding exceeds 90 days (see Table 1). The results in Table 2 may reflect the fact that short-term rates (that is, 90 T-bill rates) are less volatile than long-term rates.

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