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INTEREST RATE SWAPS: THEIR USE IN FINANCING AGRICULTURE

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Interest rate volatility in the early 1980s led to several financial innovations which include financial futures contracts, options on financial futures instruments, and recently interest rate swaps. The interest rate swap (one of several types of swaps) is an innovation which found a niche in financial markets and has achieved phenomenal growth since 1981. As a result, swaps have begun to rival the use of financial futures and options as an interest rate risk management tool. Some observers have estimated that swaps have grown from an infant industry in 1982 (with total traded volume of $100 million) to an $80 billion market in just 3 years. Swap market observers contend the swap is here to stay due to growth in swap innovations and their general applicability.

Swap financing techniques have been used by numerous financial institutions and corporations to transform interest payments from a floating-rate to a fixed-rate basis, and in other instances from fixed to floating rates through the exchange of interest payments on debt. The swap enables a business to potentially reduce its overall exposure to interest rate fluctuations and may create cheaper

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liabilities or higher-yield assets in the process. Swapping activity has been likened to a "mega-million dollar financial flea market" in which corporations and financial institutions swap something they do not want for something they do want.

This paper examines the economics of interest rate swaps. First, the history of swapping is briefly examined to better understand why and how it evolved. Second, the economic incentives to swap are discussed briefly and swaps are compared with other means of reducing risk. Third, use of swap financing by agricultural lenders will be explored with the use of some examples. Finally, some research issues are raised.

Development of Interest Rate Swaps

Characteristics which apparently contributed to the rapid growth of swap financing are the relative simplicity, flexibility, and efficiency of the typical swap transaction. In order to execute a swap the originator needed only call an intermediary (usually an investment banker) who in turn located a counterparty with an equal and opposite asset structure. Most swap arrangements could, and still can be, worked out over the phone. The swap contract itself was usually only 3-4 pages in length.

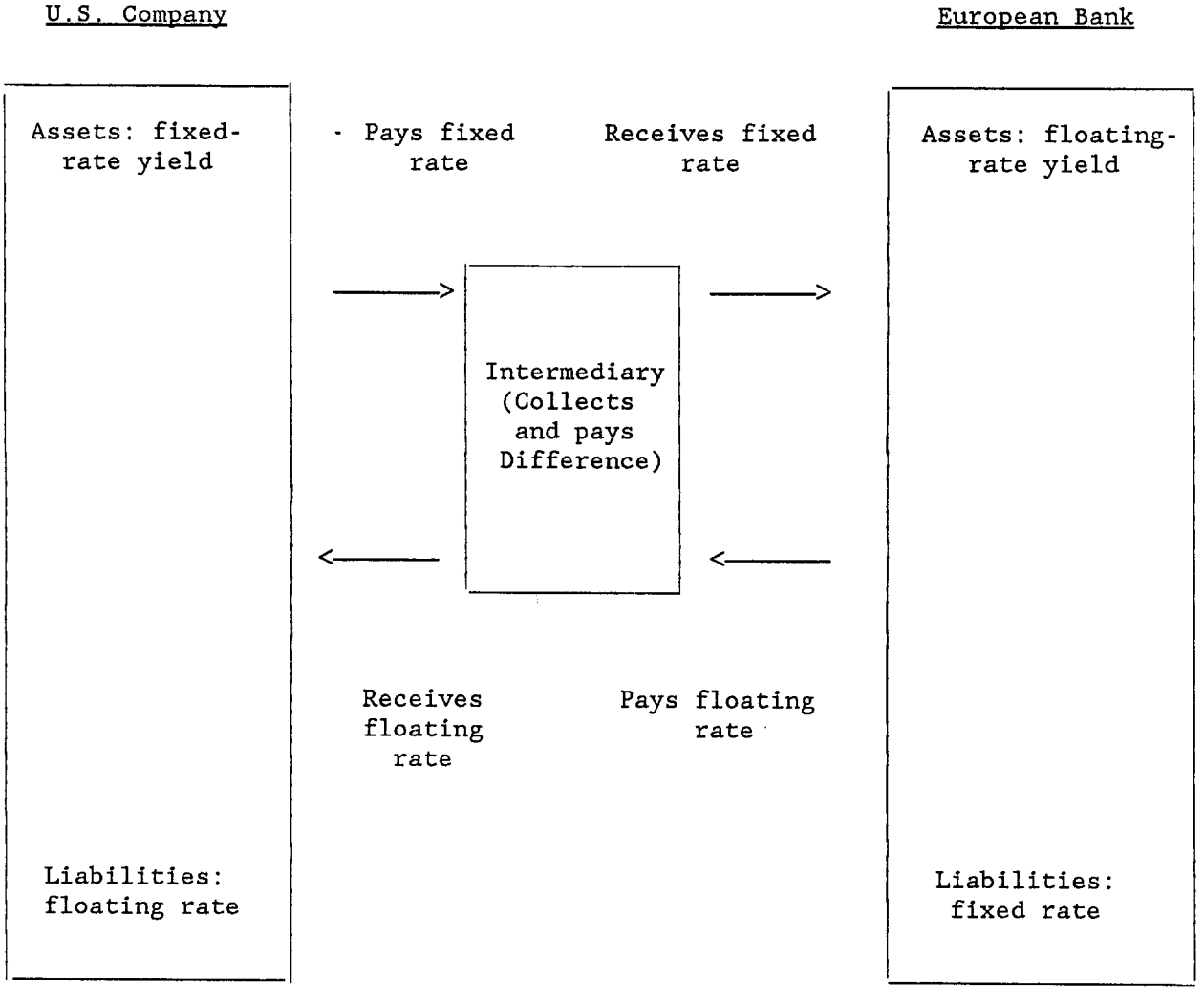
The first major swap transaction to gain wide publicity took place in the Eurobond market with the Deutsche Bank Luxembourg swap. The bank initiated what is known as a "plain vanilla" swap in which it converted a dollar Eurobond issue with a fixed rate into simulated floating-rate liability at a spread below the London Interbank Offered Rate (LIBOR). Other European banks soon followed suit. The

major impetus for the execution of the swap was that foreign banks were eager to match their floating-rate assets with floating-rate liabilities. Deutsche Bank Luxembourg, as well as most other large European banks, had access to relatively cheap fixed-rate financing as a result of their high-grade credit ratings. Bank assets usually carried floating rates.

The basic strategy was to swap the fixed rate at which the bank could borrow for the floating rate of a U.S. corporation as illustrated in Figure 1. The European bank ended up paying a floating rate on its liabilities, which more closely mirrored its floating-rate assets and, therefore, reduced its interest rate risk exposure. The transaction benefited the U.S. corporation by effectively transforming its variable-rate liabilities into a fixed-rate loan. Companies could borrow on a cheaper floating-rate basis and turn these borrowings into fixed-rate debt at a lower cost than could be obtained through normal channels (such as a bond issue). These transatlantic swap deals are generally regarded as the initial experience with swap financing in the U.S.

Use of swaps in the domestic U.S. market began to gain momentum in 1982. Two early participants in this market were the Student Loan Marketing Association (Sallie Mae) and ITT financial corporation. This swap agreement was executed in 1982, and it caught the attention of many major financial institutions. All of the ingredients that motivate a swap transaction were present. Sallie Mae had just issued $100 million in 13.5 percent fixed-rate debentures, while ITT was rolling over $100 million of commercial paper at a floating rate of

Figure 1. Illustration of Fixed-for-Variable, Single-Currency (Plain Vanilla) Interest Rate Swap



50 basis points above the 3-month Treasury bill rate. As a result of the swap, Sallie Mae was able to obtain floating-rate debt to match its floating-rate assets, and ITT managed to lock in the cheaper fixed rate that it preferred on its borrowings. Both parties improved their financial situations because Sallie Mae had a comparative advantage in the long term, fixed-rate debt market, while ITT had a clear advantage in the short-term, floating-rate market.

As the swap market expanded it also grew in diversity. Currently, there are four identifiable swap structures: the interest rate (coupon or generic) swap, the fixed-rate currency swap, the currency coupon swap, and the basis rate swap.

The basic structure of an interest rate (coupon) swap is an exchange of fixed-rate interest for floating-rate interest in the same currency, calculated using a mutually agreeable notational principal amount and maturity. These "plain-vanilla," interest rate swaps are the focal point of this paper. A fixed-rate currency swap involves the exchange of fixed-rate interest in one currency for fixed-rate interest in a second currency. The currency coupon swap is a hybrid of the interest rate swap and the fixed-rate currency swap. It consists of the exchange of fixed-rate interest in one currency for floating-rate interest in another currency. The structure of the basis rate swap is similar to the plain-vanilla interest rate swap. The exceptional feature is that with a basis rate swap floating interest payments calculated on one "basis" (a reference rate) is exchanged for floating interest calculated on a different "basis". For example, the two reference rates could be

LIBOR and the U.S. Treasury bill rate.[1]

The emergence of a secondary market provided the vehicle for a flood of new corporate entrants. Investment and commercial bankers, acting as intermediaries, initially earned large commissions for arranging swap deals. The growing market has produced fierce competition among investment bankers. Typical swap fee rates had reportedly declined to one-eighth of one percent of the principal amount by early 1986. Although swap transaction volume has grown rapidly, swaps have not been used widely and a specialized swap vocabulary has evolved in the market. Appendix Table A contains several frequently used terms and their common usage.

Economic Incentives to Swap

Financial managers have utilized swap arrangements for two separate and somewhat different reasons; 1) to take advantage of a lower-cost financing option (the arbitrage motive), and 2) to transform an existing asset or liability item and either reduce exposure to interest rate risk (the hedging motive) or augment interest rate risk (the speculative motive). One or more of these management objectives may be operative in a given swap. A brief, nontheoretical discussion of the economic issues underlying these two arguments is presented in this section.

Reduction of Financing Costs

Swap proponents contend that rate swaps provide an efficient method of improving flexibility over financing decisions and

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[1] An excellent discussion of the valuation methodology for generic and nongeneric swaps is found in Kopprasch et al. (1985).

minimizing financing costs. Since the transaction does not involve exchange of principal amounts (net interest payments are the only cash flows actually paid), swaps give corporations the flexibility to vary their underlying source of funds. For example, a corporation could switch from a bank line to commercial paper (depending on which was the cheapest source of funds) during the term of the swap. Swaps may be used on debt obligations that are already outstanding. Therefore, corporations and banks are able to vary their liability mix without adding leverage to their balance sheets.[2]

A potential cost saving advantage is that borrowing rates can be managed for the life of the swap. These savings could be substantial, if rates were to move in the anticipated direction. In fact, most swap transactions by corporate borrowers result from a management decision to change the nature of an outstanding debt in order to minimize borrowing costs. Simple cost reduction strategies could involve; 1) replacing existing floating-rate debt with fixed-rate debt when borrowing rates are expected to rise, or 2) replacing floating-rate debt with fixed-rate debt when borrowing rate declines are anticipated. Traditionally, these replacements have occurred through a refinancing, which required the firm to purchase one instrument and issue another.

A natural question occurs. Why would a firm go to the trouble and expense of negotiating a swap when it could, for instance, buy

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[2] It is useful to note that swaps do not actually qualify as financing, since a financial liability (one which would be shown on the balance sheet) is not created in the transaction. Only an exchange of cash flows is made.

back its floating-rate liabilities and issue fixed-rate debt with the price and maturity characteristics it desires? The answer is largely economic in that the transaction costs of refinancing may exceed the fees incurred in a swap transaction. In the case of a bond issue those refinancing costs include advertising, an underwriting spread, legal and other noninterest fees.

In the situation where a firm wants to buy back bonds and issue short-term or long-term debt at a lower rate, the premium over par on the existing bonds may be substantial. The repurchase loss in this case could prohibit a timely refinancing and debt restructuring. Also, refinancings typically take time to implement and may be difficult to arrange with the firm's existing lenders.

Interest rate swaps are purported to exploit a credit anomaly by effectively arbitraging (i.e., buying and selling for profit) the credit spread differentials which have been found to exist between the long-term capital market and the short-term bank credit market. These "quality spread differentials" are premiums that borrowers with low credit ratings have to pay over borrowers with higher credit ratings. For example, companies with low credit ratings cannot raise funds through a fixed-rate bond issue, or can do so only at a high cost. With the advent of swap financing, however, a company could borrow cheaper floating-rate funds from a bank and transform this funding to a fixed-rate basis by entering into a coupon swap with a

fixed-rate issuer.[3]

Table 1 contains an example of how a credit quality spread could be exploited. The situation assumes interest rates have recently fallen and company management wants to issue long-term bonds. However, the firm has a Baa bond rating and would have to issue bonds at 10.20 percent. Through an intermediary a bank was located, which wanted to reduce its floating rate below its present 75 basis points over the T-bill rate, and thereby improve its spread on floating-rate assets. The bank is assumed to carry a Aaa bond rating and could issue long-term bonds at 8.8 percent. The resulting quality spreads were 0.50 percent in the short-term, floating-rate credit market and 1.40 percent in the long-term bond market. Under the swap arrangement the company agreed to pay the bank an additional 1 percentage point. The company borrowed at its floating rate (T-bill + 1.25%) and paid the bank 9.8 percent. The bank borrowed at its long-term rate (8.8%) and paid the company its 3-month T-bill rate plus 1.25 percent. The net cost of funds to the company declined to 9.8 percent (a 40 basis point saving) and the cost of funds for the bank fell to the T-bill rate plus 0.25 percent (a 50 basis point saving). In this case the saving to the bank (the floating-rate payer) is larger than it is for the company (the fixed-rate payer). This would be a fairly common situation when rates are low and can be expected to rise in the future.

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[3] Floating-rate debt of most firms is typically of the short-term variety (bank credit, commercial paper, certificates of deposit, or floating-rate notes with short effective maturities), while fixed rate debt is predominately in the form of long-term bonds and debentures.

Table 1. Hypothetical Quality Spread Differentials and Net Cost of Funds

Item	Company	Bank	Quality Spread
Cost of credit facility:			
floating-rate	3 mo. T-bill + 1.25%	3 mo. T-bill + 0.75%	0.50%
fixed-rate	10.20% (Baa)[a/]	8.8% (Aaa)[a/]	1.40%
Exchange of rates:			
swap inflow	3 mo. T-bill + 1.25%	9.8%	
swap outflow	9.8%	3 mo. T-bill + 1.25%	
net cost	(T-bill + 1.25) + 9.8 -(T-bill + 1.25)=9.8%	8.8 + (T-bill + 1.25)-9.8 = T-Bill + 0.25%[b/]	
saving	(10.20% - 9.8%)=0.40%	(1.25% - 0.75%)=0.50%	

The general concept of arbitrage suggests that market adjustments (such as changes in interest rates, stock prices, commodity prices, etc.) are driven by individuals who seek out arbitrage profit opportunities from several sources. One of those sources would be excessive quality spreads between low- and high-rated issuers of debt. If excessive spreads existed, a sufficient number of market participants would recognize this fact and would exploit the opportunity. Arbitrage activity would eventually (but not instantaneously) force rates and prices to levels consistent with all relevant, market information, and excess profits would be eliminated. Expectations theory, from which market efficiency conditions derive, implies that markets (bond markets, for instance) adjust rapidly to new information as expectations of participants are revised. Once expectations have been completely revised, prices of financial assets with different maturities fluctuate about their "intrinsic (expected) values."

Evidence from previous studies suggests that financial markets are efficient (i.e., they do process information efficiently and prices respond quickly).[4] That being the case in both short-term credit and long-term bond markets, quality spread differentials exploited through the swap market would be due mainly to differences

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[4] A nontechnical discussion of the market efficiency and references can be found in Van Horne (1984). A theoretical treatment of the subject can be found in Copeland and Weston (1983).

in risk that lenders face in the fixed- and floating-rate markets.[5]

Risk Management

While a primary motivation for using interest rate swaps has been interest cost reduction, a second major consideration for financial institutions and nonfinancial corporations is the potential for reducing interest rate risk. Generally, parties to an interest rate swap are motivated to change their exposure to interest rate fluctuations in opposing directions.

For example, assume firm A currently holds floating-rate liabilities and fixed-yield assets in its portfolio. If interest rates rise unexpectedly, firm A would realize a loss in earnings as interest expenses rise and revenues remain constant. An unexpected decline in interest rates would generate an earnings windfall. The described sensitivity of firm A's net earnings to interest rate fluctuations represents the firm's exposure to interest rate risk. Firm B (the counterparty to a swap with firm A) would hold assets which generate a variable rate of return based on market interest rates, while its interest payments on long-term liabilities are fixed. Firm B would benefit from an unexpected increase in interest rates, since revenues would rise while the cost of borrowing remains stable, yielding an increase in net earnings.

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[5] The theoretical counterpart to this result is that efficient markets are a necessary, but not sufficient condition for the pure expectations theory to hold. Expectations theory and the presence of liquidity (risk) premiums jointly imply efficient markets also. In this context excessive quality spreads would be due to abnormally large liquidity premiums for risk.

The portfolio choices available to corporate and financial institution managers differ, therefore, the risk management alternatives related to interest rate swaps will also differ. When deciding to execute a swap, corporate management must weigh the benefits of lower cost financing against the costs associated with shifting rate risk and default risk from debt holders to equity holders. The shift in incidence of rate risk is hypothesized to occur because debt holders (creditors, or those in net long positions) consider short-term debt less risky than long-term debt, and require smaller credit quality spreads.[6] However, short-term debt would be more risky than long-term debt for equity holders because of repricing risk (the possibility that the debt will not be rolled-over at the same rate in subsequent periods). Furthermore, due to various bond indenture and priority rules which may apply, issuance of short-term debt shifts implied default risk from debt holders to equity holders (Ho and Singer 1982). For example, a firm that swaps its floating-rate, short-term interest payments for fixed-rate payments (instead of borrowing long term at a fixed rate) would be shifting risk to its equity (stock) holders.

The trade-off between lower cost funds and increased risk exposure to equity holders also exists at financial institutions. In theory a bank could operate with no interest rate exposure, if it had no equity capital and perfectly "match funded" all of its assets. Practically, this is not possible, however, due to regulatory

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[6] This assumption would be consistent with Hicks' liquidity premium theory of interest rate term structure and a normal, upward-sloping yield curve (Van Horne 1984).

restrictions, and changes which often occur in interest rates and the composition (maturity mix) of bank assets and liabilities. Banks would find it extremely difficult (or impossible) to completely insulate bank capital from interest rate risk. In spite of these limitations, bank risk management has typically involved efforts to either achieve a closer match between interest rate sensitive assets and liabilities, or to control rate risk exposure through active use of other informal (experience) or formal methods of asset/liability management (Gildea 1985). The existence of a negative funds gap (the dollar volume of deposits and other rate-sensitive liabilities being greater than that of rate-sensitive bank loans and securities) would translate into reduced bank profits if interest rates increased significantly.

Banks have a couple of alternatives to use in modifying the financial consequences of a funds gap, once it has been identified and measured. First, the gap could be "managed," although that may not be a viable option for smaller banks which do not make significant use of purchased funds.[7] A second option is to hedge bank earnings through the use of financial futures.[8]

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[7] Gap management involves actively adjusting the volume of rate-sensitive bank assets and/or rate-sensitive liabilities. Management of rate-sensitive liabilities (e.g., CDs, money market deposit accounts, Fed funds purchased) is a viable alternative for large banks. Small banks have tended in the past to be relatively more asset sensitive.

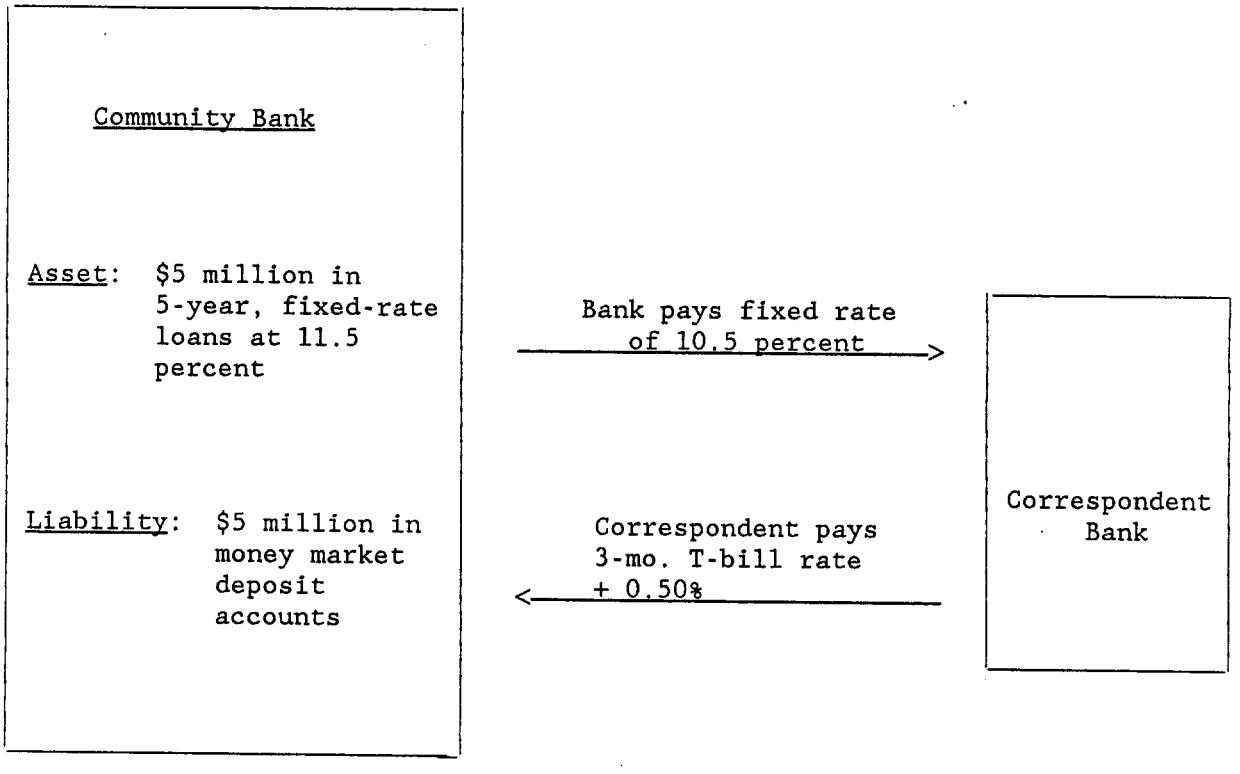
[8] Large banks have been the primary users of financial futures among banking institutions (Drabenstott and McDonley 1984). Small banks have not utilized futures contracts as an interest rate risk management tool due to lack of bank expertise, and the existence of regulatory and accounting problems.

The conventional strategy for hedging a positive funds gap given the expectation that rates will rise, is to take a long position by buying a sufficient number of futures contracts to cover the gap. This effectively locks-in the desired interest spread and protects bank earnings. The hedged bank trades interest rate risk in the cash market for basis risk in the futures market (basis risk being more predictable). The strategy works in the opposite direction when the bank identifies, and wants to hedge, a negative funds gap and interest rates are anticipated to rise.

Use of interest rate futures by banks is confined to defensive, risk-avoiding measures. A positive funds gap could not be converted to a negative gap using futures, since bank regulations restrict a bank from gapping for the purpose of speculating on interest rate changes. If bank management wishes to mismatch assets and liabilities, that must be done in the cash market.

A third option for bank management of a balance sheet gap is to engage in a fixed-for-variable rate swap, as illustrated in Figure 2. For simplicity assume the bank has written $5 million in 5-year fixed-rate loans at a rate of 11.5 percent, payable quarterly. The bank has funded those loans with $5 million in variable-rate money market deposit accounts and has a negative funds gap. To protect bank earnings from a rate increase the bank enters a swap agreement with a correspondent bank (or other counterparty). The agreement requires the bank to pay a fixed rate of 10.5 percent on the notional amount of $5 million. The correspondent agrees to pay the bank a 3-month T-bill rate plus 50 basis points (the correspondent's borrowing

Figure 2. Closing a Balance Sheet Gap with an Interest Rate Swap



rate), reset and payable on a quarterly basis.

Three observations can be made concerning the swap. First, the community bank's spread has been reduced to 1 percent, less any rate risk which might arise if the T-bill rate and the rate on money market deposit accounts diverge by more than 50 basis points.[9] Second, this swap covers only a portion of the bank's balance sheet and other swaps may need to be considered if the gap exceeds the notional amount of the swap. A macro-hedge in the futures market could have potentially closed the entire balance sheet gap. Third, the community bank may be required (as the fixed-rate payer) to provide collateral to the correspondent to consummate the deal.

An interest rate swap and a financial futures contract would have a similar impact on bank earnings. In each case interest rate risk would be reduced or eliminated and bank performance would potentially improve. The similarity stops there. Table 2 contains a comparison of the financial characteristics of swaps, futures, forwards, and options.

The unique features of the swap arrangement are; the length of contract, the potential credit risk, the size of the typical contract, and its relative illiquidity. Swap contract maturities begin where interest rate futures terminate in the maturity spectrum. Financial futures have the disadvantage of being available only for delivery at 3-month intervals with contract maturities up to 1-1/2 years on T-bills and 2-1/2 years on T-bonds. The most actively

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[9] Presumably, the bank would set the rate paid on MMDAs based on the T-bill auction rate and this form of "basis risk" could be eliminated.

Table 2. Comparison of Characteristics of Financial Hedge Instruments

Characteristic	Instruments			
	Swaps	Futures	Forwards	Options
Periodic cash flows prior to maturity	yes	yes	no	no
Periodic cash flows based on the market value of the position held	no	yes	no	no
Opportunity to match cash flows of underlying assets and liabilities precisely	yes	no	yes	no
Significant cash flows at termination of the contract are possible	yes	no	yes	yes
Obligation to take or make delivery at maturity (unless settled earlier)	no	yes	yes	no
Standardized instruments trading on organized exchanges	no	yes	no	yes
Relative liquidity	low	high	low	high
Relative credit risk	varies	low	varies	low
Relative duration of contract	long	short	varies	short
Relative dollar size of typical contract	large	small	varies	small
Relative flexibility in defining terms of the contract	high	low	high	low
Intermediary/broker transaction fees	moderate	low	moderate	low

traded financial futures contracts are in the 3- to 6-month range. Swap contracts usually carry maturities in the 3- to 10-year range and provide a vehicle for hedging interest rate risk well beyond the maximum horizon of exchange-traded futures and options.

A swap is a private transaction, and not legally tied to an asset or a liability, therefore, the risk of default would be high relative to futures or options which carry safeguards. Since no principal is exchanged, credit risk is confined to the cash interest payments received. If a counterparty stopped making interest payments under the agreement, the initiating party could also stop paying and would be left with interest rate risk exposure. To reduce the risk of default, collateral is increasingly required in the form of pledged securities (usually U.S. government issues), or additional security is provided with the use of standby letters of credit and third-party guarantees. Since credit risk exposure increases with swap maturity (the number of years it is in effect) and decreases with the passage of time (as payments are made), the collateralization issue is most critical when the swap is negotiated.

Additional Incentives for Lenders

An advantage of the swap contract is that it allows lenders to separate the "rate decision" from the "funding decision." For example, a bank could make the decision to provide a loan, or issue notes, before it decides what rate would best meet its needs. Once the decision is made, the cash flows resulting from the funding decision can always be exchanged for cash flows with the desired rate. With this flexibility a commercial bank is allowed to offer

customers fixed-rate loans without taking on additional interest rate risk.

Swaps could provide agricultural banks access to fixed-rate money that their deposit base and traditional funding sources may not currently provide. Agricultural banks have traditionally funded themselves with demand and time deposits supplemented with short-term variable rate debt, such as certificates of deposit and money market deposit accounts. Due to increasing reliance on retail deposits and the implied rate risk exposure, agricultural banks have been increasingly reluctant to make farm and agribusiness term loans on a fixed-rate basis. With the use of an interest rate swap a bank could continue to acquire funds on a variable rate, then swap with a fixed-rate payer to lock-in an acceptable spread. The advantage over a comparable futures hedge is that the spread is tied to a long-term loan. Potential counterparties for agricultural banks are the Federal Intermediate Credit Bank, life insurance companies, large banks, and selected nonfinancial corporations which have access to bond markets at attractive rates. In effect the swap serves as a substitute for fixed-rate financing in the bond market, which would not be available to the small bank.

An internal swap can be potentially useful to bank holding companies which have acquired banks with different asset/liability structures. The member bank which is excessively asset sensitive (e.g., overlent) needs access to fixed interest rates and is willing to pay a variable rate to a liability-sensitive (underlent) member bank in need of a higher yielding asset. The holding company would

serve as the intermediary in this arrangement.

The problems inherent in implementing swaps at smaller agricultural banks are basically the same as with interest rate futures. Limited resources and the lack of personnel trained in swap trading are major deterrents. Another problem is the lack of useful, or easily understood, information on swap trading with commercial banking applications. An additional deterrent is the relatively large size of the typical swap transaction (contracts start at $5 million). That contract size would exceed the needs of many individual, small agricultural banks, but could readily match the funding requirements of larger agricultural credit corporations.

Agricultural Examples

To better illustrate how interest rate swaps can play a role in financing agriculture, two examples from the St. Paul Farm Credit Services portfolio are discussed in greater detail.

The FICB Swap

The initial St. Paul Farm Credit Services interest rate swap transaction occurred between the Federal Intermediate Credit Bank of St. Paul (FICB/St. Paul) and a bank counterparty in August 1985. A notional principal amount of $30 million with a maturity just under 2-1/2 years (August 1, 1986 - January 20, 1987) was negotiated in this plain vanilla swap. The objective of the FICB was to shorten the effective maturity of the bond portfolio by replacing fixed-rate interest payments with a floating-rate commitment repriced at 6-month intervals. The FICB became the floating-rate payer in the swap with the reset based on the Farm Credit bond coupon rate.

Table 3 contains the rate history and cash flow summary for the FICB/St. Paul Swap transaction. Due to the decline of interest rates and reduced cost of 6-month FCS bonds, the spread between the negotiated fixed and variable rates widened. As a result, the FICB received net interest payments in each period. Total net interest gain was projected to equal $784,234. In addition to the interest gain the FICB was able to improve its debt structure without retiring existing debt.

The FLB "Forward Rate" Swap

A second example is provided by two "forward rate swaps" negotiated by the St. Paul Farm Credit Services during June - August 1986. The underlying objective of these two swaps (as part of a planned series of swaps) was to reduce the cost of existing high-coupon Federal Land Bank (FLB) debt and, thereby, reduce the average cost of the variable rate pool on the FLB over a 4-year period. In each of these two swap deals the forward rate was determined by entering two simultaneous swaps. The first swap requires the counterparty to pay FLB/St. Paul a fixed rate, and FLB/St. Paul pays the counterparty a variable rate. The offsetting swap requires the FLB/St. Paul to pay the counterparty a fixed rate (at a spread below the fixed rate the FLB receives from the counterparty) and the counterparty pays a floating rate to the FLB. An important feature of these simultaneous swaps is that the maturities differ.

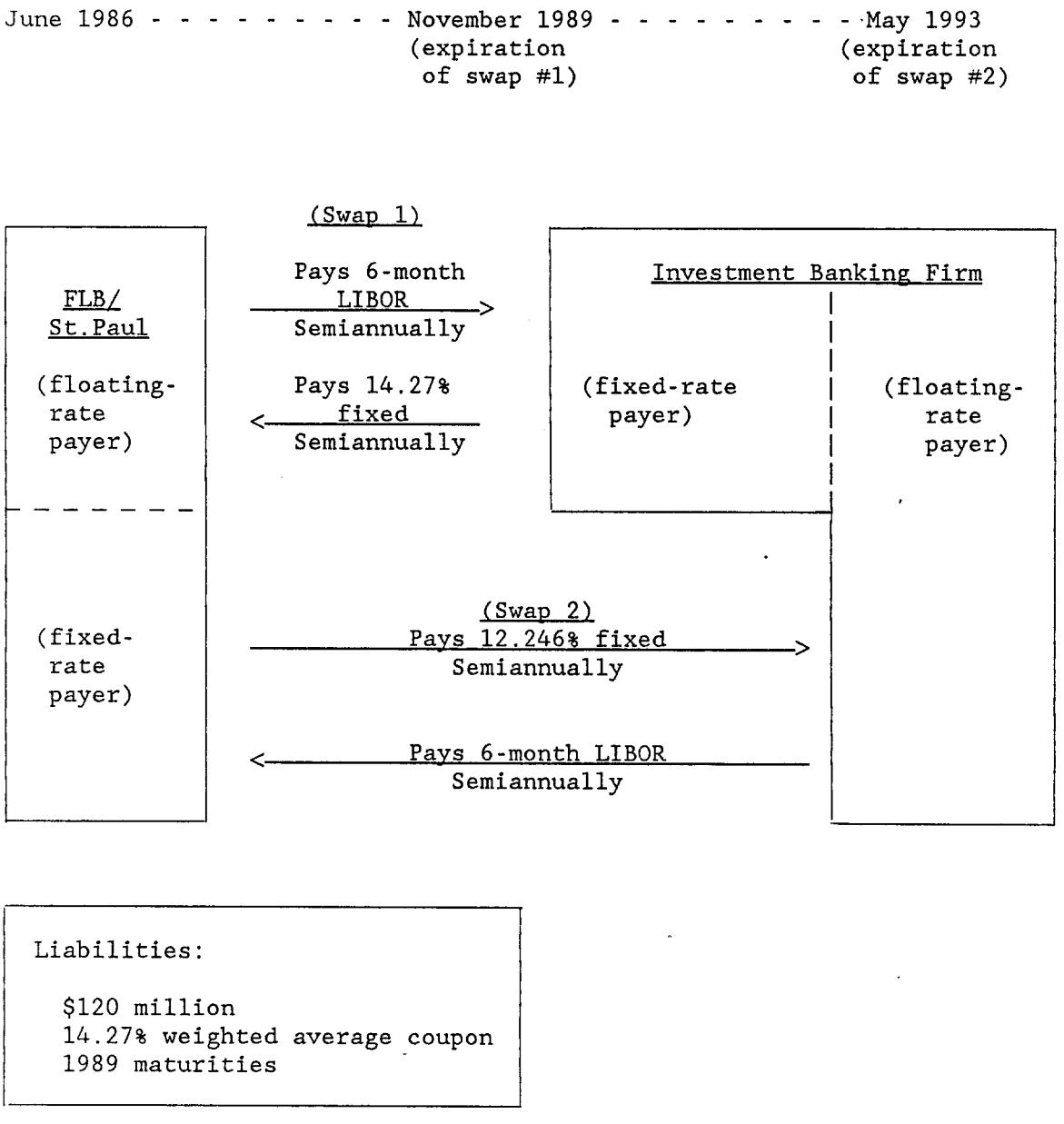
Figure 3 provides an illustration of the first in the series of forward rate swap arrangements which was negotiated with an investment banking firm with a guarantee provided by the parent

Table 3. Summary of the FICB/St. Paul Interest Rate Swap

Payment Date	FICB/St.Paul Floating Rate	Counterparty Fixed Rate	Semiannual Accrued Interest Counterparty	Semiannual Accrued Interest FICB/St. Paul	Net Payment to FICB/St. Paul
August 1985	8.02%[a/]	9.309%	--	--	--
January 1986	8.00[a/]	9.309	$1,311,017	$1,129,483	$181,534
July 1986	8.00	9.309	1,396,350	1,200,000	196,350
January 1987	6.60	9.309	1,396,350	990,000	406,350

a/ The swap agreement called for the floating rate to be indexed to the underlying FICB 6-month bond issue, which on the settlement date (August 1, 1985) carries a yield of 8.02 percent. The first reset also occurred on August 1 at 8.00 percent, the coupon rate of the 6-month Farm Credit bond deliverable on January 2, 1986.

Figure 3. Illustration of the FLB/St. Paul Forward Rate Swap



Liabilities:

$120 million
14.27% weighted average coupon
1989 maturities

company. Debt maturity and rate adjustments were both accomplished through the swap. Debt maturities scheduled for July and October 1989, were extended until November 1989. The effective rate on the $120 million liability was reduced by 202 basis points (from 14.27% to 12.246%) from June 1986 until November 1989. The estimated annual reduction in interest expense for the FLB/St. Paul is $2,428,800. By comparison a traditional repurchase of the existing bonds at a premium over par and reissue of a 7-year Farm Credit bond would have resulted in a $19.62 million loss.[10]

The forward rate was locked-in until expiration of the first swap. A reduction in the average cost of debt in the variable rate pool was accomplished with limited rate risk exposure and maximum flexibility. After 1989, the FLB continues to pay a fixed rate to the investment bank under the second swap. At that point in time the FLB may be in a stronger earnings position than it is currently, and be able to carry the cost of high coupon debt. Alternatively, the FLB could elect to either fund the swap and pay the price to terminate it, or enter another forward swap.

The second forward swap in the series occurred between FLB/St. Paul and an investment bank with a notional principal amount of $142 million. The underlying FLB liabilities carried a weighted average coupon rate of 14.843 percent and had 1992 maturities. To effect the

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[10] A comparison of all-in costs indicated that the forward swap rate (12.246%) was greater than the rate on the existing bonds (11.984%) by 26 basis points, and greater than new issue 7-year Farm Credit bonds (8.76%) by 348 basis points. Clearly, the loss on repurchase of the bonds would have swamped the rate reduction obtained through a refinancing.

forward rate the FLB/St. Paul negotiated two simultaneous swaps analogous to those already shown in Figure 3. The first swap requires the investment bank to pay FLB/St. Paul 14.843 percent (fixed) from June 1986 to August 1992. In exchange FLB/St. Paul pays the investment bank 6-month LIBOR. The offsetting swap has FLB/St. Paul paying the investment bank 13.155 percent (fixed) from June 1986 until August 1996. The investment bank reciprocates by paying 6-month LIBOR to FLB/St. Paul. As a result, the effective rate on FLB debt is reduced 169 basis points to 13.155 percent through August 1992. The interest expense reduction is $2,396,960 on an annual basis. In August 1992, the FLB again has the option to fund or replace the second swap.

Combined forward rate swaps provide the FLB/St. Paul with a 9.6 basis point reduction in the average cost of the FLB variable rate pool over the next 3-1/2 years. This suggests a borrowing rate for FLB farm borrowers which will be lower than would occur without the use of swaps.

Farm Credit Services potentially gains some additional future funding advantages through use of interest rate swaps. Spreads between Farm Credit bonds and Treasuries could widen as the FCS releases additional adverse financial information on its farm loan portfolio. Swaps could be used to effectively reduce repricing risk while the maturity of the FLB bond portfolio is being reduced. Basis risk, implied by a widening spread between Farm Credit and Treasury issues, could be managed by issuing term debt (e.g., 3-year bonds) and swapping the fixed rate for a floating rate such as 6-month LIBOR

(which has been quite stable since 1982, as indicated by 90-day LIBOR yields shown in Figure 4a). In effect the FLB would be substituting basis risk implied by an increasing spread between LIBOR and Treasury bills for basis risk associated with Farm Credit and Treasury issues. The spread between 90-day LIBOR and T-bills has been relatively stable since 1982 (see Figure 4b). A potential future disadvantage to this swap strategy is that LIBOR-Farm Credit spreads could narrow at a time when Farm Credit-Treasury spreads are widening.

Some Research Issues

Substantial growth has occurred in the size and diversity of the swap market. The interest rate swap, one such financial innovation, provides a tool for financial restructuring without incurring the additional transaction costs associated with traditional refinancing practices (repurchase and reissue of debt). In addition rate swaps are widely viewed as tools which potentially; 1) reduce borrowing costs by arbitraging credit quality spreads between short-term credit market instruments (and rates) and long-term debt instruments (and rates), and 2) provide an effective hedge against interest rate risk on instruments with long maturities. These hypothesized characteristics represent some of the important researchable issues underlying the economics of interest rate swaps.

Currently, there appears to be a lack of theoretical justification for the existence of excess credit quality spreads and continued swap arbitrage opportunities. It is hypothesized that these quality spreads are attributable to differences in the risks which lenders face when pricing instruments with different maturities

Figure 4a. Yields on 90-Day Treasury Bills and 90-Day LIBOR, 1979-1985

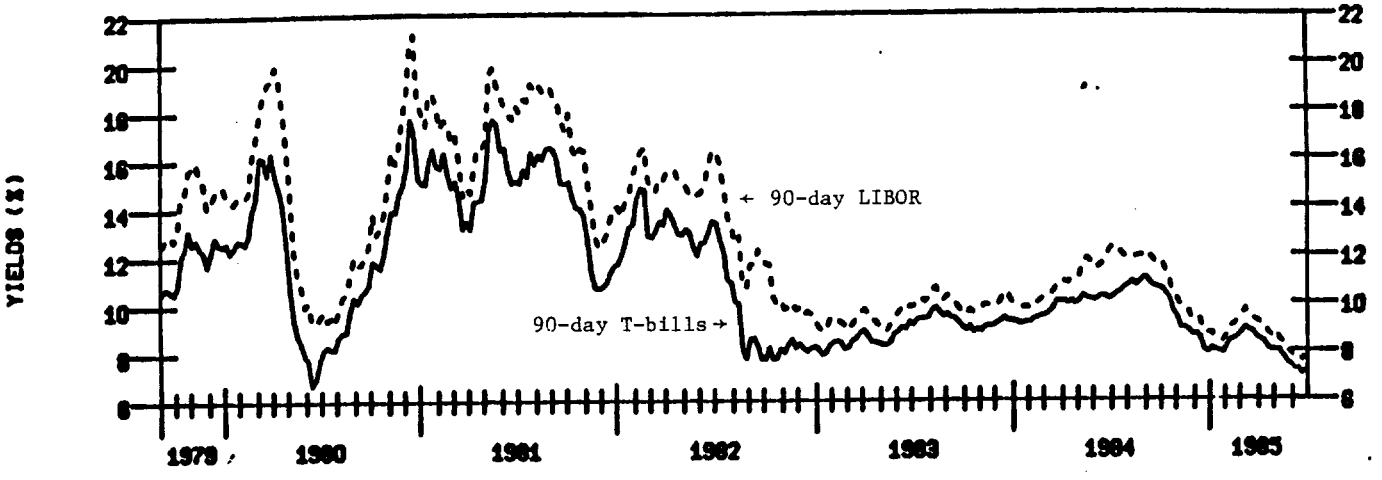
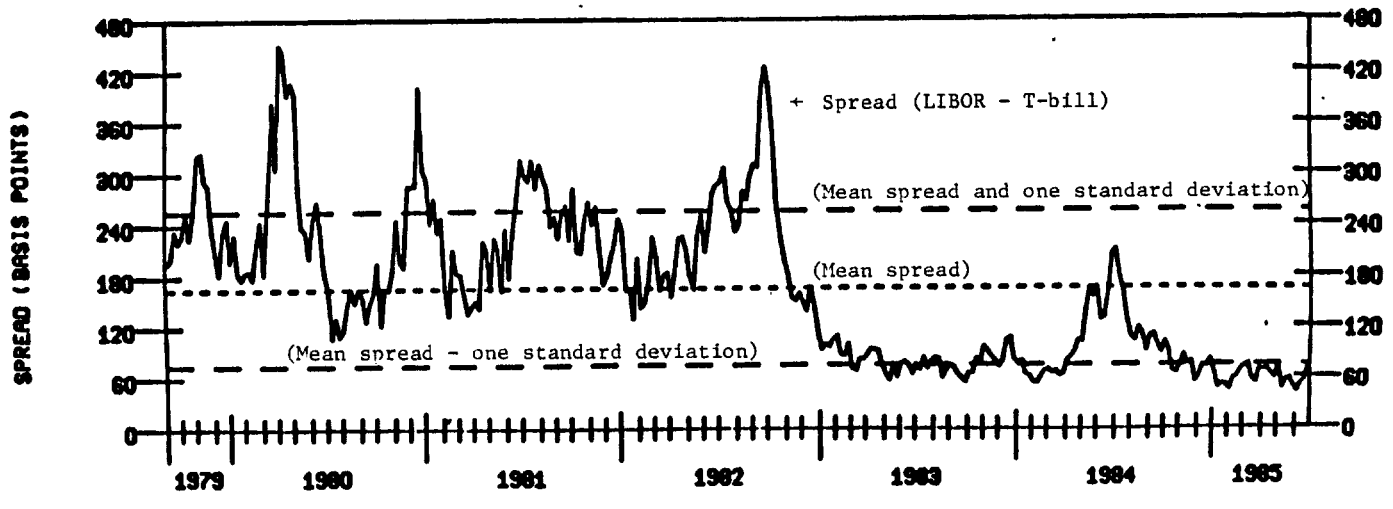


Figure 4b. Spreads Between 90-Day LIBOR and 90-Day Treasury Bill Yields, 1979-1985



(effectively different markets) and are not due to market inefficiency. A modified expectations theory which incorporates risk premiums for illiquidity and other sources of risk may provide a framework for developing testable hypotheses on pricing efficiency with respect to risk. That is, the hypotheses that expectations are rational and that any discrepancy between the expected rates of return (or in this case the certainty equivalent rates of return) of different assets is quickly arbitraged to eliminate abnormally large expected profits, could be developed and applied to swap market transactions to test the general efficient markets hypothesis.

A second research issue involves a comparison of the risk efficiency of interest rate swaps, financial futures, forward rate contracts, options and other hedge instruments. There appear to be significant differences between the financial characteristics of these risk management tools. Portfolio models have been used to develop illustrations of how interest rate futures reduce earnings risk when compared to unhedged bank portfolios. It would be useful to consider the relative risk efficiency of applying these hedging tools in the context of different asset/liability structures.

Third, interest rate swaps and financial futures suffer from similar problems when it comes to applying them to actual small, agricultural bank situations. Applied research could focus on innovations which would make swaps more adaptable for use by these financial institutions. The focus could be on ways in which agricultural banks could access and utilize swap markets to provide a fixed-rate funding alternative to support long-term, fixed-rate farm loans with a minimum of rate risk exposure.

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APPENDIX A

Appendix Table A. Swap Market Terminology

All-in-cost (AIC):	The overall value or cost of a swap excluding credit enhancements (i.e., collateral, letters of credit, etc.). Under market convention the AIC is always quoted as a semiannual rate. The AIC rate is used to discount the fixed coupon payments when computing the present value of the bond (which is part of the full price of the fixed side of a swap).
Basis swap:	A variable-for-variable interest rate swap (two interest rate indexes are involved).
Circus swap:	A combined interest rate and currency swap; also called a cross-currency interest rate swap.
Counterparty:	An end-user of a swap; a principal party to a swap other than an intermediary.
Fixed-rate payer:	The counterparty to a coupon swap which pays fixed interest and receives floating interest. This counterparty has "bought" a swap and, therefore, is "long" in the swap market and "short" in the bond market. The opposite conditions apply to the floating-rate payer.
Floating rate index:	Floating rate payments are tied to any of several short term rates such as; LIBOR, Treasury bills, commercial paper composite, prime, CD composite, or Federal funds.
Floating rate reset:	The floating rate which applies to floating rate payments is periodically adjusted to track the market. Resets can be scheduled daily, weekly, monthly, quarterly, or yearly.
Hedged swap:	A swap for which there is no underlying asset or obligation, but for which interest rate risk is reduced or eliminated in some other way.
Intermediary:	A commercial or investment bank that stands between two or more swap counterparties; the market maker.
Matched book of swaps:	A strategy used by an intermediary in an effort to reduce interest rate risk by holding offsetting swap positions with a variety of counterparties (see "Offsetting swap position").

Appendix Table A continued.

Matched swap:	A swap in which an underlying asset or liability possesses interest payment terms similar to those of the swap.
Notional principal amount:	The amount on which interest payments are calculated; usually the amount of the underlying asset or liability, which can vary between $5 million and $500 million.
Offsetting swap position:	Two swaps that counter-balance each other, thereby reducing interest rate risk (see "Matched book of swaps").
Plain vanilla swap:	A single-currency, fixed-for-variable interest rate swap. Also a coupon swap.
Reverse swap:	A swap that has terms opposite those of another swap, thereby effectively canceling the former swap (see "Unwinding a swap").
Underwater swap:	An unprofitable swap position (from the perspective of one of the counterparties) caused by adverse movements in interest rates since the inception of the swap. The losing party is making net payments to the counterparty or the intermediary and would have to pay the counter party to terminate the agreement.
Unlocking an interest rate:	Changing a fixed-rate to a variable-rate interest obligation through a swap or other means.
Unmatched ("naked" or "one-sided") swap:	A swap for which no underlying asset or liability exists.
Unwinding a swap:	Terminating a swap agreement (see "Reverse swap").