

Interest Rate Swaps: Risk Exposure and Financial Disclosure

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Abstract

In recent years, the trading of interest payments on debt obligations has become a major form of off-balance sheet financing. As swaps have increased in dollar volume, the amount of financial disclosure about these instruments has remained nonexistent or minimal. Yet, even with a lack of financial information available to evaluate swaps, previous analyses of swaps have always focused on their positive aspects. Our analysis finds there are negative aspects to swaps that need to be considered. The issues of lack of financial disclosure, unfavorable changes in risk exposure as well as questions about risk evaluations of firms involved in swaps are all related to the negative aspects of swaps. These issues are considered here. It is concluded that although there are advantages to swaps, these advantages are intrinsic to the instrument itself rather than to the alleged arbitrage profits. Furthermore, an example is used to illustrate how a firm's risk exposure can be altered by a swap agreement. The ability of the market to evaluate the change in this risk may be hampered by lack of financial disclosures.

Introduction

Interest rate swaps have become one of the most discussed financial innovations of recent years. With an estimated annual volume approaching 180 billion dollars in 1986, they have received a significant amount of attention in both the academic and trade press (1).

Interest rate swaps are contracts between two parties who agree to pay each other a stream of cash for a specified period of time. The payment schedules which are exchanged may be either fixed or variable. The motivation for these transactions varies greatly, ranging from interest rate hedging to speculation. For example, a company with long-term fixed-rate liabilities and asset returns which fluctuate with interest rates may exchange these fixed-rate obligations with a firm that wishes to avoid variable rate exposure because its asset returns are of a fixed nature. This type of hedging transaction, termed a "matched swap" is one possible motivation for swaps. Another reason is to speculate on a projected change in interest rates either by locking in a fixed rate if future rates are expected to rise or by acquiring variable-rate debt if interest rates

are expected to fall. This transaction is called an "unmatched swap."

A company's risk exposure may be altered significantly through the hedging or speculating opportunities available by way of interest rate swaps. An important question which must be addressed is whether the financial community has adequate information to properly evaluate how a particular swap will alter the risk of a firm. Specifically, does the present degree of financial disclosure allow creditors, financial analysts, and stockholders an accurate view of the risk of the firm? Can a firm's risk of bankruptcy and other types of financial distress which may be impacted by interest rate swaps be properly evaluated given the present level of financial reporting?

A Typical Swap Agreement

A simple swap involves the exchange of one company's variable-rate debt payments for the fixed-rate debt payments of a second company. For example, assume Company A is rated AAA

and wants to have variable-rate debt in its capital structure. It can issue a variable-rate bond with a rate equal to the T-bill rate plus 1.5 percentage points or a fixed-rate bond at 12 percent. Company B, rated BBB, wants to have long-term fixed-rate debt and can issue a variable-rate bond at the T-bill rate plus 2.0 percentage points or a fixed-rate bond at a rate of 14 percent. A summary of the debt alternatives for companies A and B appears below:

	Rating	Fixed-Rate	Variable-Rate
Co. A-AAA		12 %	T-bill rate+1.5%
Co. B-BBB		14 %	T-bill rate+2.0%

At first glance, the prescriptive solution appears simple: Company A should issue variable-rate obligations and Company B should issue fixed-rate liabilities.

Company B has a higher cost of funds because it is viewed as riskier by the investment community. The difference between the rates for the higher-rated company and the lower-rated company is the quality spread, i.e., the spread between yields on issues of different quality which in this case amounts to 200 basis points for the fixed-rate obligations and 50 basis points for the variable-rate obligations.

Company A wants a variable-rate liability, and Company B wants a fixed-rate liability. The financial press is full of articles touting an interest rate swap in such a situation as a means to accomplish one's goals at a lower interest cost than simply issuing the desired form of debt. It is argued that one possibility is for Company A to issue the fixed-rate debt at 12 percent and Company B to issue the variable-rate debt at T-bill plus 2 percent and then switch with each other. Assume that an arrangement whereby B pays 12.75 percent and A pays T-bill plus 1.0 percent is agreed upon. Company A is better off in that T-bill plus 1.0 percent is better than T-bill plus 1.5 percent, and Company B is better off because 12.75 percent fixed plus 1 percent is lower than the 14 percent rate. Ignoring intermediary fees, both companies appear to be better off after the swap.

Do Swap Advantages Really Exist?

Advocates of interest rate swaps argue that the two firms may be able to benefit from the

issue of obligations for which each has the greater relative advantage and then swap with another company (2),(3),(5),(7),(9),(10),(15). Indeed, Wishon and Chevalier (16) cite an example similar to the one previously described in which the apparent arbitrage gains are more than sufficient to cover the intermediary fee and conclude, "in short, everyone wins."

In their pure form, interest rate swaps are simply attempts to arbitrage interest rate differentials in different segments of the capital market. Most studies indicate that these differentials are at best transient and fairly small (6), (13), (14). Much of the apparent advantage of interest rate swaps may simply involve a repositioning of the firm's financial structure.

If one accepts the proposition that financial markets are efficient, then interest rate differentials such as the one cited above must be due to factors such as coupon, maturity, call, and credit differences between the two issues. There may be other important reasons for engaging in interest rate swaps than simply to try and improve one's net interest cost.

It has been argued that swaps are preferable to refunding because refunding is often constrained by restrictive covenants in either the refunded debt or in other debt of the corporation. Swaps have no such requirements. They can thus alter the terms of the contract without disclosure to the parties of the contract. While the covenants are still technically binding, swaps provide a means of circumventing the intent (if not the letter) of the restrictive covenants of the contract. For example, a creditor may have determined that a company has reached its maximum safe debt capacity based on its ability to service its debt. The creditor may have imposed a provision that a company not issue additional debt, thereby reducing its ability to service its existing obligations. Through a swap agreement, the company may opt to speculate on interest rates and swap its fixed-rate debt for variable rate obligations, i.e., enter into an unmatched or naked swap. If interest rates move against the company, the interest expenses may be substantially higher with the variable-rate obligation than they would have been with the fixed. It will thereby have reduced its borrowing capacity and its ability to repay existing debts. The company will thus have effectively circumvented the in-

tent of the restrictive covenant provisions of the old debt. Covenants are imposed to ensure that no reduction in the firm's ability to service its debts occurs (12). Unfortunately, a reduction in debt servicing ability can arise as a result of interest rate swaps. As an alternative to refunding, swaps are quicker to effect. Refunding requires registration with the Securities and Exchange Commission (SEC) as well as compliance with other regulatory restrictions which do not apply to interest rate swaps. Refunding entails legal fees, advertising, and many other costly administrative expenses. Swaps are not bound by a prescribed process as with a refunding operation and are therefore more flexible. They can be negotiated to meet any requirements of the company and can be completed in a matter of days, not the weeks or months which refunding may require (6),(11),(16).

Firms wishing to hedge interest rate exposure or to speculate on future interest rate movement may use financial futures contracts. The primary disadvantage of futures is their generally short-term duration since firms often require hedging operations that extend many years into the future. Thus, firms would constantly have to roll over futures contracts to achieve the desired results which would involve added cost as well as accepting some of the risk they may be trying to avoid. Interest rate swaps can be tailored to meet any maturity, and thus can better meet the needs of many companies.

It is sometimes argued that an advantage of swaps is that they provide off-balance-sheet financing. According to this line of reasoning swaps allow firms to acquire more and lower cost debt than they otherwise would be able to if full disclosure of the terms of the swap was available. From the standpoint of the corporation, the advantage arises not because swaps provide lower cost financing, but rather because the accounting profession is unable to provide timely pronouncements on the appropriate methods of disclosing swap transactions in financial statements.

Risk Exposure and Swaps

Capital structure adjustments accomplished through interest rate swaps are similar to working capital decisions in that increasing the amount of floating-rate debt will always increase

the variability of interest expense, in the absence of portfolio effects. Portfolio effects may, however, play a major role in the decision to engage in swaps.

Firms must decide on the appropriate combination of current versus fixed assets and short-term versus long-term liabilities in their capital structure. With the level of current assets given, the relationship between the amount and composition of a firm's current (short-term) debt and long-term debt (net working capital policy) depends on management's attitude toward the risk-return tradeoff inherent in alternative asset/liability structures. A conservative debt policy involves a high proportion of long-term debt relative to short-term debt in an attempt to keep interest costs stable and predictable. An aggressive debt policy involves a low proportion of long-term debt in an effort to keep expected interest costs low. Interest rate swaps reflect the company's assessment of the risk-return relationship in the same manner as an aggressive or conservative policy does, and it is essential that readers of financial statements be able to assess the impact of the swap on the risk of the company.

Given an ascending yield curve, short-term debt results in lower interest costs and more risk than long-term debt. As short-term interest rates are more volatile than long-term rates, the firm's interest expense and earnings will be more volatile. Additional risk also results from the uncertainty of refinancing each year. The market's assessment of the company's risk may change, resulting in a willingness to lend only at higher rates.

Long-term debt, on the other hand, involves no such uncertainty. It is fixed by contract and invariant to a change in the risk complexion of the company. Higher profit (lower interest cost) calls for a high level of current debt relative to long-term debt while risk-avoidance dictates just the reverse. A conservative debt policy thus involves a higher proportion of long-term debt relative to short-term debt than an aggressive policy which attempts to keep interest costs low. The flexibility of short-term debt can be advantageous in that capital structure adjustments can be made easily without refunding long-term debt. Depending on the covariance of a firm's revenues with interest expenses, an unmatched interest rate swap of fixed-for-variable-rate debt

may subject the firm to more risk in much the same manner as does an aggressive working capital policy which opts for short-term over long-term debt. The variability of earnings will increase as short-term interest rates fluctuate. If a firm selects a long-term variable-rate swap to overcome these disadvantages, other problems can arise. Although a long-term variable-rate swap does not entail the need to roll over short-term debt annually, there is an additional negative feature. A long- or intermediate-term variable-rate swap cannot be canceled without a significant penalty while, with traditional short-term debt, no change need be made if interest rates move strongly against the company. Thus, the firm has the same added risk in a long- or intermediate-term variable-rate swap, i.e., increased variability of earnings but without the flexibility of traditional short-term debt. The only "advantage" is not being subjected to the whims of the market each year, yet this can be construed as a disadvantage because the firm does not have the alternative of simply not borrowing at the higher rate and funding its needs in other ways.

As with short-term debt, long-term debt obtained through a swap is less flexible than traditional long-term debt. Traditional long-term debt is generally callable immediately or after a deferred call period. This enables a company to refund a bond issue if interest rates drop sufficiently to cover the refunding cost. A company will never actually be locked into a long-term high interest rate situation. A long-term fixed-rate swap agreement is noncancelable without sufficient penalties to compensate the other party for any damages created by the premature cancellation of the contract.

The choice between short or long-term debt is a basic net working capital decision and is based on the company's attitude toward the risk-return trade-off. As previously discussed, variable-rate debt is equivalent to short-term debt in that the rate varies according to the terms of the agreement. Swaps simply allow firms to quickly and efficiently alter their net working capital position by exchanging fixed-for-variable- or variable-for-fixed-rate debt. One important difference arises because of the access that the investing public has to the financial information. An aggressive or conservative net working capital policy is obvious to the reader of a financial statement. A

swap may result in a similarly aggressive or conservative position but may not be apparent to the reader of the financial statement.

Firms may engage in swaps to hedge their interest rate exposure or to speculate on the future course of interest rates in exactly the same way that a firm may alter the composition of short- and long-term debt. A hedge involves obtaining debt with rates that vary with revenues of the company so when revenues increase (decrease), interest expenses will also increase (decrease). The result of the hedge is a reduced variability of earnings. A company in a hedged position would not simultaneously experience a fall in revenues and a rise in interest expenses but would have revenues and interest expenses moving in the same direction. The revenues of some companies are very responsive to interest rate movements. These companies can reduce their earnings variability by having variable-rate debt. This debt may be obtained through rolling over short-term debt annually, borrowing through a variable-rate loan, or swapping for a variable-rate loan. Some company's revenues are insensitive to interest rate movements. These companies can reduce earnings variability by obtaining fixed-rate debt either by issuing long-term fixed-rate debt directly or by swapping for this debt.

Companies may also choose to speculate on interest rate movements through interest rate swaps with the result being an increase in earnings variability. A company, expecting that rates are going to fall, may swap fixed- for variable-rate debt hoping to lower interest costs if their expectations are correct. In situations such as this a company may find that their revenues and interest costs are negatively correlated, with the result being an increase in earnings variability. Their lower interest expenses may simply be obtained by moving out the risk-return spectrum.

A simple example can be used to demonstrate that a firm's risk will vary depending on the correlation between sales and interest expenses. Consider the case of a company with a profit margin M ($\text{Sales} - \text{Cost of Goods Sold}$) that varies according to a known probability distribution. In addition, interest expenses are variable and also subject to a known probability distribution. In this event the variability of earnings is computed below:

N = Earnings after interest and taxes (EAT)
 S = Sales
 C = Cost of goods sold
 I = Interest expense
 T = Marginal tax rate

$$(S - C - I) (1 - T) = N \quad \text{with } S - C = M$$

$$M (1 - T) - I (1 - T) = N$$

$$\text{Var}(N) = (1 - T) [\text{Var}(M) + \text{Var}(I) - 2 \text{Rmi } SD(M) SD(I)]$$

An example demonstrates how risk changes depending on the relationship between sales or margin and interest expense. Consider a company which has \$40,000 of long-term debt at a fixed rate of 12 percent. This interest rate will not vary for the term of the debt; thus, the variance of the cash flows associated with it is zero. A pro forma balance sheet and income statement are presented in Exhibit 1 for this firm on a pre- and post-swap basis. This firm has sales of \$150,000, interest expenses of \$4,800, and net income of \$5,100.

Table 1

Pro forma Balance Sheet and Income Statement

		Pre-Swap	Post-Swap
Current Assets	\$ 40,000	Short-term Debt (10%) \$ 0	\$ 40,000
Fixed Assets	60,000	Long Term Debt (12%) 40,000	0
		Common Stock 60,000	60,000
Total Assets	\$100,000	Total Liabilities and Net Worth	\$100,000

Income Statement

	Pre-Swap	Post-Swap
Sales	\$150,000	\$ 150,000
-COGS	- 135,000	- 135,000
EBIT	\$ 15,000	\$ 15,000
- I	- 4,800	- 4,000
EBT	10,200	11,000
- T	- 5,100	- 5,500
EAT	\$ 5,100	\$ 5,500

This firm's sales and earnings before interest and taxes (EBIT) vary according to the probability distribution described in Exhibit 2. The expected value of this earnings stream (U_m) is \$15,000 with a variance of \$30,000. After adjusting for taxes, the variability of earnings after interest and taxes $\text{VAR}(N)$ will be the same as the variability in margin $\text{VAR}(M)$ if all other variables are known with certainty, i.e., have a zero variance. Specifically,

$$\begin{aligned} \text{Var (N)} &= (1 - T) [\text{Var}(M) + \text{Var}(I) - 2 R_{mi} \text{SD}(M) \\ &\text{SD}(I)] \\ \text{Var (N)} &= (1 - .5) (30 + 0 - 0) \\ \text{Var (N)} &= 15 \end{aligned}$$

Table 2

**Determination of Variance of Profit Margin
Based on Hypothetical Probability Distribution**

p	M	pM	(M - Um)	² (M - Um)	² (M - Um)p
.10	25	2.5	10.0	100	10
.20	20	4.0	5.0	25	5
.40	15	6.0	0	0	0
.20	10	2.0	- 5.0	25	5
.10	5	.5	-10.0	100	10

Um = 15.0

Var(M) = 30.0
SD(M) = 5.48

Var(N) can be lowered if this company takes a course of action which will allow interest expenses to go up when sales go up and go down when sales revenue goes down, i.e., interest and sales are positively correlated. A swap of fixed- for variable-rate debt may reduce the variability of earnings if I and M are positively correlated. If not, the variability of earnings will increase as a result of the swap.

Take for example the swap of \$40,000 of 12 percent fixed-rate debt for an equal amount of 10 percent variable-rate debt. Assume that each future year's interest rate is based on the probability distribution of interest rates shown in Exhibit 3 where the expected interest rate (Ui) is 10 percent with a standard deviation SD (I) of 3.29 percent.

Table 3

p	I	pI	(I - Ui)	² (I - Ui)	² (I - Ui)p
.10	16	1.6	6	36	3.6
.20	13	2.6	3	9	1.8
.40	10	4.0	0	0	0
.20	7	1.4	-3	9	1.8
.10	4	.4	-6	36	3.6

Ui=10

Var(I) = 10.8
SD (I) = 3.29

As seen in Exhibit 1, the immediate impact of the swap on earnings is a decrease in interest expense from \$4,800 to \$4,000 with a resulting increase in earnings from \$5,100 to \$5,500. The impact of this swap on earnings variability depends on the correlation between M and I. If the

correlation between M and I is perfectly positive ($R_{mi} = +1$), the variance of earnings will drop from 15.00 to 12.25. Equation (1) computed the variance of earnings VAR(N):

$$\begin{aligned} \text{Var (N)} &= (1 - T) [\text{Var}(M) + \text{Var}(I) - 2 R_{mi} \text{SD}(M) \text{SD}(I)] \\ \text{Var (N)} &= (1 - .5) [30 + 10.8 - 2(+1) (5.48) (3.29)] = 12.25 \end{aligned}$$

This depicts the ideal use of swaps to hedge one's interest rate exposure. If on the other hand the correlation is zero or negative, the variability of earnings actually increases. This is described below for perfectly negative and zero correlation.

$$\begin{aligned} \text{If } R_{mi} &= -1, \\ \text{Var (N)} &= (1 - .5) [30 + 10.8 - 2 (-1) (5.48) (3.29)] = 28.54 \end{aligned}$$

$$\begin{aligned} \text{If } R_{mi} &= 0, \\ \text{Var (N)} &= (1 - .5) [30 + 10.8 - 2 (+0) (5.48) (3.29)] = 20.40 \end{aligned}$$

These examples demonstrate that a company's risk exposure may change depending on the nature and terms of interest rate swaps. Specifically, the correlation between a firm's revenues and interest expenses may significantly affect the impact of the swap on the risk of the company. If a company's preference for short-term versus long-term debt is obscured by interest rate swaps, a true picture of the company's risk is impossible to discern unless complete disclosure of all terms of the swap, i.e., the details of the short- versus long-term financial contracts, is made. Do financial analysts have access to the information necessary to evaluate risk, and, if they do, does this information filter down to other participants in the financial community?

Financial Disclosure for Swaps

One area where interest swap information should be available for financial analysts is in the audited financial reports. Although disclosure of material swap activity is required as part of Management's Discussion and Analysis, one alleged advantage of swaps is the absence of financial reporting requirements. Swaps have been termed "silent" financing because financial statements do not necessarily reflect that they have been made. A company may choose to disclose the presence and terms of a swap in a footnote to the balance sheet, but it is questionable whether such minimal and nonstandard subjective disclosure provides adequate information for determining the riskiness of the swap activity.

Perhaps an even more important question is, "Does the presence or absence of financial disclosure matter, and if so, to whom?" From the standpoint of the accounting profession, it matters in that financial statements should reflect, as accurately as possible, the true financial condition of the company.

Financial information about interest rate swaps needs to be considered from the disclosure perspective. The SEC and the American Institute of Certified Public Accountants (AICPA) have established criteria to evaluate the adequacy of financial disclosure. Outside the audited financial statements, the SEC disclosure rules are covered under Regulation S-K which relates to the Management Discussion section of the annual report. Presently, this is where most interest swap disclosure appears. The FASB currently has outstanding an exposure draft titled "Disclosures about Financial Instruments." One aspect of this exposure draft deals with proposed disclosure about interest rate swaps (4). One rule for disclosing material swap activity is listed in Regulation S-K:

Factors that might have an impact on the company's liquidity or ability to generate enough cash to maintain these projects [should be disclosed].

Within audited financial statements, disclosure rules are covered under generally accepted auditing

standards issued by the AICPA. The third standard of reporting states, "informative disclosures on the financial statements are to be regarded as reasonably adequate unless otherwise stated in the report." This standard considers the adequacy of material disclosures covered under the auditor's opinion.

It is obvious that disclosing information about interest rate swaps may be necessary in order to meet the rules of disclosure, a conclusion reached by those corporations that have provided disclosures about their interest rate swap activity. An example of such disclosure follows:

AMFAC: During the first quarter of 1983, Amfac agreed to two interest rate swap transactions, each relating to a principal amount of \$25.0 million. Under these agreements, Amfac will pay the counterparties interest at a fixed rate, and the counterparties will pay Amfac interest at a variable rate based on the London Interbank Offered Rate. Amfac did not receive any funds related to the principal amounts from the counterparties. Each of these agreements is with a major domestic bank. The agreements have terms of seven years and eight years, respectively. (Management's Discussion, 1983.)

The information provided in such disclosures varies, with Amfac's disclosure being more detailed than most. In general, companies disclose the effective rate of interest on the total corporate debt, the effective rate of interest on the variable debt after the swap, the amount of principal related to the swap, and whether the swap is matched.

Although these disclosures are useful, more information is needed. For example, information such as the duration of the swap, the effective interest rates swapped in a complex financial package, and the present value of the payments traded should be provided. Furthermore, an ongoing determination should be made of the probability of loss in case of nonpayment. Any significant loss penalty may need to be recognized under FASB Statement No. 5, "Accounting for Contingencies." As corporations have no guidelines for accounting recognition of swaps, the method used to recognize any loss or revenue should be disclosed. If loss exposure is reduced by the guarantees of intermediaries to the swap, disclosures about how this loss exposure is re-

duced should be made (8).

From an equity valuation perspective, the issue of whether financial disclosure matters is less clear. Most would agree that the market is the best judge of the risk of a particular equity issue, but does the market have sufficient information to make this determination? From the information currently available in the audited annual report the answer is "no". From a broader perspective, the answer depends on whether the financial analyst has access to this information from sources other than the audited financial statements. If the information is available, the answer is "yes", and the financial reporting of the presence and terms of interest rate swaps is unimportant because the market is evaluating the risk of the company properly. If the information is unavailable, the answer is "no", and equity values may be mispriced because the market lacks sufficient information to properly judge the firm's risk exposure.

Summary

The growth of interest rate swaps raises many important questions. They have been marketed as financial innovations which allow participants to exploit market imperfections by extracting arbitrage profits. But given highly efficient financial markets, these arbitrage profits are more illusory than real. The perceived quality spreads between the variable- and fixed-rate debt actually may be due to factors other than quality such as coupon, maturity, credit, and call differences between the issues.

Swaps are useful tools for companies that wish to hedge interest rate exposure or speculate on future interest rates. Swap agreements are preferable to refunding debt or using financial futures to accomplish these ends. Swaps are more flexible, quicker, and less costly to effect than refunding operations; and they provide long-term positions which are not available in the futures market.

It is often argued that no new debt is incurred through a swap; only the terms of the existing debt are modified. For this reason, it is argued that swaps need not be disclosed except possibly in the Management's Discussion and Analysis section of the annual report. There is a fine line between the presence of "new" debt and a sig-

nificant alteration in the terms of the existing debt. From the standpoint of existing or potential creditors, any modification of the terms of existing debt may be "significant" to the credit capacity of the company and should be disclosed in the financial statements. Indeed, this may be a serious problem with swaps if a firm substantially changes its risk exposure without reporting this change to creditors or the investing public.

Another issue concerns the impact of swaps on the equity values of the companies involved. Interest rate swaps are similar to working capital decisions in that increasing the amount of variable-rate debt will alter the variability of earnings of the firm in the same way that a large proportion of short-term debt relative to long-term debt will alter a firm's risk. A high positive correlation between interest expense and revenues will reduce earnings variability while a negative correlation will increase this variability. A firm's risk exposure may be altered significantly through swaps with minimal financial reporting required. The implications of this lack of financial disclosure depend on one's perception of the market's ability to obtain and sort out relevant facts in the absence of formal information reported by firms. To the extent that the market can accomplish this, equity values will not be affected by financial statement disclosure of swaps. On the other hand, lacking adequate and timely information on risk exposure, the market may be unable to properly value equity securities.

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