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A Tale of Two Bond Swaps

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ABSTRACT

Market prices reveal valuation differences across tax brackets grudgingly, if at all. Market transactions, however, can often provide better evidence of these differences. This study shows how differences between the corporate and individual tax rates enabled two firms to engage in bond swaps which, while not changing the market value or the face value of their outstanding debt, generated savings in a present value sense. These swaps also illustrate how tax law and accounting treatment spur financial innovation.

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Empirical researchers have debated the importance of tax-driven valuation differences across stocks with different dividend yields,[1] across stocks of corporations with different leverage ratios,[2] and across government bonds with different coupons and maturities.[3] Since market prices reveal these valuation differences grudgingly, if at all, market transactions may prove a happier hunting ground. On May 2, 1990, two subsidiaries of U.S. West, Northwestern Bell Telephone (NWB), and Mountain States Telephone and Telegraph (MST), each extinguished portions of several low-coupon debt issues and issued one longer-term, low-coupon debt issue. In each transaction, the combined principal amount and market value of the retired bonds equalled the principal amount and market value of the new bonds. To financial economists, raised on the creed that the purchase or sale of securities at market prices creates no value, these transactions may seem puzzling.

Standard explanations of debt-for-debt restructurings do not apply here. First, since the periodic interest payment on the new bonds slightly exceeds that on the old bonds, the firms did not reduce current debt service costs. Besides, neither firm exhibited the signs of financial distress which often lead to restructurings of that kind. Second, since the utilities retired only a portion of each old bond issue, the transactions did not eliminate any restrictive covenants. Third, the transactions did not result in any tax payment or credit.

Professionals involved in the transactions justified them on the grounds of positive net present value and of positive accounting implications. The purpose of this article is to explain why the NWB and MST deals were positive net present value projects. Section I describes the swaps in detail. Section II demonstrates that such swaps can prove profitable when the corporate tax rate exceeds the tax rate of a large enough set of investors. The analysis rests on how tax-induced valuation differences change with maturity. Section III shows that, viewed in this light, the NWB and MST transactions were highly profitable in a present value sense. Section IV describes the accounting implications of the swaps, presents a brief history of financial innovations with respect to the refunding of discount debt, and concludes the paper.

I. THE SWAPS

The NWB transaction evolved as follows. Morgan Stanley & Co. purchased $42.675 million face amount of the utility's debt for about $34.5 million through open market and privately negotiated transactions. Table 1 provides some details on these bonds. NWB subsequently exchanged $42.883 million face amount of newly issued 7 3/4 percent bonds due 5/1/30 and a cash payment of $408,000 for the $42.675 principal amount of bonds purchased by Morgan Stanley. Finally, Morgan Stanley sold the new bonds to the public for $34.28 million. Figure 1 schematically illustrates the transaction.

Table 1
Bonds Retired Through the Northwestern Bell Telephone Debt-for-Debt Swap
(principal reported in millions of dollars)

Coupon	Maturity	Principal Outstanding	Principal Retired
4-7/8%	6/1/98	$45	$9.590
7-1/2	4/1/05	100	4.000
6-1/4	1/1/07	100	10.300
7	1/1/09	75	7.185
7-7/8	1/1/11	150	4.600
9-1/2	8/15/16	300	7.000
			Total: $42.675

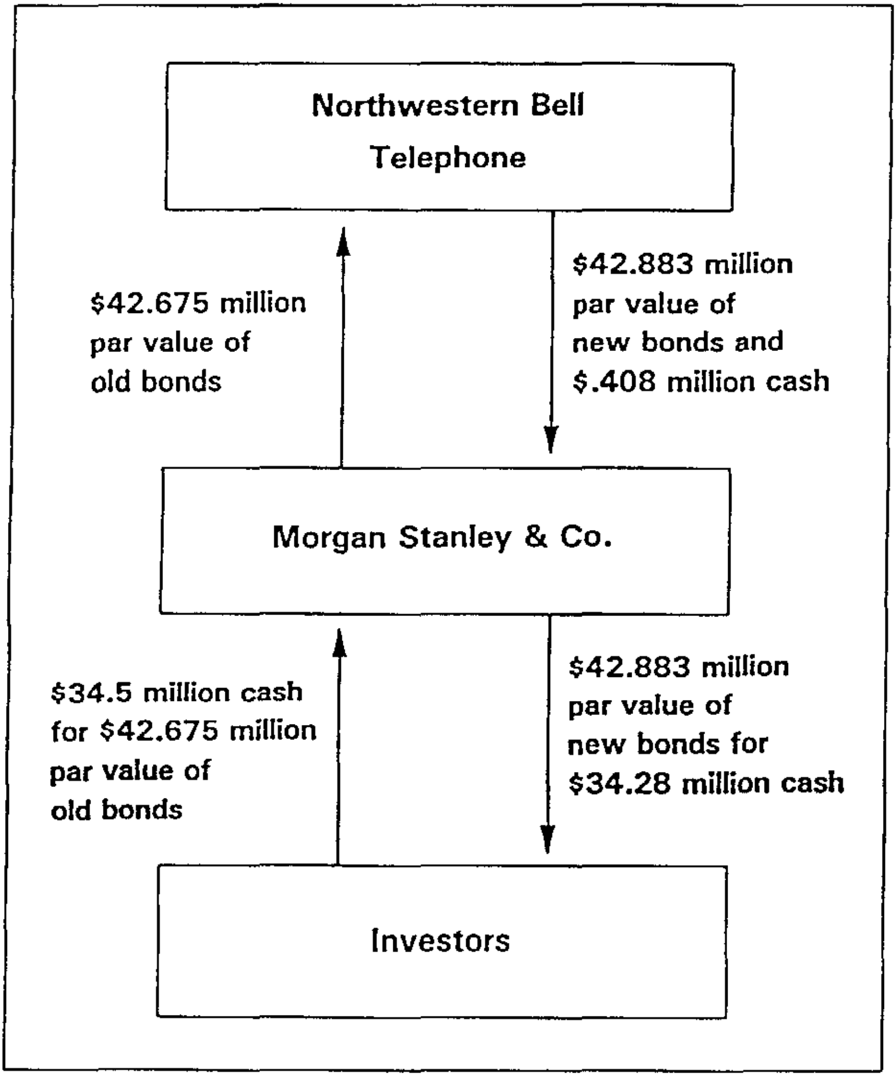
Had Morgan Stanley acted as agent for NWB, purchasing the old bonds for NWB's account, the difference between each bond's basis[4] and its market price would have been taxable income to NWB. But the tax law at the time allowed for tax-free exchanges so long as the principal amount of the new issue was about the same as the principal amount retired.[5] Structuring the transaction as an exchange, therefore, allowed NWB to avoid taxes on its debt retirement. Section III shows that neither of the transactions would have proved profitable if taxes had to be paid on book gains. MST structured its exchange in the same way. Table 2 lists the retired bonds and Figure 2 depicts the rest of the swap.

II. TAX-INDUCED VALUATION DIFFERENCES

As will be shown, when the corporate tax rate exceeds the marginal investor's tax rate, corporations value their outstanding discount debt[6] above market and their par debt at about market. Consequently, if the book gain on the extinguishment of discount debt were not taxed, corporations could profit by repurchasing discount bonds and simultaneously issuing par bonds. When the gain is taxed, however, the tax bill usually swamps the tax-induced valuation differences and destroys the profitability of the refunding operation.[7]

By avoiding the tax on debt extinguishment, the exchange structure used by NWB and MST attempted to restore the profitably of retiring discounts. But to

Figure 1
The Northwestern Bell Telephone Exchange



qualify for non-taxable status, the bonds offered in exchange had to have the same face value as the bonds retired. This constraint, along with the desire to avoid cash inflows or outflows,[8] forced the companies to offer new discount

Table 2
Bonds Retired Through the Mountain State Telephone and Telegraph Debt-for-Debt Swap
(principal reported in millions of dollars)

Coupon	Maturity	Principal Outstanding	Principal Retired
5-1/2%	6/1/05	$50	$9.24
6	8/1/07	85	14.80
7-3/8	11/1/11	125	11.00
7-3/4	6/1/13	250	20.00
			Total: $55.04

bonds in the exchanges.[9] Evidently, in order to profitably retire discounts, the companies had to sacrifice value by offering new discounts in exchange!

As shown below, the key to the profitability of the exchanges was that, for a given market value, the difference between the corporate and market valuation of discount bonds normally declines with maturity. Therefore, NWB and MST profited by exchanging their outstanding intermediate-term discounts for newly issued long-term discounts of the same market value. The benefit to the firms from extinguishing the intermediate-term discounts exceeded the losses from concomitantly offering the long-term discounts.

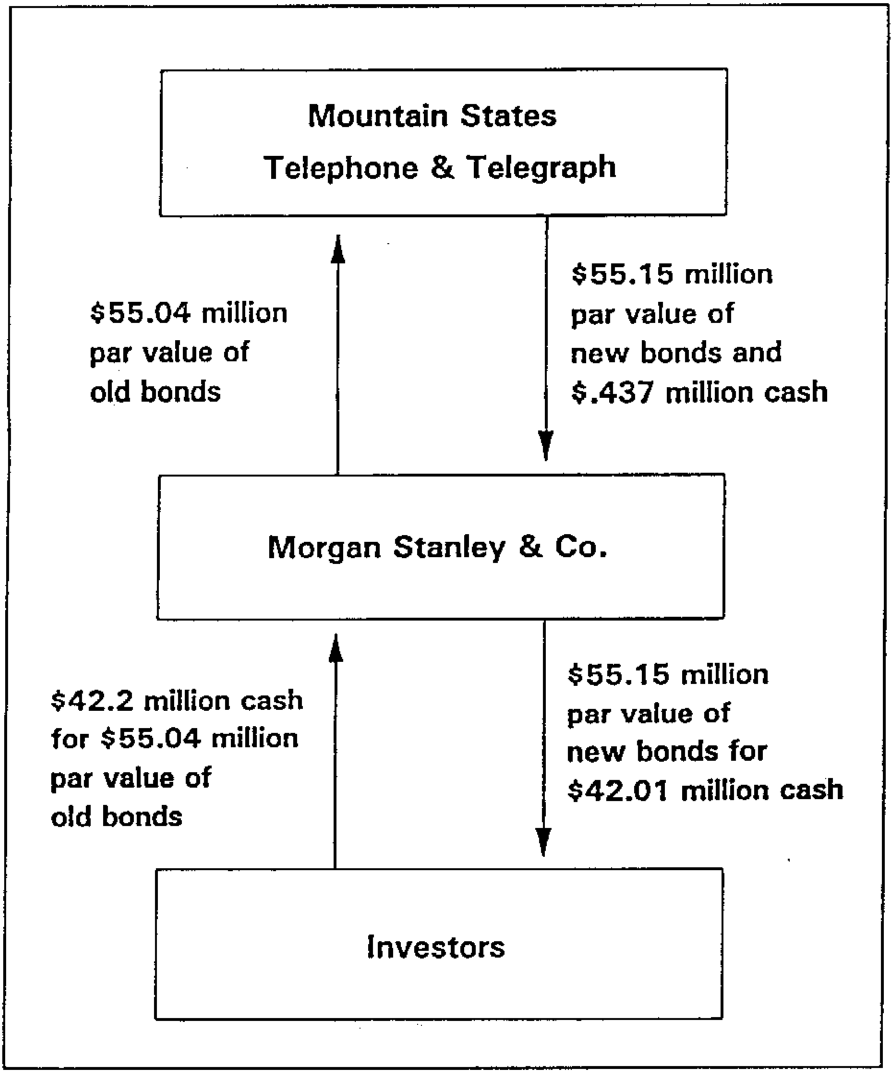
To begin the analytic demonstration, assume that (1) the investor tax rate is zero, (2) corporations pay taxes at a rate of τ_c, and (3) the yield curve is flat at rate y. Under these assumptions, the bond valuation equation is:[10]

$$\begin{aligned} V(c,N,y,\tau) &= \sum_{t=1}^{N} c(1-\tau)[1+y(1-\tau)]^{-t} + [1+y(1-\tau)]^{-N} \\ &= c/y + (1-c/y)[1+y(1-\tau)]^{-N} \end{aligned} \quad (1)$$

where c is the annual coupon rate, N is the number of years to maturity, and τ is the relevant tax rate. Since this study concerns discount bonds, it is assumed throughout that $c < y$.

Say that a corporation considers exchanging outstanding bonds with a coupon of c_1, a maturity of N_1, and a face value of $1 for new bonds of equal market

Figure 2
The Mountain States Telephone and Telegraph Exchange



value with a coupon of c_2, a maturity of N_2, and a face value of $1.[11] Mathematically, the market value constraint takes the form:

$$c_2/y + (1 - c_2/y)(1 + y)^{-N_2} = V(c_1, N_1, y, 0) \tag{2}$$

Solving for c_2 and substituting into the bond valuation equation 1 gives a valuation function, $v(N,y,\tau)$, which incorporates the constraint that the market value of the new issue must equal the market value of the outstanding issue.[12] In other words, $v(N_2,y,\tau)$ does not depend on a coupon level because, for a given N_2, c_2 is adjusted to obey equation 2, the market value constraint. Some algebra reveals that:

$$v(N_2,y,\tau) = \frac{V(c_1,N_1,y,0) - (1+y)^{-N_2}}{1-(1+y)^{-N_2}} + \frac{[1+y(1-\tau)]^{-N_2}[1-V(c_1,N_1,y,0)]}{1-(1+y)^{-N_2}} \tag{3}$$

The goal of this section is to analyze $v(N_2,y,\tau_c) - v(N_2,y,0)$, the difference between the corporate and market valuations of a discount bond. Showing that this difference is positive establishes that a corporation gains value when repurchasing discounts but loses value when offering discounts in exchange. Claim 1 proves this result. Showing that this difference decreases in N_2 establishes that a corporation gains more by extinguishing relatively short-term discounts than it loses by offering relatively long-term discounts in exchange, i.e., that these exchanges will prove profitable. Claim 2 gives sufficient conditions for this result.

Claim 1: $v(N_2,y,\tau_c) - v(N_2,y,0) > 0$.

Proof: The difference $v(N_2,y,\tau_c) - v(N_2,y,0)$ equals:

$$\int_0^{\tau_c} \frac{\partial v}{\partial \tau}\, d\tau \tag{4}$$

Therefore, establishing that $\partial v/\partial\tau > 0$ is sufficient for the valuation difference to be positive. This follows immediately from differentiating equation 3 with respect to τ:

$$\frac{\partial v}{\partial \tau} = yN_2[1 + y(1-\tau)]^{-N_2-1}\, \frac{1 - V(c_1, N_1, y, 0)}{1 - (1 + y)^{-N_2}} > 0 \tag{5}$$

The inequality follows since, for discount bonds, $V < 1$.■

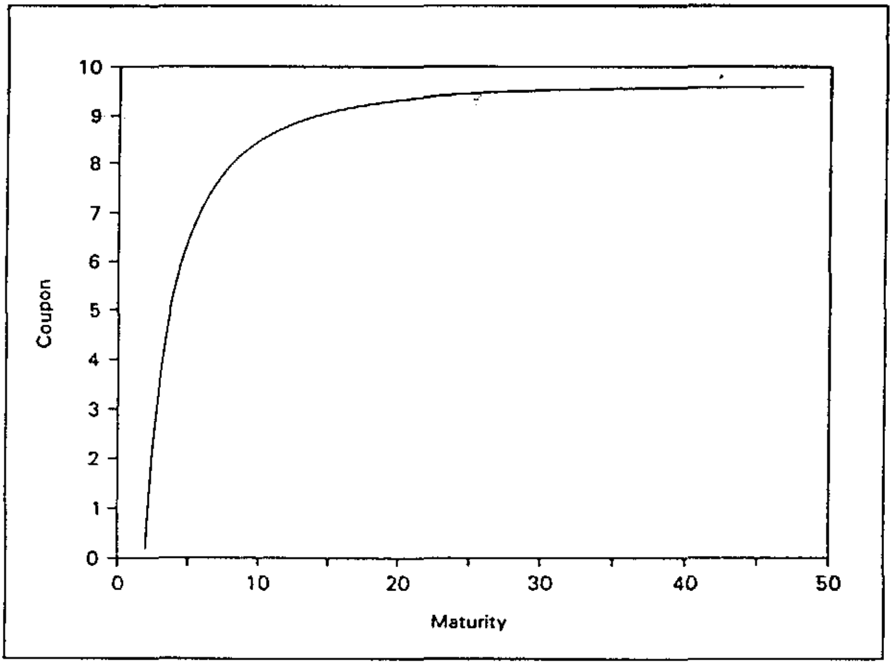
Claim 2: Two sufficient conditions for $v(N_2,y,\tau_c) - v(N_2,y,0)$ to decrease in N_2 are $\tau_c \leq 1 - [(1 + y)^{1/2} - 1]/y$, and $\tau_c \leq .5$.

Proof: By equation 4, establishing that $\partial^2 v/\partial\tau\partial N_2 < 0$ for $\tau \leq \tau_c$ is sufficient for the valuation difference to decrease in N_2. The following lemma, proved in the appendix, signs $\partial^2 v/\partial\tau\partial N_2$ and completes the proof.

Lemma: If $\tau \leq 1 - [(1 + y)^{1/2} - 1]/y$, then $\partial^2 v/\partial\tau\partial N_2 < 0$ for all $N_2 > 0$. In particular, if $\tau \leq .5$ then, $\partial^2 v/\partial\tau\partial N_2 < 0$ for all N_2, $y > 0$.■

Figures 3 and 4 illustrate the interpretation of Claim 2 in the context of a discount debt refunding. Assume that the yield curve is flat at 12 percent and that τ_c = 34 percent. The corporation's outstanding bonds carry a coupon of 9.32

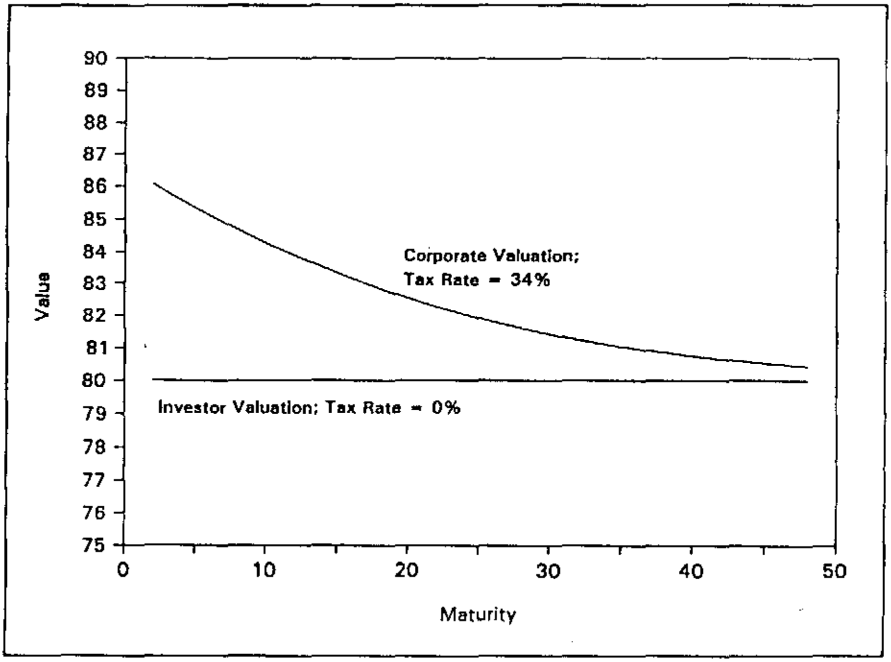
Figure 3
Coupon Rate Required So That Bonds of Various Maturities Will Sell for 80 in the Market
(the yield curve is assumed flat at 12 percent)



percent, mature in 20 years, and, given the 12 percent yield, command a market price of $80 for each $100 in face value. The corporation wishes to swap these bonds for a new issue which can be sold at $80. Given this constraint, the coupon of the new issue must lie on the curve of Figure 3. For example, 9.57 percent bonds maturing in 40 years can be sold for $80. Figure 4 contrasts the corporate valuation of bonds which sell for $80 with the market valuation of $80. Notice that the corporation values its outstanding 9.32 percent, 20-year bonds at $82.55 while it values the 9.57 percent, 40-year bonds at $80.74. Therefore, swapping $100 face value of the 9.32 percent bonds for $100 of the 9.57 percent requires no cash outlay but generates a present value gain of $82.55 - $80.74 = $1.81. Figure 4 reveals that maturity extension creates these present value gains.

Claims 1 and 2 assumed that the investor tax rate is zero. Since the goal of this study is to show that corporations can profitably swap at least some of their discount bonds and since a sizable fraction of corporate bonds are held by

Figure 4
Corporate Valuation of Bonds Priced By Investors at 80 as a Function of Maturity
(the yield curve is assumed flat at 12 percent)



investors with zero tax rates,[13] this assumption seems reasonable and allows for analytic proofs. However, the assumption can be substantially weakened. Corporations could profit from valuation differences with the market as long as a large enough set of investors in corporate bonds pay taxes at rates below τ_c. The current level of individual tax rates and the workings of clientele effects which attract relatively low-taxed investors to the corporate bond market virtually guarantee that this weakened assumption holds.[14]

In the case of a sloping yield curve, it is difficult to derive an analogue to Claim 2 analytically. First, the yield at which investors with marginal rates of zero discount cash flows no longer equals the pre-tax yield at which the corporation should discount flows. Second, both yields are functions of the new bond's maturity, N_2. Extensive numerical work reveals that the difference between corporate and investor valuation falls with maturity as long as any downward-sloping yield curve is not unrealistically steep.

III. ANALYSIS OF THE NWB AND MST EXCHANGES

Table 3 presents the gains of NWB and MST from their exchanges. The first two columns of each panel describe the retired and newly issued bonds. The third and fourth columns list market yields to maturity and prices, the source of which will be described shortly. Using τ_c = 34 percent and the yield in column three,[15] the fifth column computes bond values to the utilities from equation 1. The sixth column lists the face amount retired. The seventh column reports the gain from each issue, i.e., the difference between the utilities' valuation of the bond and its market price multiplied by the face value retired. The bottom lines of each panel report present value gains, costs, and net gains. The costs were defined as proceeds from the distribution of the new issue minus the cost of acquiring the old bonds plus the cash payment plus any miscellaneous expenses. Miscellaneous expense data were included in the prospectuses of the new issues.[16]

The market prices of the new bonds were reported in the press at the time of issue. While the aggregate amount Morgan Stanley paid for the bonds it purchased was reported in the exchange circulars, the prices of individual issues were not reported. In order to discount each bond's cash flows by the most applicable rate, data on the spread between the yields of the various issues were collected from *Moody's Bond Record*. The yield level was chosen to equate the market value of the old bonds with Morgan's expenditure.[17] It should be noted that the present value gains are quite robust to yield assumptions.

According to Table 3, the exchange allowed NWB to lower the present value of its outstanding debt by $1.125 million at a cost of $.248 million. MST gained $1.376 million at a cost of $.292 million.

As noted earlier, had the extinguishment of discount debt been taxable, the transactions would have proved unprofitable. According to the table, the book

Table 3
Present Value Gains from the Northwestern Bell Telephone and Mountain States Telephone and Telegraph Exchanges

Prices and values are as a percentage of face amount. Principal and present value gain are in millions of dollars. Corporate value computations use a corporate tax rate of 34 percent.

Panel A: The Northwestern Bell Telephone Exchange

Coupon	Maturity	Market Yield	Market Price	Corporate Value	Principal Retired	PV Gain
4.875%	6/1/98	9.30%	75.23	81.60	$9.590	.611
7.50	4/1/05	9.42	84.77	87.79	4.000	.121
6.25	1/1/07	9.45	73.39	78.29	10.300	.506
7.00	1/1/09	9.54	78.03	81.73	7.185	.266
7.875	1/1/11	9.53	85.14	87.45	4.600	.106
9.5	8/15/16	9.78	97.34	97.66	7.000	.023
7.75	5/1/30	9.80	79.54	80.72	42.833	-.508

Total present value gain:	$1.125 million
Costs of doing the exchange:	.248
Net gain:	$ .877 million

Panel B: The Northwestern Bell Telephone Exchange

Coupon	Maturity	Market Yield	Market Price	Corporate Value	Principal Retired	PV Gain
5.50%	6/1/05	9.54%	68.04	74.29	$9.24	.577
6.00	8/1/07	9.59	70.01	75.35	14.80	.791
7.375	11/1/11	9.57	81.16	83.11	11.00	.324
7.75	6/1/13	9.51	83.67	85.95	20.00	.456
7.375	5/1/30	9.80	75.79	77.19	55.15	-.773

Total present value gain:	$1.376 million
Costs of doing the exchange:	.292
Net gain:	$1.084 million

gains amount to \$8.17 and \$12.84 million, implying potential tax liabilities of \$2.78 and \$4.37 million, respectively. The magnitudes of these liabilities would eclipse profits from the valuation differences.

The analysis of this section might be questioned along the following lines. Assume that the utilities plan to borrow through the maturity of the newly issued bonds, i.e., through 2030. It follows that, in the absence of the swaps, they would refinance their maturing bonds by issuing par bonds maturing in 2030. Why aren't those bonds incorporated in the analysis? The answer emerges by observing that investors and corporations differ little in their valuation of par bonds. Therefore, the value of the future refunding operation is near zero and may be ignored when analyzing the swaps.[18]

Unlike the refundings analyzed in the academic literature, these exchanges do not preserve after-tax debt service.[19] The swaps extend maturity and, therefore, increase the duration of the firms' debt. Consequently, if interest rates fall dramatically, the utilities would wish that they had left their intermediate-term debt outstanding. Of course, if desired, they could at least partially hedge against falling rates with financial futures. Furthermore, because regulatory lag delays the pass-through of the benefits of lower borrowing costs to consumers, utilities may be naturally hedged against falling rates.[20]

Recognition of the interest rate risk of the exchanges leads to another consideration. In the absence of transaction costs, firms would execute exchanges as soon as it were profitable to do so. In the presence of transaction costs, however, firms might postpone a profitable exchange in the hopes that rates will rise further and allow for an even more profitable exchange. While this implicit option has not been studied here, Mauer and Lewellen (1987) have studied a similar option in the context of premium debt refundings.

The analysis to this point has ignored the call features of the repurchased bonds. (The new issues are not callable.) This simplification comes at little cost. First, apart from the NWB 9.5's of 2016, the call features of bonds currently selling from 68 percent to 85 percent of face value will not be worth very much. Second, the market yields used to construct the fourth and fifth columns of the table incorporate the value of the call options. Therefore, the table neglects only the differences between the company's valuation of the call options and the marginal investor's valuation of the call options. While the omission of this effect does overestimate the profit from the exchanges,[21] the overestimation should be quite small.

IV. CONCLUSION

This paper has shown that by exchanging outstanding intermediate-term discount bonds for newly issued, long-term discount bonds, NWB and MST capitalized on the tax-driven difference between corporate valuation and market price. While management was motivated by these present value gains, it appears that it was also concerned with the accounting implications of the exchanges.

Shortly after these transactions were completed, NWB called and refunded $56.7 million of 13.5 percent bonds at 110.77 percent and, in the process, incurred a book loss of 6.11 million. MST called and refunded $60.8 million of 11 5/8 percent bonds at 107 percent and $39.9 million of 12 1/4 percent bonds at 110.16 percent, for a total book loss of $8.31 million. Before 1988, FCC regulation allowed multi-state telephone companies to amortize such losses over the life of the refunding issue.[22] After 1988, these losses had to be recognized immediately. Reluctant to show such losses, NWB and MST were pleased to engage in exchanges which generated sufficient accounting gains to cancel the book losses resulting from the high-coupon redemptions.

The NWB and MST transactions provide an effective illustration of how financial innovation may be motivated by tax arbitrage and accounting considerations. The companies executed the swaps "just in time." Were it not for the exchanges, FCC accounting rules would have forced the companies to recognize large losses from the calls of their premium debt. Furthermore, had the companies waited to act, new laws[23] would have taxed the gains from discount debt extinguishment, making the exchanges unprofitable.

The swaps analyzed here are the latest in a series of innovations to escape the taxation of gains from discount debt repurchases.[24] Before 1981, some firms could, in lieu of paying taxes on the gains, reduce the basis of non-depreciable assets by the amount of the gains. The Bankruptcy Act of 1980 required firms to reduce the basis of depreciable assets, thus restoring taxability. Investment banks responded by creating equity-for-debt swaps: the bank bought an issuer's discount bonds, swapped them with the company for shares, and then sold the shares. The tax-free treatment of these swaps again enabled companies to avoid taxes when retiring discounts. Congress, in turn, responded with the Tax Reform Act of 1984, canceling the tax-free status of these swaps except for firms in bankruptcy. Enter the NWB and MST debt-for-debt swaps, followed by the Omnibus Budget Reconciliation Act of 1990. This act made debt-for-debt exchanges taxable events, except for companies in bankruptcy. Presumably the search is on for yet another means of escaping the tax.

There remain, perhaps, two unanswered questions. First, why didn't the companies repurchase more of each issue and possibly other discount issues as well? Second, why hadn't many other companies done the same?

An answer to the first question may be that Morgan Stanley could not buy many more bonds at the same, advantageous prices. This price pressure effect may be due to investor transaction costs and to the existence of investors, like insurance companies, who are extremely reluctant to sell bonds at a book loss. Another answer might be that the telephone companies were concerned that large book gains might induce regulators to reduce allowed revenues.

As to why other companies had not followed the lead of NWB and MST *en masse*, there are three possible explanations. First, understanding the transactions requires considerable financial sophistication. Second, at the time of the exchanges there were few deep discount bonds outstanding. Third, the legality of avoiding tax through these exchanges had not been definitively established. Firms may have been waiting on the sidelines to observe the response of the IRS and the courts. In short, innovators, almost by definition, are the few.

APPENDIX

Proof of Lemma

Lemma: If $\tau \leq 1 - [(1 + y)^{1/2} - 1]/y$, then $\partial^2 v/\partial t \partial N_2 < 0$ for all $N_2 > 0$. In particular, if $\tau \leq .5$ then, $\partial^2 v/\partial t \partial N_2 < 0$ for all N_2 and $y>0$.

Proof: Equation 5 can be rewritten as:

$$\frac{\partial v}{\partial \tau} = \frac{k_0 N}{k_1^N - k_2^N} \tag{A.1}$$

where $k_0 = y(1 - V(c_1,N_1,y,0)/[1 + y(1 - \tau)]$, $k_1 = 1 + y(1 - \tau)$, $k_2 = k_1/(1 + y)$, and $N = N_2$. Since only discounts are being considered, $V < 1$ and $k_0 > 0$. Furthermore, since $\tau \in (0,1)$, $k_1 > 1 \geq k_2 > 0$.

This proof analyzes $\partial v/\partial \tau$ as a function of N in four steps. First, the limits are computed as N tends to 0 and as N tends to infinity. Second, the limit of $\partial^2 v/\partial \tau \partial N$ as N tends to 0 is computed. Third, it is shown that $\partial^2 v/\partial \tau \partial N$ decreases in N. From the three steps one can draw two possible shapes for the function $\partial v/\partial \tau$. Fourth, the necessary and sufficient condition for $\partial^2 v/\partial \tau \partial N < 0$ is derived.

Step 1: Using l'Hopital's rule, it can be easily seen that:

$$\lim_{N \to 0} \frac{\partial v}{\partial \tau} = \frac{k_0}{\log k_1 - \log k_2} > 0$$

and that:

$$\lim_{N \to \infty} \frac{\partial v}{\partial \tau} = 0$$

Step 2: Differentiating equation A.1 with respect to N gives:

$$\frac{\partial^2 v}{\partial\tau\partial N} = k_0 \frac{k_1^N - k_2^N - N[k_1^N \log k_1 - k_2^N \log k_2]}{(k_1^N - k_2^N)^2} \qquad \text{(A.2)}$$

Applying l'Hopital's rule twice reveals that:

$$\lim_{N \to 0} \frac{\partial^2 v}{\partial\tau\partial N} = \frac{-k_0 \log(k_1 k_2)}{2 \log(k_1/k_2)} \qquad \text{(A.3)}$$

which is non-positive when $k_1k_2 \geq 1$ and positive when $k_1k_2 < 1$.

Step 3: Differentiating the numerator of equation A.2 with respect to N and using the fact that $k_1 > k_2$ reveals that the numerator falls in N. Differentiating the denominator with respect to N and using the two facts $k_1 > k_2$ and $k_2 < 1$ reveals that the denominator increases in N. Hence, $\partial^2 v/\partial\tau\partial N$ decreases in N.

From these three steps, $\partial v/\partial\tau$ will rise and then fall in N if $k_1k_2 < 1$. The function will monotonically fall in N if $k_1k_2 > 1$.

Step 4: Reverting to the notation in the text, it is easy to show that $k_1k_2 \geq 1$ if and only if:

$$\tau \leq 1 - \frac{(1 + y)^{1/2} - 1}{y} \qquad \text{(A.4)}$$

The right-hand side of equation A.4 increases in y. The limit as y tends to 0 is .5. Therefore, if $\tau \leq .5$, then $\partial v/\partial\tau$ declines in N_2.■

NOTES

1. See, for example, Eades, Hess, and Kim (1984), Elton and Gruber (1970), Kalay (1982), Litzenberger and Ramaswamy (1982), Long (1978), Miller and Scholes (1982), and Poterba (1986).

2. See Harris, Roenfeldt, and Cooley (1983) and Kim, Lewellen, and McConnell (1979).

3. See Litzenberger and Rolfo (1984) and Schaefer (1982).

4. From the issuer's perspective, the basis of a bond equals the original issue price minus unamortized underwriting expenses. Therefore, bonds sold at par carry a basis very close to face value.

5. This is a sufficient condition. The principal amount of the new bonds could have also exceeded the principal amount of the old bonds. This point will be discussed further in endnotes 9 and 11.

6. Throughout this paper, "discount debt" means debt that was issued at or close to par but, because of a rise in rates, is now selling below par. Original issue discount debt is not being considered.

7. See Kalotay (1978).

8. The difference between the market value of the old bonds and the market value of the new bonds was just \$.22 million in the NWB exchange and \$.19 million in the MS exchange.

9. The new issue also sells at a discount when its principal amount exceeds that of the old issue. As mentioned in footnote 5, such a structure also qualifies as a non-taxable exchange.

10. For arguments in support of discounting debt-equivalent, after-tax cash flows by the after-tax rate of interest, see Brealey and Myers (1991), pp. 470-74, and Ruback (1986).

11. The text assumes that the face value of both issues are the same because the corporation will choose to match principal. The reasoning is as follows: In matching market value, a corporation may choose a new issue with either a low coupon and a high face value or with a high coupon and a low face value. It is easy to show that the corporate valuation of the bond falls as coupon increases. Therefore, it will opt to offer bonds with a high coupon and a low face value. But, as mentioned in endnote 5, the lowest face value which preserves the exchange's non-taxable status is the face value of the old securities.

12. This procedure implicitly invokes the assumption that the yield curve is flat. Otherwise, it would be incorrect to assume that the investor discount rates are the appropriate pre-tax rates for the corporation.

13. At year end 1989, about 23 percent of corporate bonds were held by pension and retirement funds. Another 5 percent were held by mutual funds which may very well invest as if the relevant tax rate were zero.

14. Capital gains taxation will, of course, enter into the determination of the price at which investors will part with their bonds. Formally modelling the effect of capital gains taxation on the difference between corporate and investor valuations would require an analysis of optimal tax-trading, as in Constantinides and Ingersoll (1984), and of tax-clienteles, as in Schaefer (1982).

15. The use of the market yield as the pre-tax yield appropriate for corporate valuation can be justified in two ways. First, the sloping yield curve effect, mentioned in endnote 12, is quite small. Second, the yield curve at the time of the exchanges was rather flat. In the beginning of May 1990, 30-year Treasury bonds were yielding 8.85 percent while 1-year Treasury bills were yielding 8.55 percent.

16. Miscellaneous expenses amounted to $60,000 for NWB and $40,000 for MS. Since these expenses are amortized over the life of the issue, the value of the resulting tax deductions is quite small and has been ignored in the analysis.

17. Using *Moody's* yield directly, gross gains differ little from those reported in the text. But, using those yields, the market value of the securities retired appears to exceed the market value of the new securities plus the cash payments, i.e., Morgan Stanley appears to have lost money and the costs to the utilities appear negative!

18. This argument does not depend on the refinancing bonds being issued at par. Under current tax law, any new issue has nearly the same pre-tax and after-tax value.

19. See, for example, Mauer and Lewellen (1987) and Finnerty (1986) for premium and discount debt refundings, respectively.

20. For a discussion of a similar point, see Kalotay (1979).

21. See Boyce and Kalotay (1979) who show that corporations value call options more than investors when the corporations are taxed at the higher rate. This means that corporations would use a higher yield than implied by market prices when computing callable bond values.

22. Prior to 1975, these losses could be amortized over the life of the outstanding issue.

23. See Hilder (1990).

24. See, for example, Finnerty (1988) and Kalotay (1982).

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