Swaptions

Product nature

- The buyer of a swaption has the right to enter into an interest rate swap by some specified date. The swaption also specifies the maturity date of the swap.

- The buyer can be the fixed-rate receiver (call swaption) or the fixed-rate payer (put swaption).

- The writer becomes the counterparty to the swap if the buyer exercises.

- The strike rate indicates the fixed rate that will be swapped versus the floating rate.

- The buyer of the swaption either pays the premium upfront or can be structured into the swap rate.

Uses of swaptions

Used to hedge a portfolio strategy that uses an interest rate swap but where the cash flow of the underlying asset or liability is uncertain.

Uncertainties come from (i) callability, eg, a callable bond or mortgage loan, (ii) exposure to default risk.
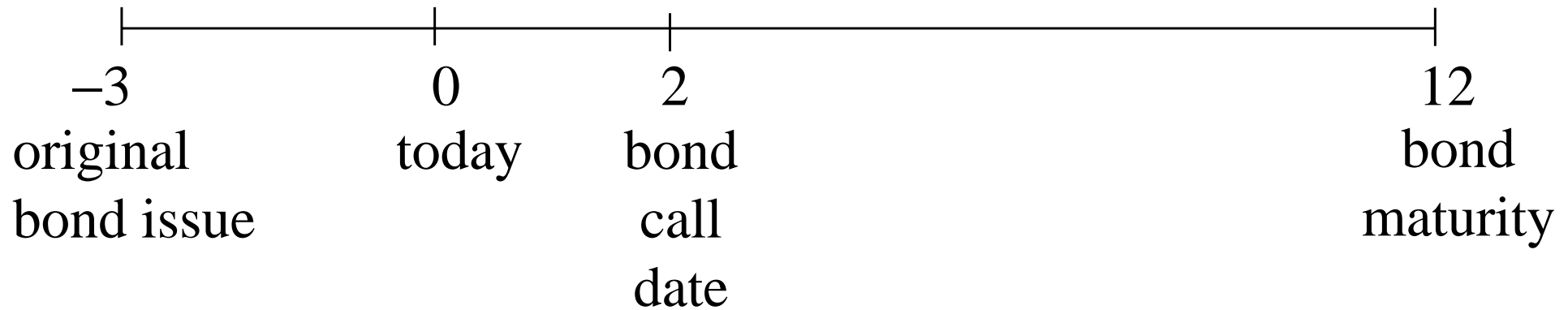
Example

Consider a S & L Association entering into a 4-year swap in which it agrees to pay 9% fixed and receive LIBOR.

- The fixed rate payments come from a portfolio of mortgage pass-through securities with a coupon rate of 9%. One year later, mortgage rates decline, resulting in large prepayments.

- The purchase of a put swaption with a strike rate of 9% would be useful to offset the original swap position.

Management of callable debt

Three years ago, *XYZ* issued 15-year fixed rate callable debt with a coupon rate of 12%.
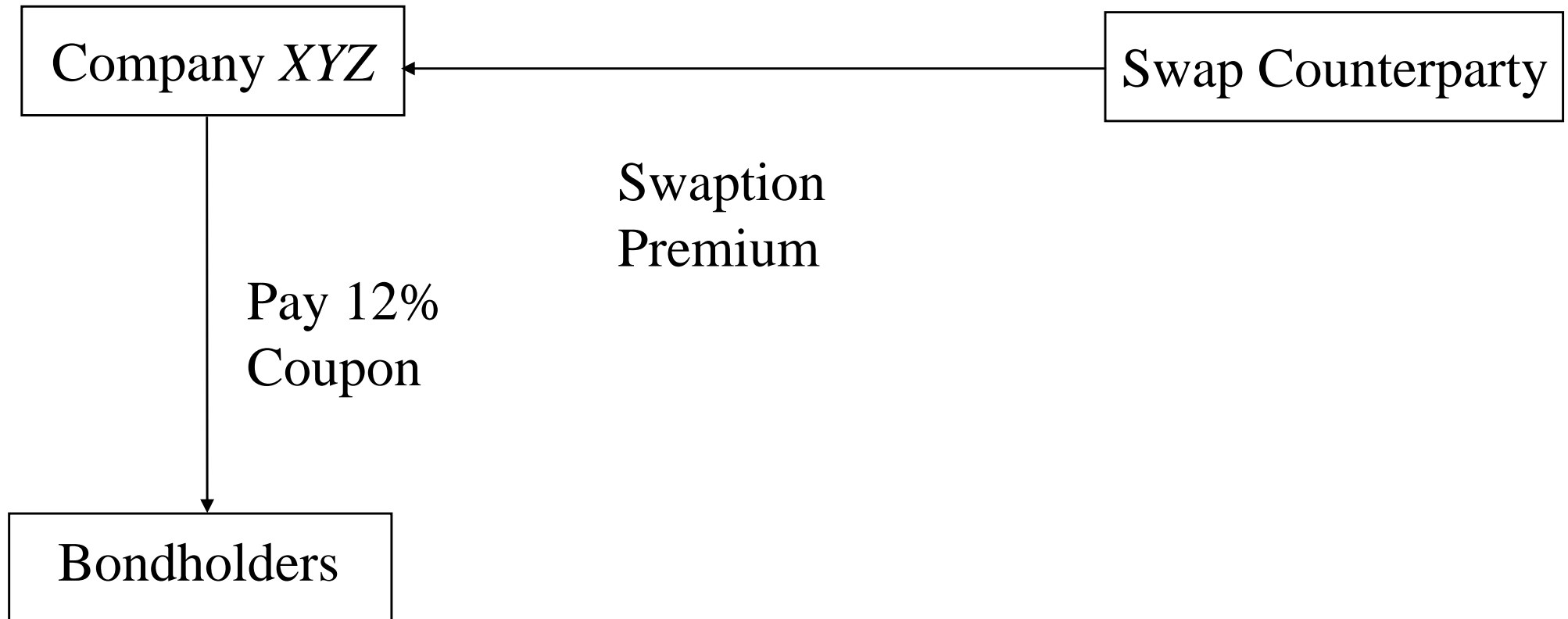
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   ├──────────────┼──────────┼──────────────────────────┤
  −3              0          2                          12
original       today      bond                        bond
bond issue                call                      maturity
                          date
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Strategy

The issuer sells a two-year receiver option on a 10-year swap, that gives the holder the right, but not the obligation, to receive the fixed rate of 12%.

Call monetization

By selling the swaption today, the company has committed itself to paying a 12% coupon for the remaining life of the original bond.
- The swaption was sold in exchange for an upfront swaption premium received at date 0.
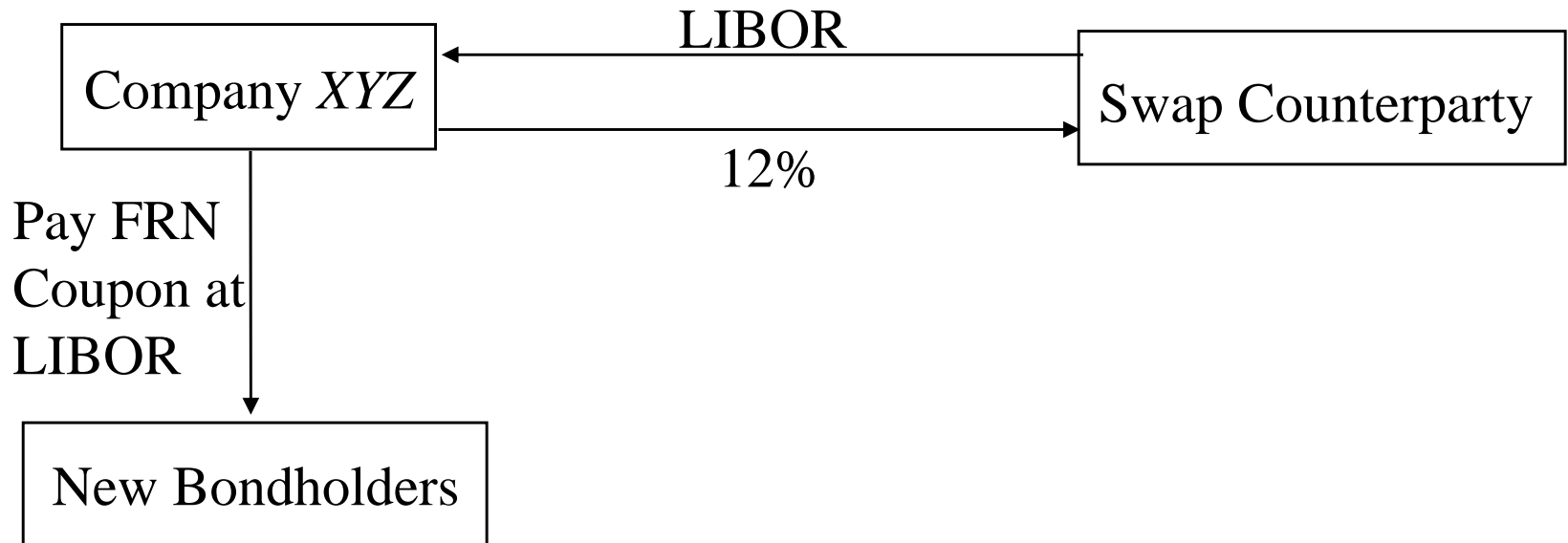
Call-Monetization Cash Flow: Swaption Expiration Date

Interest Rates ≥12%

Company *XYZ* → **Pay 12% Coupon** → Bondholders

Swap Counterparty

Interest Rates < 12%

Swap Counterparty → **LIBOR** → Company *XYZ*

Company *XYZ* → **12%** → Swap Counterparty

Company *XYZ* → **Pay FRN Coupon at LIBOR** → New Bondholders

Disasters for the issuer

- The fixed rate on a 10-year swap was below 12% in two years but its debt refunding rate in the capital market was above 12% (due to credit deterioration)

- The company would be forced either to enter into a swap that it does not want or liquidate the position at a disadvantage and not be able to refinance its borrowing profitably.

Example on the use of swaption

- In August 1992 (two years ago), a corporation issued 7-year bonds with a fixed coupon rate of 10% payable semiannually on Feb 15 and Aug 15 of each year.
- The debt was structured to be callable (at par) offer a 4-year deferment period and was issued at par value of $100 million.
- In August 1994, the bonds are trading in the market at a price of 106, reflecting the general decline in market interest rates and the corporation's recent upgrade in its credit quality.

Question

The corporate treasurer believes that the current interest rate cycle has bottomed. It the bonds were callable today, the firm would realize a considerable savings in annual interest expense.
Considerations
- The bonds are still in their call protection period.
- The treasurer's fear is that the market rate might rise considerably prior to the call date in August 1996.

Notation
T = 3-year Treasury yield that prevails in August, 1996
$T + BS$ = refunding rate of corporation,
   where BS is the company specific bond credit spread
$T + SS$ = prevailing 3-year swap fixed rate,
   where SS stands for the swap spread

Strategy I. Enter an off-market forward swap as the fixed rate payer

Agreeing to pay 9.5% (rather than the at-market rate of 8.55) for a three-year swap, two years forward.

Initial cash flow: Receive $2.25 million since the the fixed rate is above the at-market rate.

Assume that the corporation's refunding spread remains at its current 100 bps level and the 3-year swap spread over Treasuries remains at 50 bps, then the annual reduction in interest rate expense after refunding

$\quad$ 10% - $(T + 0.55)$] if the firm is able to refund

$\quad$ 0 $\qquad\qquad\qquad$ if it is not.

The gain (or loss) on unwinding the swap is the fixed rate at that time
$= [T + 0.5\% - 9.5\%]$.

The two effects offset each other, given the assumed spreads. The corporation has effectively sold the embedded call option for $2.25m.
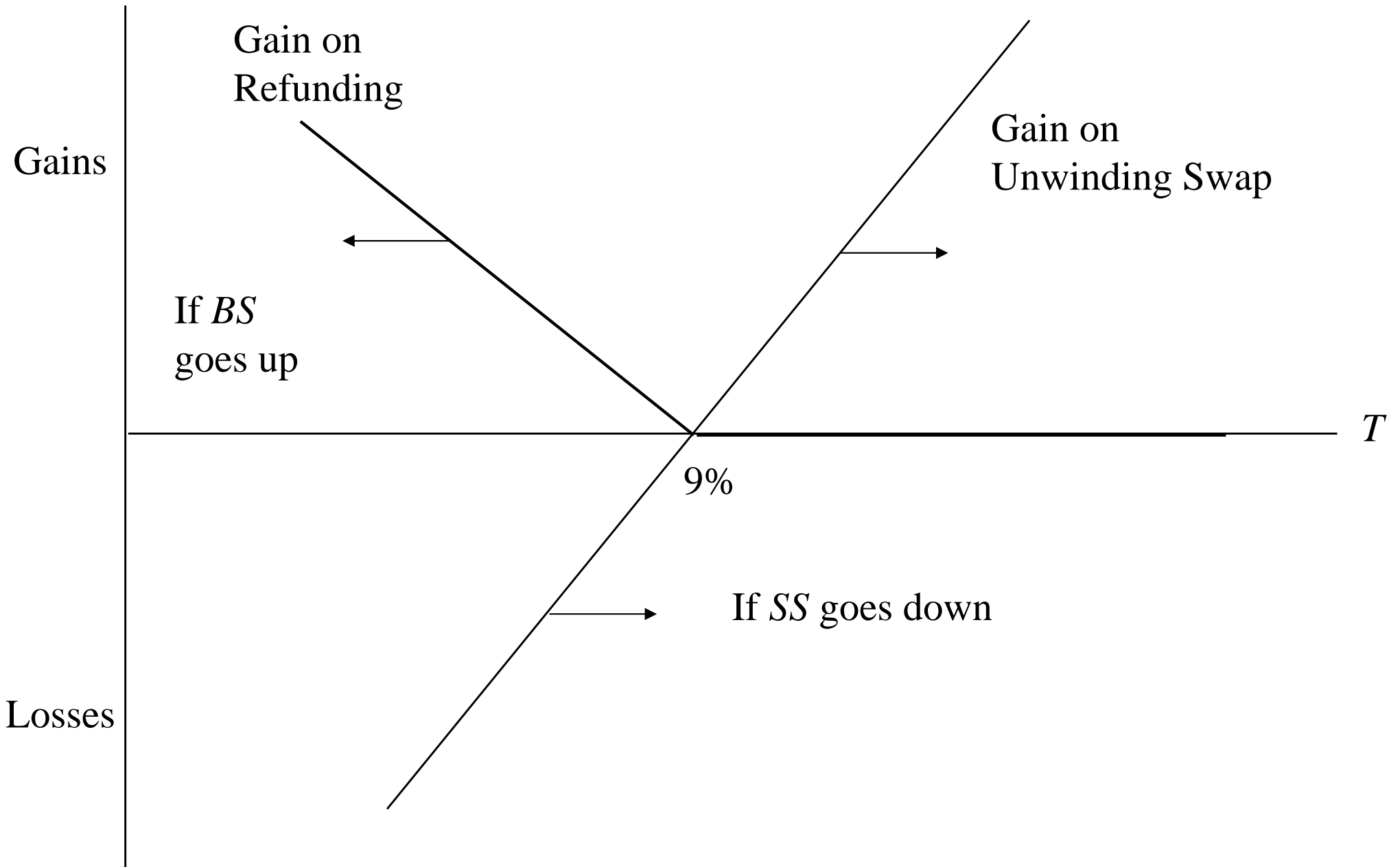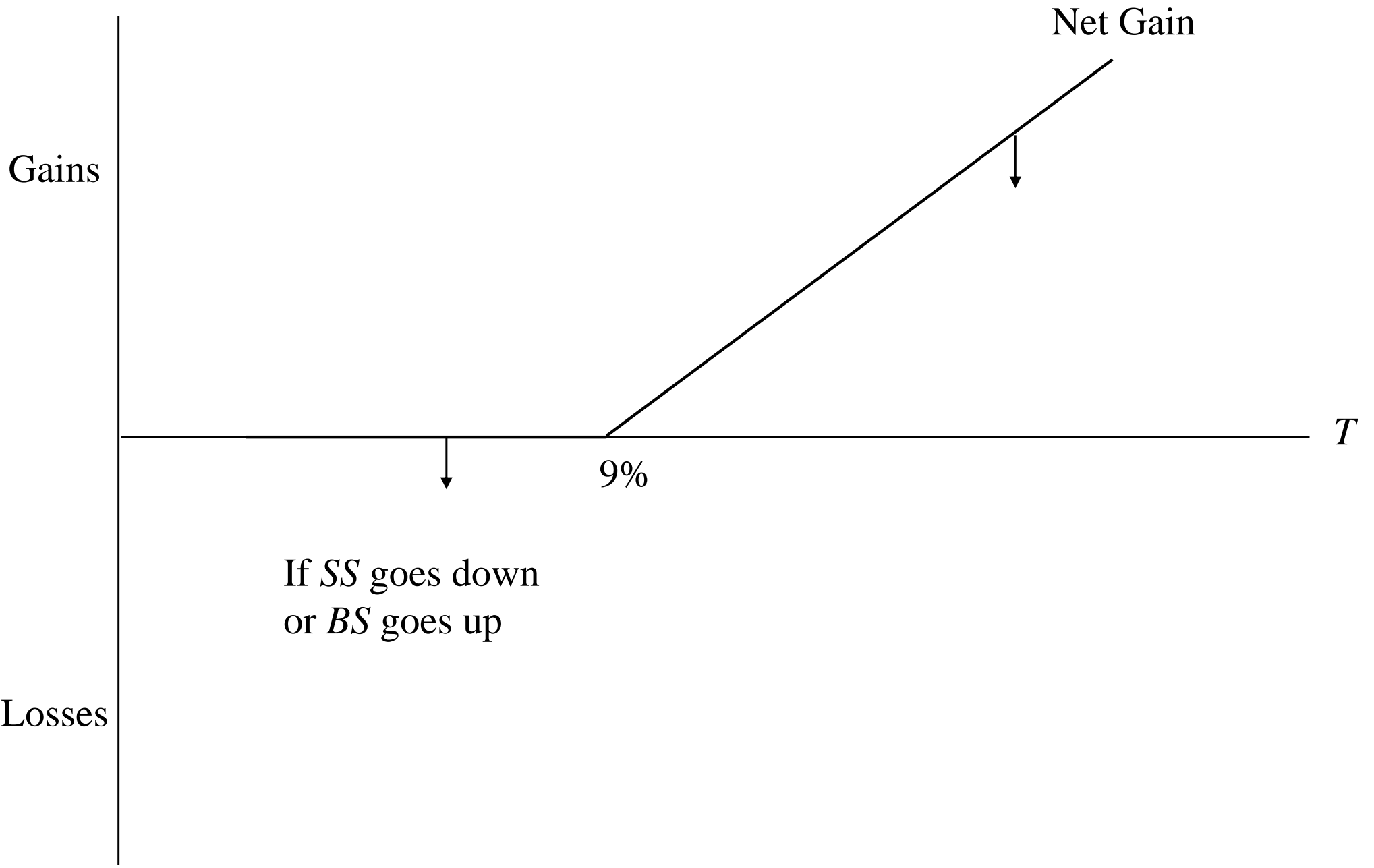
Gains and losses

August 1996 decisions:

- Gain on refunding (per settlement period):

  [10 percent – $(T + BS)$] if $T + BS < 10$ percent,

  $\qquad$ 0 $\qquad\qquad\qquad$ if $T + BS \geq 10$ percent.

- Gain (or loss) on unwinding the swap (per settlement period):

  – [9.50 percent – $(T + SS)$] if $T + SS < 9.50$ percent,

  [$(T + SS) - 9.50$ percent] $\quad$ if $T + SS \geq 9.50$ percent.

Assuming that $BS = 1.00$ percent $SS = 0.50$ percent, these gains and losses in 1996 are:

Callable Debt Management with a Forward Swap

Gain on
Refunding

Gains

Gain on
Unwinding Swap

If *BS*
goes up

T

9%

If *SS* goes down

Losses

Gains

Net Gain

T

9%

If *SS* goes down
or *BS* goes up

Losses

Comment on the strategy

Since the company stands to gain in August 1996 if rates rise, it has not fully monetized the embedded call options. This is because a symmetric payoff instrument (a forward swap) is used to hedge an asymmetric payoff (option) problem.

Strategy II. Buy payer swaption expiring in two years with a strike rate of 9.5%.
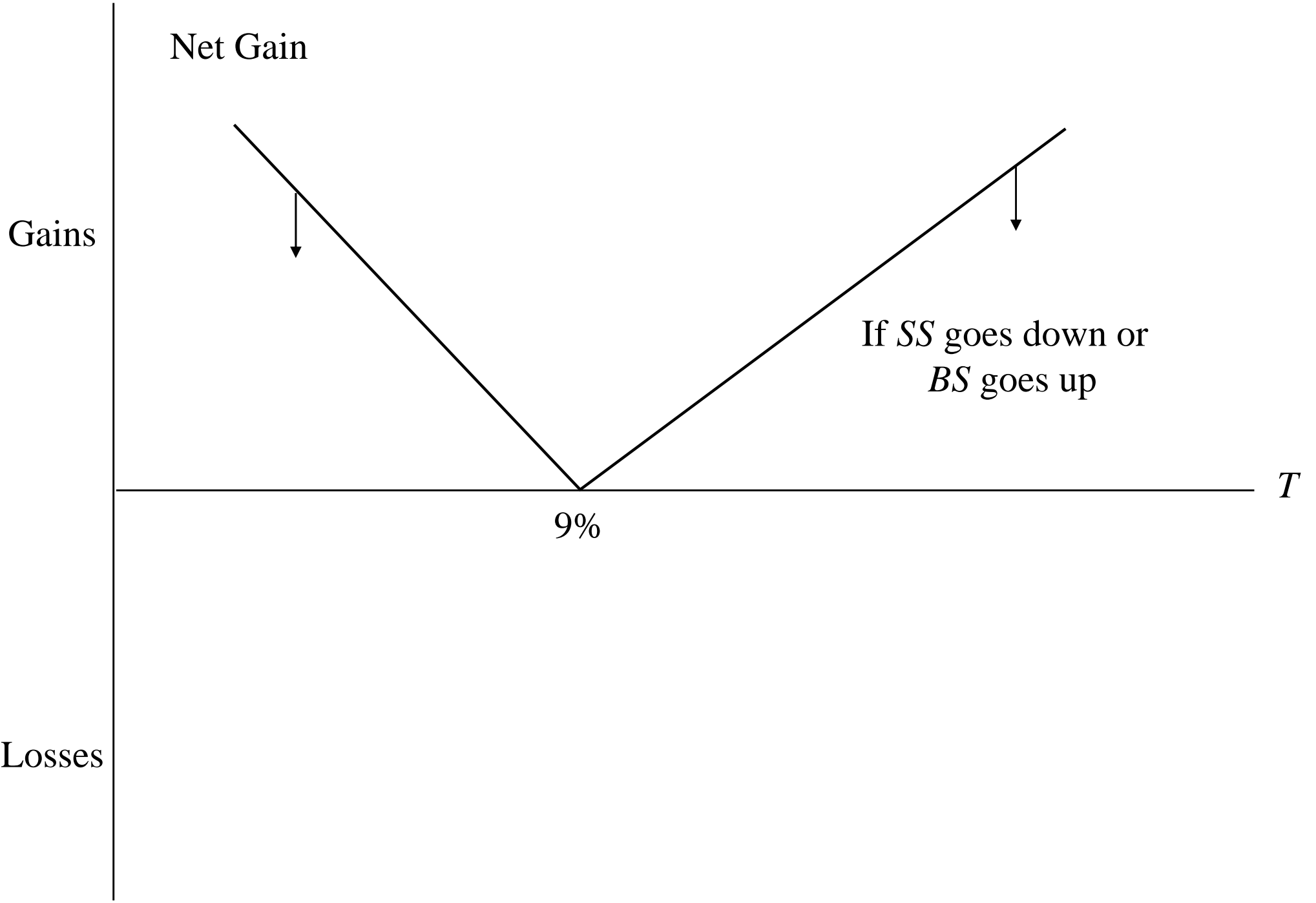
Initial cash flow: Pay $1.10 million as the cost of the swaption (the swaption is out-of-the-money)

August 1996 decisions:

- Gain on refunding (per settlement period):

$$[10 \text{ percent} - (T + BS)] \text{ if} \quad T + BS < 10 \text{ percent,}$$
$$0 \qquad\qquad\qquad \text{if} \quad T + BS \geq 10 \text{ percent.}$$

- Gain (or loss) on unwinding the swap (per settlement period):

$$[(T + SS) - 9.50 \text{ percent}] \text{ if} \quad T + SS > 9.50 \text{ percent,}$$
$$0 \qquad\qquad\qquad \text{if} \quad T + SS \leq 9.50 \text{ percent .}$$

With $BS = 1.00$ percent $SS = 0.50$ percent, these gains and losses in 1996 are:

Net Gain

Gains

If *SS* goes down or *BS* goes up

T

9%

Losses
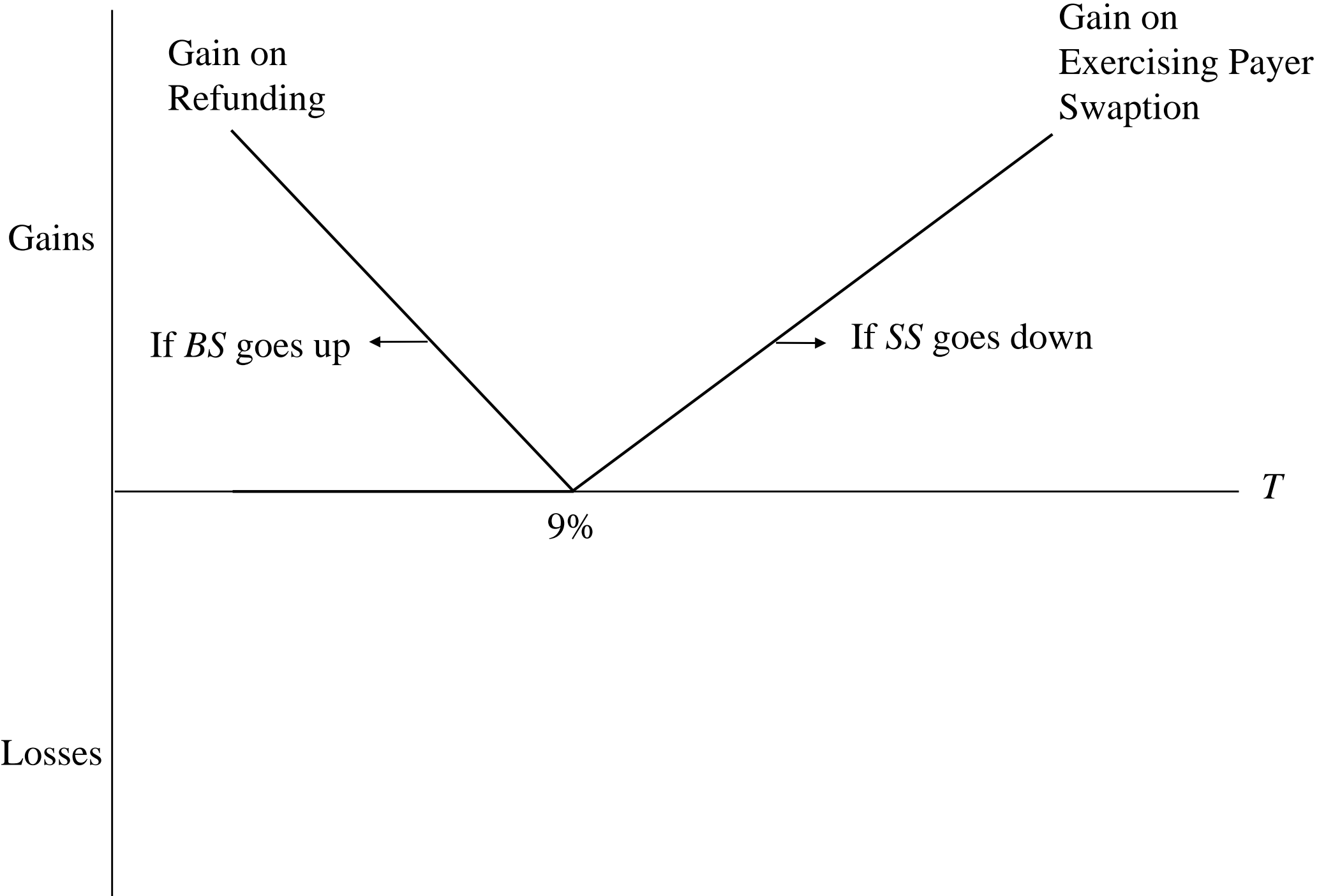
Comment on the strategy

The company will benefit from Treasury rates being either higher or lower than 9% in August 1996. However, the treasurer had to spend $1.1 million to lock in this straddle.
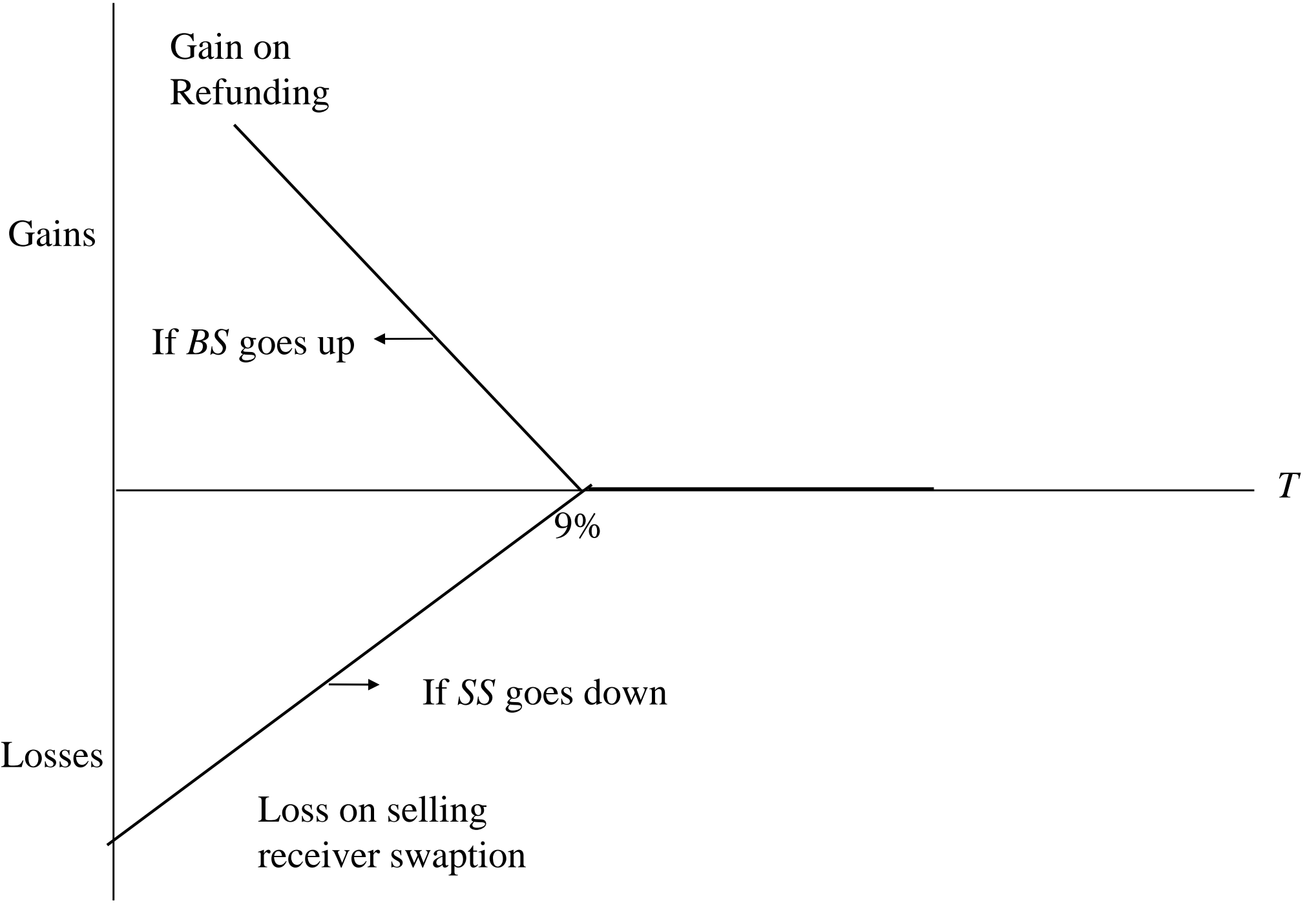
Strategy III. Buy payer swaption at a strike rate of 9.5%.

Initial cash flow: Receive $2.50 million (in-the-money swaption)

August 1996 decisions:
- Gain on refunding (per settlement period):
  [10 percent − (T + BS)] if T + BS < 10 percent,
       0   if T + BS ≥ 10 percent.

- Loss on unwinding the swap (per settlement period):
  [9.50 percent − (T + SS)] if T + SS < 9.50 percent,
       0   if T + SS ≥ 9.50 percent .

With *BS* = 1.00 percent *SS* = 0.50 percent, these gains and losses in 1996 are:

Gains

Gain on
Refunding

If *BS* goes up ←

9%

T

If *SS* goes down →

Losses

Loss on selling
receiver swaption

Gains

Net Gain

9%

T

If *SS* goes down
or *BS* goes up

Losses

Comment on the strategy

By selling the receiver swaption, the company has been able to simulate the sale of the embedded call feature of the bond, thus fully monetizing that option. The only remaining uncertainty is the basis risk associated with unanticipated changes in swap and bond spreads.