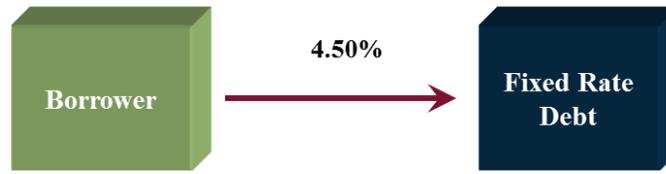


Prepayment Comparison: Fixed Rate Loans Vs. Interest Rate Swaps

By: Bryan Kern

Fixed Rate Loan Prepayment Penalties

Fixed rate loans are traditional debt financing tools with which every borrower is familiar. Let's assume a borrower secures \$100 million in debt financing today for 10 years with a 30 year amortization at a rate of 4.50% (act/360 daycount convention). The borrower will pay approximately \$510,600 per month through the term of the loan and will have a balloon payment of approximately \$80,460,000 due at maturity. These mechanics are outlined below:



If the borrower keeps the loan in place through maturity, there is no concern for prepayment penalties. However, if the borrower elects to sell the financed asset or refinance the debt during the life of the loan, the loan documents will prescribe a formula for calculating a prepayment penalty. While this language can vary dramatically from loan to loan, the most common prepayment penalty calculation is a make whole formula.

Under a make whole formula, the lender attempts to recoup its theoretical loss under the loan. This should be based partly on the lender's cost of funds through the remaining term of the debt at the time of prepayment. However, expressing a lender's cost of funds as a predefined formula would be rather onerous. As a conservative compromise, lenders simply assume that they fund at the same level as the United States government. The result is a formula that calculates the present value of all future remaining principal and interest payments on the loan using the yield from a U.S. Treasury security with a maturity most closely matching that of the loan and then subtracting from this sum the balance of the loan as of the prepayment date. If U.S. Treasury rates are above the coupon on the loan, the prepayment penalty is \$0.

Example

A borrower secures ten year financing on \$100 million at 4.50%. The loan amortizes over 30 years. Six years later, the borrower sells the financed asset and must prepay the loan. The balance of the loan at the time of prepayment is approximately \$89,251,000. Assuming a 4 year Treasury yield of 1.80% at the time of prepayment and using a common make whole formula, the borrower would be required to pay a penalty of approximately \$8,979,000. This represents a penalty equivalent to roughly 10% of the remaining balance of the loan.

Swap Termination Payments

Interest rate swaps are less universally understood than fixed rate loans. Let's assume a borrower secures \$100 million in variable rate debt financing today for 10 years with a 30 year amortization at a rate of one month LIBOR + 2.50%. By swapping this loan to fixed for ten years, the borrower locks in a rate today of 4.50% (act/360 daycount convention). The borrower will pay approximately \$510,600 per month through the term of the loan and will have a balloon payment of approximately \$80,460,000 due at maturity. The mechanics of a swap are outlined below:



The end result of a swap plus variable rate financing is the same as a fixed rate loan. If the borrower keeps the loan in place through maturity, there is no concern for prepayment penalties. However, if the borrower elects to sell the financed asset or refinance the debt during the life of the loan, the swap will have to be terminated at its market value. There is no formula for determining the value of a swap at the time of termination, but it is similar to the make whole concept embedded in fixed rate loans.

Under a swap termination, the termination value is determined by where an identical swap can be done in today's market for the remaining term of the borrower's swap. Once this swap rate is determined (the "Replacement Rate") it is compared to the borrower's existing swap rate. The difference in these two rates, after applying it to the outstanding notional of the swap, is then discounted back to today. If the Replacement Rate is above the borrower's current swap rate, not only will the borrower not owe a termination payment, but they will also receive a premium to terminate the swap. Additionally, if the swap provider is not offering the most aggressive termination value possible, the borrower may elect to auction the instrument to the best bidder.

Example

A borrower secures ten year variable rate financing on \$100 million at one month LIBOR + 2.50%. The loan amortizes over 30 years. Simultaneously, the borrower executes a swap to fix its rate at 4.50% for the term of the loan. Six years later, the borrower sells the financed asset and must prepay the loan. The balance of the loan at the time of prepayment is approximately \$89,251,000. Because variable rate loans are fully prepayable without penalty, the loan is prepaid in full. However, the swap must also be terminated. Assuming a Replacement Rate of 1.80% at the time of prepayment, the borrower would be required to pay a penalty of approximately \$658,000. This represents a penalty equivalent to roughly 0.7% of the remaining balance of the loan.

Why Is There Such a Large Difference Between Loan and Swap Terminations?

After looking at two identical loan scenarios, we see that the prepayment penalty of our fixed rate loan is \$8,979,000 (10% of loan balance) while the penalty associated with our variable rate loan and swap is \$658,000 (0.7% of loan balance). Why is the fixed rate loan penalty \$8 million higher than the swap termination? The answer is twofold.

1. Funding Level

Lenders typically fund themselves at some spread *above* Treasuries. By referencing a flat Treasury rate (i.e., Treasuries + 0.00%) in the fixed rate loan prepayment formula, the discount rate is much too low to provide a fair representation of the lender's cost. Swaps, on the other hand, are ignorant of funding spreads. Instead, they rely on replacement swap rates. For illustrative purposes, the examples below assume the lender makes no profit.

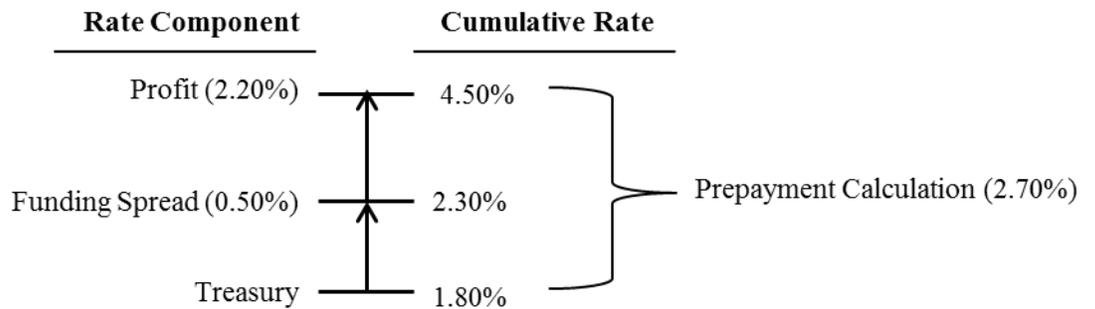
Fixed rate loan example: A fixed rate lender may fund itself at Treasury rates + 0.50% and determine prepayment penalties based on Treasury rates + 0.00%. If a borrower secures financing one day and terminates the very next day, it will owe a prepayment penalty equal to the present value of all its future principal and interest payments. In this case, the principal and interest payments are based on Treasury rates + 0.50% while the discount rate is determined by Treasury rates + 0.00%. In the absence of any rate movement, the borrower will owe a prepayment penalty equal to the present value of 0.50% simply because the lender is not using its cost of funding as the discount rate. If the lender were to fund at Treasury rates + 0.50% and determine its prepayment penalty at Treasury rates + 0.50%, there would be no prepayment penalty.

Interest rate swap example: Regardless of where lenders fund themselves, they will all offer a fixed rate based on then-current swap rates. Due to the liquidity of the swap market, this rate will be the same regardless of the lender (again, this example assumes the lender does not profit on the swap). If a borrower secures financing one day and terminates the very next day, it will owe a swap termination penalty based on discounting the difference between the rate it locked in and the Replacement Rate. In the absence of any rate movement, the borrower will not owe a prepayment penalty because the fixed rate it locked in on its swap is the same as the Replacement Rate.

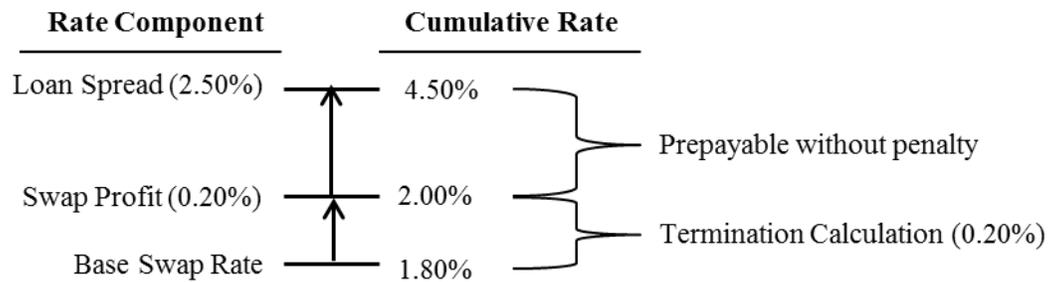
2. Profit Level

The previous examples illustrate only part of the reason why fixed rate loan prepayments are larger than swap termination payments. The largest difference actually comes from a lender’s profit. The illustrations below show the components of how a fixed rate loan is calculated in relation to its prepayment penalty as well as a variable rate loan with a swap.

Fixed rate loan example: A fixed rate loan is made up of several components to get to an all-in fixed rate. The illustration below shows a lender with a funding spread of 0.50% over Treasuries for ten years. The lender takes the 10 year Treasury (currently 1.80%) and adds its 0.50% funding spread and then a profit of 2.20% to get to an all-in rate of 4.50%. If a borrower were to secure funding today and then prepay the loan tomorrow, then it would owe a prepayment penalty based on the present value of its principal and interest payments at 4.50%. The discount rate is Treasuries + 0.00% so in the absence of any rate movement the prepayment penalty is equal to the present value of 2.70% over ten years. In other words, the lender’s funding spread and profit are included in the calculation of the prepayment penalty.



Interest rate swap example: Because interest rate swaps are contracts separate from the underlying financing, there are two components in determining the all-in fixed rate. The illustration below shows a lender offering a variable rate loan at LIBOR + 2.50% and then swapping that to a fixed rate of 2.00%¹. In this example, the lender is making 0.20% on the swap. If the borrower were to secure funding today and then prepay the loan tomorrow, then it would owe a penalty based on the present value of the difference between the swap rate (2.00%) and the Replacement Rate. In the absence of any rate movement, the Replacement Rate would be 1.80% and the borrower would owe a payment equal to the present value of 0.20% over ten years. In other words, the lender's funding spread and loan profit are excluded from the calculation of any prepayment penalty.



¹ The base swap rate in this case is the same as the Treasury rate in the previous example. This is due to the fact that a 10 year notional schedule with a 30 year amortization at a 4.50% rate has a weighted average life of approximately 9.60 years. Because of the shorter WAL and terms of the swap (monthly payments, act/360 daycount), the base swap rate is the same as the ten year Treasury rate.

Conclusion Fixed rate loan prepayment penalties and interest rate swap terminations require very different calculations. Based on the way fixed rate loans are calculated, they will always be more punitive than swap terminations for several reasons:

- Fixed rate loan prepayment penalties are formulaic and therefore conservative by nature. Swap terminations are market based.
- Fixed rate loan prepayment penalties include the entire funding spread and profit. Swap terminations only include swap profit because funding spread and loan profit are built into the underlying loan (which is prepayable without penalty).
- Discount rates for fixed rate loan prepayment penalties are much lower than a lender's actual funding cost. Discount rates for swaps ignore funding costs altogether and instead are compared to comparable swap rates at the time of termination (the Replacement Rate).
- At best, a fixed rate loan prepayment penalty will be \$0 in high rate environments. Swaps will actually pay borrowers a premium if the Replacement Rate is above the locked in swap rate.
- Borrowers must deal directly with lenders in calculating and making fixed rate loan prepayment penalties. Swap users can auction their swaps in the open market if they disagree with the termination value from the lender.

Fixed rate loans and variable rate loans with swaps are very different funding vehicles that produce similar results if left undisturbed through maturity. Prior to selecting one of these vehicles, a borrower should analyze the benefits/detriments of differing factors such as leverage, recourse, and counterparty risk. These factors are beyond the scope of this paper.

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