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White Paper

Calculating a Swap's Termination or Market Value

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Introduction

Fair value, market value, and termination value are all labels used to describe a swap's changing market value. From the moment a swap's price is set and locked-in, its market value will increase or decrease as swap rates rise or fall, in the same way a fixed-rate bond's value changes over time.

This paper describes a simple method to approximate a swap's value with a minimum of inputs and calculations.

Value as the Difference in Future Cash Flows

Any derivative's value is a function of the difference between its contract price and the current market price for a similar contract. For an interest rate swap, this is the difference between its fixed rate and the current market fixed rate for a swap with *similar* terms. The difference in rates defines a set of future cash flows, which can then be discounted back to today (present-valued) to determine the swap's market value.

Example

To illustrate a swap's market value calculation, suppose a borrower has a swap with a bank with the following swap details:

Notional Principal:	$10 million
Remaining Maturity of Swap:	5-years
Fixed Rate:	4.00%, paid monthly
Floating Rate:	1-mo LIBOR
Fixed Rate Payer:	Company

Let's also suppose that the current market rate for a similar 5-year swap is 3.50%. Notice that we are not concerned with current market rate corresponding to the *original term* of the swap, which was obviously longer than 5 years. The only thing relevant is how much time is remaining.

Calculation

The difference between contract and market rates is .50% (4.00% less 3.50%). Since the fixed rate being paid by the company is higher than the current market, the swap value is negative from the

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company's point of view; negative because it is an opportunity cost to the company (if the company had waited until today to execute the swap, it could have saved .50% on the rate).

Cash flow differential:	.50% monthly on $10 million (-$4,167/month)
Remaining term:	5 years (60 months)
Total cash flow flows:	-$250,000 (-$4,167 x 60)
Discounted at 3.50%:	-$225,000 (we use the current market rate to present-value the cash flows)

Therefore, the market value of the swap from the company's point of view is -$225,000. The company would have to pay this amount to its counterparty in order to terminate the swap.

Accrued Interest - There is one last adjustment we need to make to our value calculations. Since the comparative current market swap rate will assume an immediately-starting structure, we need to add the current swap's accrued interest to our calculated value in order to arrive at an accurate final value.

Discussion

The valuation method above will give an *approximate* value for the swap. A more accurate valuation (one needed for counterparty negotiating purposes) would require a much more complicated set of calculations. Here are some of the issues to focus on:

Market Rate – Obtaining the representative current market rate for the swap is critical to the valuation process, and its value will be a main negotiating point. The bank counterparty will argue for why the rate should be further in the direction that benefits them, etc. If a swap is non-amortizing, a market rate may be interpolated from current generic market data. If the structure is amortizing, a weighted-average-life calculation can be used, but this will decrease the accuracy of the valuation.

Index - The variable index must be considered when determining the current market rate. 3-month LIBOR carries different pricing from 1-mo LIBOR, Prime, etc.

Discount Rate – In our calculations above, we used the current swap market rate to discount the cash flows. To be entirely accurate, one would use a unique interest rate for each future cash flow, using a "zero-curve" methodology.

Other types of Derivative Contracts (commodity, foreign exchange, option) - These can be valued using the same method outlined above; discounting the cash flow differential between the contract and market rates. Option contracts are more difficult to value, since they require a more sophisticated pricing model and more market-based inputs.

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