Amortizing and Accreting Swap Vaulation Pratical Guide

FinPricing

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Amortizing or Accreting Swap Introduction

◆ An amortizing swap is an interest rate swap whose notional principal amount declines during the life of the contract

◆ An accreting swap is an interest rate swap whose notional principal amount increases instead.

◆ The notional amount changes could be one leg or two legs, but typically on a fixed schedule.

◆ The notional principal is tied to an underlying financial instrument with a declining principal, such as a mortgage or an increasing principal, such as a construction fund.

The Use of Amortizing or Accreting Swap

◆ The notional principal of an amortizing swap is tied to an underlying financial instrument with a declining principal, such as a mortgage.

◆ On the other hand, the notional amount of an accreting swap is tied to an underlying instrument with an increasing principal, such as a construction fund.

◆ The notional principal schedule of an amortizing or an accreting swap may decrease or increase at the same rate as the underlying instrument.

◆ Both amortizing and accreting swaps can be used to reduce or increase exposure to fluctuations in interest rates.

Valuation

- The analytics is similar to a vanilla interest rate swap but the principal amount used by each period may be different.

- The present value of a fixed rate leg is given by

$$PV_{fixed}(t) = R \sum_{i=1}^{n} N_i \tau_i D_i$$

where t is the valuation date and $D_i = D(t, T_i)$ is the discount factor.

- The present value of a floating leg is given by

$$PV_{float}(t) = \sum_{i=1}^{n} N_i (F_i + s) \tau_i D_i$$

where $F_i = \left(\frac{D_{i-1}}{D_i} - 1 \right) / \tau_i$ is the simply compounded forward rate and s is the floating spread.

Valuation (Cont)

◆ The present value of an interest rate swap can expressed as

◆ From the fixed rate payer perspective, $PV = PV_{float} - PV_{fixed}$

◆ From the fixed rate receiver perspective, $PV = PV_{fixed} - PV_{float}$

Practical Notes

◆ First of all, you need to generate accurate cash flows for each leg. The cash flow generation is based on the start time, end time and payment frequency of the leg, plus calendar (holidays), business convention (e.g., modified following, following, etc.) and whether sticky month end.

◆ We assume that accrual periods are the same as reset periods and payment dates are the same as accrual end dates in the above formulas for brevity. But in fact, they are different due to different market conventions. For example, index periods can overlap each other but swap cash flows are not allowed to overlap.

◆ The accrual period is calculated according to the start date and end date of a cash flow plus day count convention

Practical Notes (Cont)

◆ The forward rate should be computed based on the reset period (index reset date, index start date, index end date) that are determined by index definition, such as index tenor and convention. it is simply compounded.

◆ Sometimes there is a floating spread added on the top of the floating rate in the floating leg.

◆ The formula above doesn't contain the last live reset cash flow whose reset date is less than valuation date but payment date is greater than valuation date. The reset value is

$$PV_{reset} = r_0 N \tau_0 D_0$$

where r_0 is the reset rate.

Practical Notes (Cont)

◆ The present value of the reset cash flow should be added into the present value of the floating leg.

◆ Some dealers take bid-offer spreads into account. In this case, one should use the bid curve constructed from bid quotes for forwarding and the offer curve built from offer quotes for discounting.

Amortizing Swap

A Real World Example

Fixed Leg Specification		Floating Leg Specification		Notional Schedule	
Currency	USD	Currency	USD	6100520	9/1/2015
Day Count	dcAct360	Day Count	dcAct360	6075492	10/1/2015
Leg Type	Fixed	Leg Type	Float	6050464	11/1/2015
Notional	6100520	Notional	6100520	6024284	12/1/2015
Pay Receive	Receive	Pay Receive	Pay	5998104	1/1/2016
Payment Frequency	1M	Payment Frequency	1M	5971924	2/1/2016
Start Date	9/1/2015	Start Date	9/1/2015	5945744	3/1/2016
End Date	4/3/2023	End Date	4/3/2023	5919564	4/1/2016
Fixed Rate	0.0245	Spread	0	5893384	5/1/2016
		Index Specification		5867204	6/1/2016
		Index Type	LIBOR	5841024	7/1/2016
		Index Tenor	1M	5814844	8/1/2016
		Index DayCount	dcAct360	5788664	9/1/2016

Thanks!

You can find more details at
https://finpricing.com/faq.html