

Interest Rate & Currency Swaps

Chapter 14

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Definitions

- In a swap, two **counterparties** agree to a contractual arrangement wherein they will exchange cash flows at periodic intervals.
- There are two types of interest rate swaps.
 - Single currency interest rate swap
 - “Plain vanilla” fixed-for-floating swaps are often just called *interest rate swaps*.
 - Cross-currency interest rate swap
 - This is often called a *currency swap*, fixed for fixed rate debt service in two (or more) currencies.

Size of the Swap Market

- In 2015 the notational principal of:
 - Interest rate swaps was \$289 trillion USD.
 - Currency swaps was \$22.7 trillion USD.
- The four most common currencies used to denominate interest rate and currency swaps are the euro, U.S. dollar, Japanese yen, and the British pound sterling, with the fifth most common currency being the Canadian dollar for interest rate swaps and the Swiss franc for currency swaps.

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EXHIBIT 14.1

Size of OTC Interest Rate and Currency Swap Markets: Total Notional Principal Outstanding Amounts in Billions of U.S.D.

Year	Interest Rate Swaps	Currency Swaps
2007	309,588	14,347
2008	309,760	13,322
2009	349,236	16,509
2010	364,377	19,271
2011	402,611	22,791
2012	370,002	25,420
2013	456,725	25,448
2014	381,129	24,042
2015	288,634	22,750

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The Swap Bank

- Swap bank is a generic term to describe a financial institution that facilitates swaps between counterparties.
- The swap bank can serve as either a broker or a dealer.
 - As a broker, the swap bank matches counterparties but does not assume any of the risks of the swap.
 - As a dealer, the swap bank stands ready to accept either side of a currency swap and then later lay off the risk, or match it with a counterparty.

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Swap Market Quotations

- Swap banks will tailor the terms of interest rate and currency swaps to customers' needs.
- They also make a market in “plain vanilla” swaps and provide quotes for these. Since the swap banks are dealers for these swaps, there is a bid-ask spread.

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EXHIBIT 14.2 Interest Rate Swap Quotations

	Euro-€		£ Sterling		Swiss Franc		USD		JPY	
	Bid	Ask	Bid	Ask	Bid	Ask	Bid	Ask	Bid	Ask
1 year	-0.16	-0.13	0.72	0.74	-0.73	-0.65	0.8	0.81	-0.08	-0.06
2 year	-0.16	-0.14	0.76	0.77	-0.73	-0.70	0.94	0.95	-0.14	-0.13
3 year	-0.14	-0.10	0.82	0.84	-0.72	-0.68	1.05	1.05	-0.16	-0.14
4 year	-0.08	-0.04								
5 year	-0.01	0.03								
6 year	0.09	0.12								
7 year	0.2	0.23								
8 year	0.32	0.35								
9 year	0.43	0.46								
10 year	0.53	0.55								
12 year	0.7	0.73								
15 year	0.88	0.92	1.01	1.03	0.06	0.11	1.07	1.07	0.28	0.31
20 year	1.04	1.06	1.67	1.68	0.18	0.23	2	2	0.42	0.45
25 year	1.06	1.10	1.66	1.67	NA	NA	2.07	2.07	NA	NA
30 year	1.08	1.09	1.65	1.66	0.29	0.34	2.1	2.11	0.48	0.5

1.06–1.10 means the swap bank will pay fixed-rate euro payments at 1.06% against receiving USD LIBOR or it will receive fixed-rate euro payments at 1.10% against receiving USD LIBOR. For 25 years.

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Swap Quotations: Bid-Ask Spread

1.06–1.10 means the swap bank will pay fixed-rate euro payments at 1.06% against receiving USD LIBOR or it will receive fixed-rate euro payments at 1.10% against paying dollar USD LIBOR.



While most swaps are quoted against “flat” dollar LIBOR, “off-market” swaps are available where one party pays LIBOR plus or minus some number.

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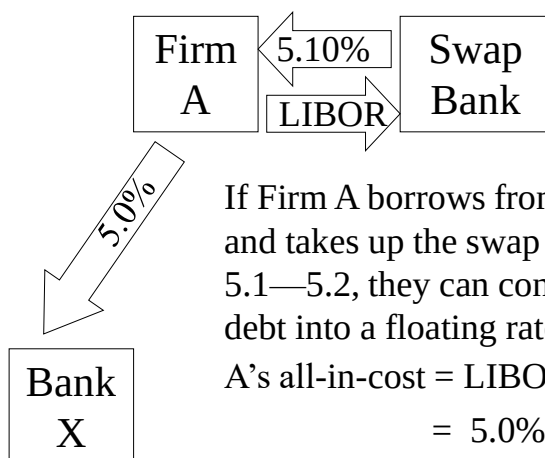
Example of an Plain Vanilla Interest Rate Swap

	Fixed	Floating
A	5%	LIBOR
B	5.50%	LIBOR + .20%

- Consider Firms A and B; each firm wants to borrow \$40 million for three years.
 - Firm A wants to finance an interest-rate-sensitive asset and therefore wants to borrow at a floating rate. A has good credit and can borrow at LIBOR.
 - Firm B wants to finance an interest-rate-insensitive asset and thus wants to borrow at a fixed rate. B has less-than-perfect credit and can borrow fixed at 5.5%.

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Example of an Interest Rate Swap: Firm A



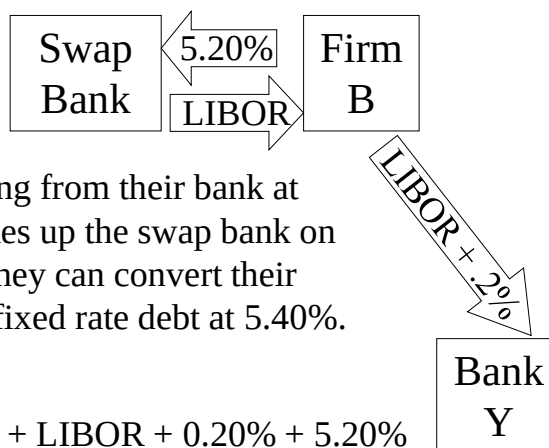
If Firm A borrows from their bank at 5.0% fixed and takes up the swap bank on their offer of 5.1—5.2, they can convert their fixed rate 5% debt into a floating rate debt at LIBOR – 0.10%.

A's all-in-cost = LIBOR – 0.10%

$$= 5.0\% + \text{LIBOR} - 5.10\%$$

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Example of an Interest Rate Swap: Firm B



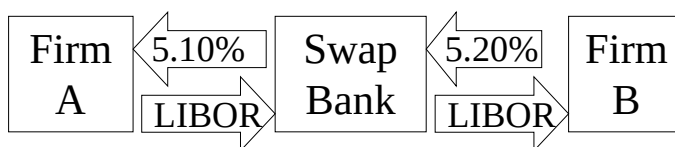
If Firm B borrows floating from their bank at LIBOR + 0.20% and takes up the swap bank on their offer of 5.1—5.2, they can convert their floating rate debt into a fixed rate debt at 5.40%.

B's all-in-cost = 5.40%

$$= -\text{LIBOR} + \text{LIBOR} + 0.20\% + 5.20\%$$

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Example of an Interest Rate Swap: Swap Bank



The swap bank makes 10 basis points on the deal.

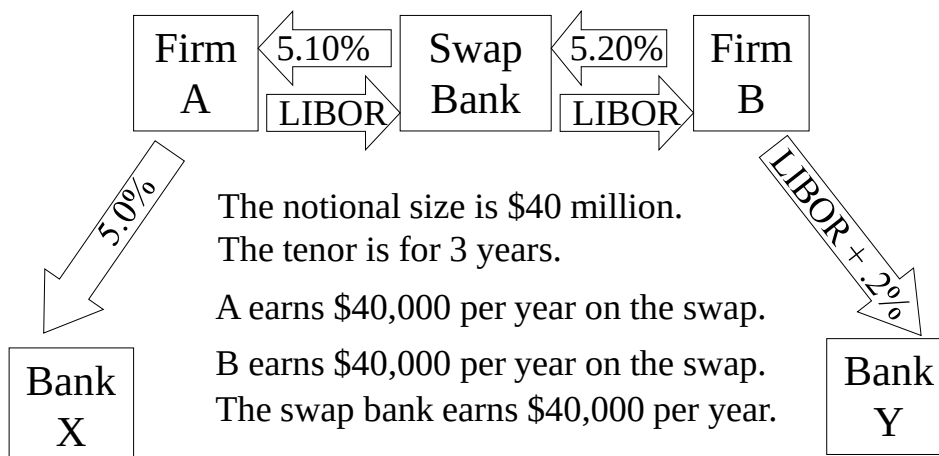
The swap bank's all-in-cost:

$$-0.10\% = -\text{LIBOR} + \text{LIBOR} - 5.20\% + 5.10\%$$

Note that a negative cost means a profit.

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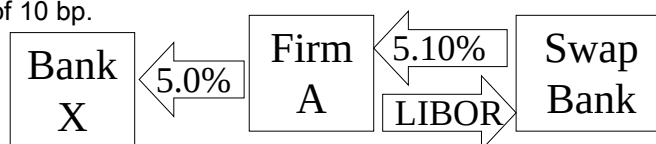
Example of an Interest Rate Swap: All Parties



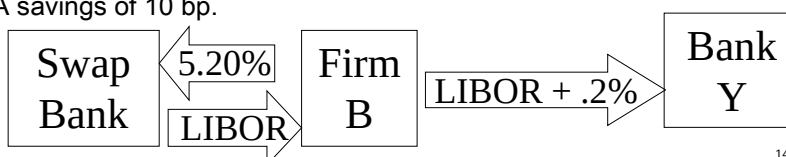
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Using a Swap to Transform a Liability

- Firm A has transformed a fixed rate liability into a floater.
 - A is borrowing at LIBOR – .10%
 - A savings of 10 bp.



- Firm B has transformed a floating rate liability into a fixed rate liability.
 - B is borrowing at 5.40%
 - A savings of 10 bp.



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What about the Principal?

- In our “plain vanilla” interest-only interest rate swap, we did not mention swapping the Notational Principal.
- It could be the case that Firm A exchanged principal with their lender, Bank X, and Firm B exchanged principal with their outside lender, Bank Y.

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Example of a Currency Swap

- Consider Firms A and B:
 - Firm A is a U.S. MNC who wants to finance a euro denominated asset in Italy, and therefore wants to borrow €40 million for 3 years. A can borrow euros at 6%.
 - Firm B is a French MNC who wants to finance a dollar denominated asset, and therefore wants to borrow \$60 million for 3 years. B can borrow dollars at 8%.

	\$	€
A	\$7%	€6%
B	\$8%	€5%

- The exchange rate at inception was $\$1.50 = €1.00$.

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Example of a Currency Swap: Swap Quotes

Suppose that the Swap Bank publishes these quotes.

The convention is to quote against U.S. dollar LIBOR.

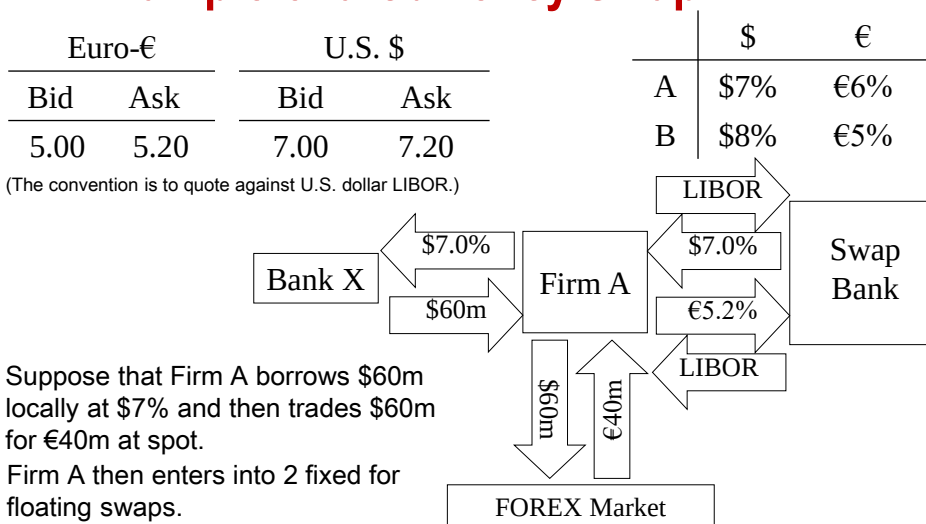
	Euro-€		U.S. \$	
	Bid	Ask	Bid	Ask
3 year	5.00	5.20	7.00	7.20

Firm A wants to finance a euro-denominated asset in Italy and wants to borrow euros. It can borrow euros at 6% or it can borrow euros at 5.2% by using a currency swap.

	\$	€
A	\$7%	€6%
B	\$8%	€5%

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Example of a Currency Swap: Firm A

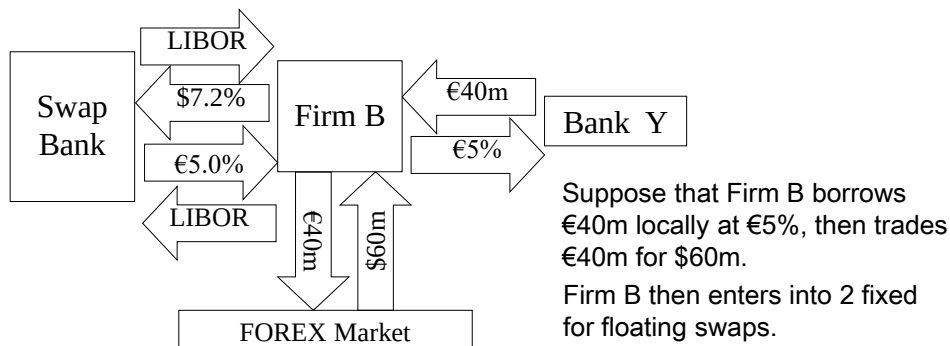


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Example of a Currency Swap: Firm B

Euro-€		U.S. \$			\$	€
Bid	Ask	Bid	Ask			
5.00	5.20	7.00	7.20	A	\$7%	€6%
				B	\$8%	€5%

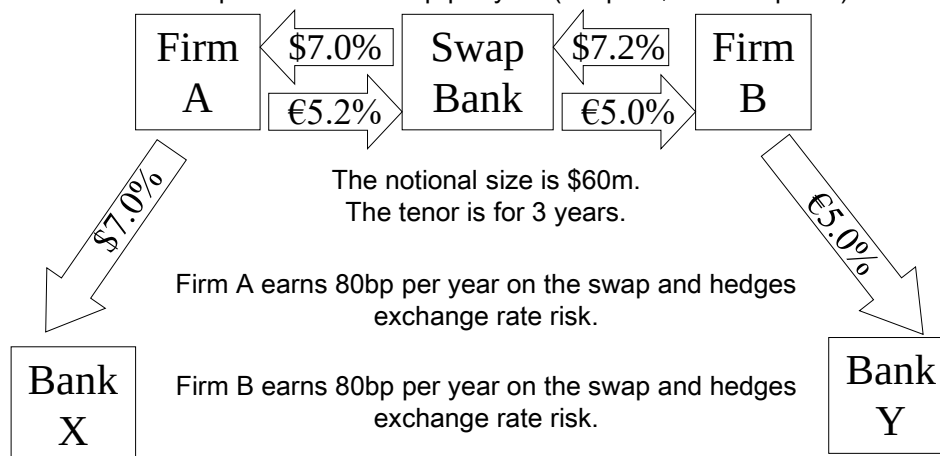
(The convention is to quote against U.S. dollar LIBOR.)



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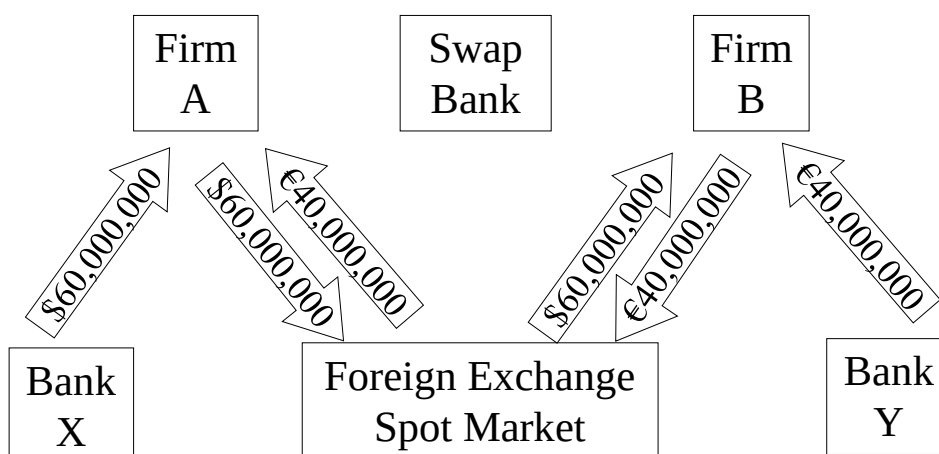
Example of a Currency Swap: Swap Bank

The swap bank earns 40bp per year (20bp in \$ and 20bp in €).



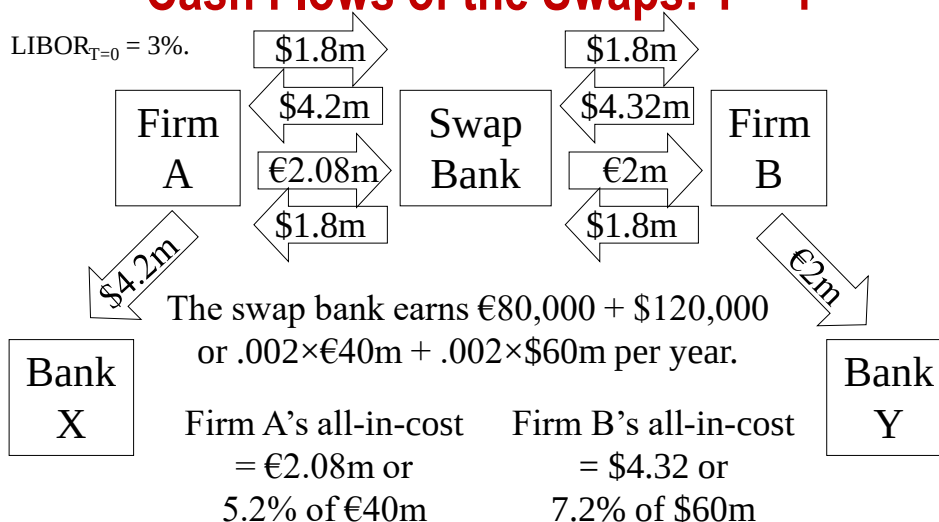
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Cash Flows of the Swaps: $T = 0$



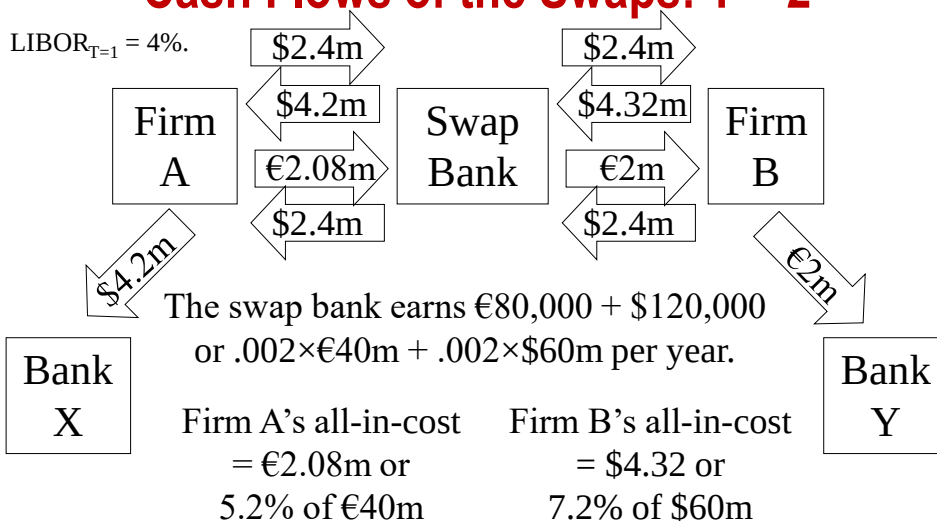
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Cash Flows of the Swaps: $T = 1$



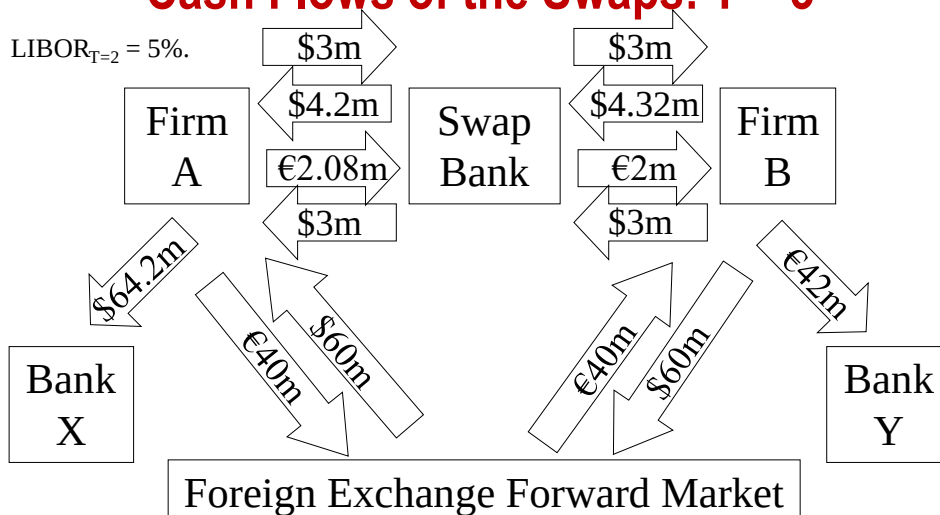
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Cash Flows of the Swaps: T = 2



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Cash Flows of the Swaps: T = 3



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The Quality Spread Differential

- The Quality Spread Differential (QSD) represents the potential gains from a swap that can be shared between the counterparties and the swap bank.
- There is no reason to presume that the gains will be shared equally.
- The QSD is calculated as the difference between the differences.

	\$	€		
A	\$7%	€6%		
B	\$8%	€5%		
QSD	1%	–	–1%	= 2%

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Valuation of an Existing Swap

- A swap is a derivative security, so valuation can be done with reference to the value of the underlying assets.
- How to value a swap:
 - Any swap's value is the difference in the present values of the payment streams that are incoming and outgoing.
 - Plain vanilla, fixed for floating swaps get valued just like a pair of bonds.
 - Currency swaps get valued just like two nests of currency forward contracts.

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Swap Market Efficiency

- Swaps offer *market completeness*, and that has accounted for their existence and growth.
- Swaps assist in tailoring financing to the type desired by a particular borrower. Since not all types of debt instruments are available to all types of borrowers, both counterparties can benefit (as well as the swap dealer) through financing that is more suitable for their asset maturity structures.

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Summary

- The basic interest rate swap is a fixed-for-floating rate swap in which one counterparty exchanges the interest payments of a fixed-rate debt obligation for the floating interest payments of the other counterparty. Both debt obligations are denominated in the same currency.
- In a currency swap, one counterparty exchanges the debt service obligations of a bond denominated in one currency for the debt service obligations of the other counterparty, which are denominated in another currency.

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Summary (continued)

- A swap bank is a generic term to describe a financial institution that facilitates the swap between counterparties. The swap bank serves as either a broker or a dealer.
- An example of a basic interest rate swap was presented. It was noted that a necessary condition for a swap to be feasible was the existence of a quality spread differential between the default-risk premiums on the fixed-rate and floating-rate interest rates of the two counterparties.
- Pricing an interest rate swap after inception was illustrated. It was shown that after inception, the value of an interest rate swap to a counterparty should be the difference in the present values of the payment streams the counterparty will receive and pay on the notional principal.

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Summary (concluded)

- A detailed example of a basic currency swap was presented. It was shown that the debt service obligations of the counterparties in a currency swap are effectively equivalent to one another in cost. Nominal differences can be explained by the set of international parity relationships.
- Pricing a currency swap after inception was illustrated. It was shown that after inception, the value of a currency swap to a counterparty should be the difference in the present values of the payment stream the counterparty will receive in one currency and pay in the other currency, converted to one or the other currency denomination.

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