Chapter Objective:

This chapter discusses currency and interest rate swaps, which are relatively new instruments for hedging long-term interest rate risk and foreign exchange risk.

Chapter Outline

- Types of Swaps
- Size of the Swap Market
- The Swap Bank
- Swap Market Quotations
- Interest Rate Swaps
- Currency Swaps
- Variations of Basic Interest Rate and Currency Swaps
- Risks of Interest Rate and Currency Swaps
- Is the Swap Market Efficient?

Definitions

- In a swap, two **counterparties** agree to a contractual arrangement wherein they agree to exchange cash flows at periodic intervals.
- There are two types of interest rate swaps:
  - Single currency interest rate swap
  - 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 2004 the notional principal of:
  - Interest rate swaps was $127,570 billion USD.
  - Currency swaps was $7,033 billion USD
- The most popular currencies are:
  - U.S. dollar
  - Japanese yen
  - Euro
  - Swiss franc
  - British pound sterling

The Swap Bank

- A 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 their risk, or match it with a counterparty.
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.

<table>
<thead>
<tr>
<th></th>
<th>Euro-€</th>
<th>£ Sterling</th>
<th>Swiss franc</th>
<th>U.S. $</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bid</td>
<td>Ask</td>
<td>Bid</td>
<td>Ask</td>
</tr>
<tr>
<td>1 year</td>
<td>2.34</td>
<td>2.37</td>
<td>5.24</td>
<td>5.22</td>
</tr>
<tr>
<td>2 year</td>
<td>2.62</td>
<td>2.65</td>
<td>5.14</td>
<td>5.18</td>
</tr>
<tr>
<td>3 year</td>
<td>2.86</td>
<td>2.89</td>
<td>5.18</td>
<td>5.19</td>
</tr>
<tr>
<td>4 year</td>
<td>3.06</td>
<td>3.09</td>
<td>5.20</td>
<td>5.21</td>
</tr>
<tr>
<td>5 year</td>
<td>3.22</td>
<td>3.25</td>
<td>5.21</td>
<td>5.22</td>
</tr>
<tr>
<td>6 year</td>
<td>3.38</td>
<td>3.41</td>
<td>5.22</td>
<td>5.22</td>
</tr>
<tr>
<td>7 year</td>
<td>3.52</td>
<td>3.55</td>
<td>5.23</td>
<td>5.23</td>
</tr>
<tr>
<td>8 year</td>
<td>3.63</td>
<td>3.66</td>
<td>5.24</td>
<td>5.24</td>
</tr>
<tr>
<td>9 year</td>
<td>3.74</td>
<td>3.77</td>
<td>5.25</td>
<td>5.25</td>
</tr>
<tr>
<td>10 year</td>
<td>3.82</td>
<td>3.85</td>
<td>5.26</td>
<td>5.26</td>
</tr>
</tbody>
</table>

An Example of an Interest Rate Swap

Consider this example of a “plain vanilla” interest rate swap.

Bank A is a AAA-rated international bank located in the U.K. and wishes to raise $10,000,000 to finance floating-rate Eurodollar loans.

- Bank A is considering issuing 5-year fixed-rate Eurodollar bonds at 10 percent.
- It would make more sense to for the bank to issue floating-rate notes at LIBOR to finance floating-rate Eurodollar loans.

An Example of an Interest Rate Swap

Firm B is a BBB-rated U.S. company. It needs $10,000,000 to finance an investment with a five-year economic life.

- Firm B is considering issuing 5-year fixed-rate Eurodollar bonds at 11.75 percent.
- Alternatively, firm B can raise the money by issuing 5-year floating-rate notes at LIBOR + ½ percent.
- Firm B would prefer to borrow at a fixed rate.

An Example of an Interest Rate Swap

The borrowing opportunities of the two firms are:

<table>
<thead>
<tr>
<th>Company</th>
<th>B</th>
<th>Bank A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed rate</td>
<td>11.75%</td>
<td>10%</td>
</tr>
<tr>
<td>Floating rate</td>
<td>LIBOR + .5%</td>
<td>LIBOR</td>
</tr>
</tbody>
</table>

An Example of an Interest Rate Swap

The swap bank makes this offer to Bank A: You pay LIBOR – 1/8% per year on $10 million for 5 years and we will pay you 10 3/8% on $10 million for 5 years.

Company A | Company B |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed rate</td>
<td>LIBOR + 10%</td>
</tr>
<tr>
<td>Floating rate</td>
<td>LIBOR + .5%</td>
</tr>
</tbody>
</table>

The swap bank makes this offer to Bank A: You pay LIBOR – 1/8% per year on $10 million for 5 years and we will pay you 10 3/8% on $10 million for 5 years.
An Example of an Interest Rate Swap

Here's what's in it for Bank A:

They can borrow externally at 10% fixed and have a net borrowing position of

\[-10 3/8 + 10 + (\text{LIBOR} – 1/8) = \text{LIBOR} – ½ %\]

which is ½% better than they can borrow floating without a swap.

½% of $10,000,000 = $50,000. That's quite a cost savings per year for 5 years.

Here's what's in it for Company B:

They can borrow externally at LIBOR + ½ % and have a net borrowing position of

\[10½ + (\text{LIBOR} + ½) - (\text{LIBOR} - ¼) = 11.25\%\]

which is ½% better than they can borrow floating.

½% of $10,000,000 = $50,000 that's quite a cost savings per year for 5 years.

The swap bank makes money too.

¼% of $10 million = $25,000 per year for 5 years.

An Example of a Currency Swap

1) Suppose a U.S. MNC wants to finance a £10,000,000 expansion of a British plant.

2) They could borrow dollars in the U.S. where they are well known and exchange for dollars for pounds.

3) This will give them exchange rate risk: financing a sterling project with dollars.

4) They could borrow pounds in the international bond market, but pay a premium since they are not as well known abroad.
An Example of a Currency Swap

- If they can find a British MNC with a mirror-image financing need they may both benefit from a swap.
- If the spot exchange rate is $0 ($/£) = $1.60/£, the U.S. firm needs to find a British firm wanting to finance dollar borrowing in the amount of $16,000,000.

Consider two firms A and B: firm A is a U.S.-based multinational and firm B is a U.K.-based multinational.

Both firms wish to finance a project in each other’s country of the same size. Their borrowing opportunities are given in the table below.

<table>
<thead>
<tr>
<th></th>
<th>$</th>
<th>£</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company A</td>
<td>8.0%</td>
<td>11.6%</td>
</tr>
<tr>
<td>Company B</td>
<td>10.0%</td>
<td>12.0%</td>
</tr>
</tbody>
</table>

Firm B’s net position is to borrow at 9.4%.
B saves 0.6%.

The swap bank makes money too:

- A’s net position is to borrow at £11%
- B’s net position is to borrow at $9.4%

At $0 ($/£) = $1.60/£, that is a gain of $64,000 per year for 5 years.

The swap bank faces exchange rate risk, but maybe they can lay it off (in another swap).
The QSD

- The Quality Spread Differential represents the potential gains from the 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.
- In the above example, company B is less credit-worthy than bank A, so they probably would have gotten less of the QSD, in order to compensate the swap bank for the default risk.

Comparative Advantage as the Basis for Swaps

A is the more credit-worthy of the two firms.
A pays 2% less to borrow in dollars than B
A pays .4% less to borrow in pounds than B:

<table>
<thead>
<tr>
<th></th>
<th>$</th>
<th>£</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company A</td>
<td>8.0%</td>
<td>11.6%</td>
</tr>
<tr>
<td>Company B</td>
<td>10.0%</td>
<td>12.0%</td>
</tr>
</tbody>
</table>

A has a **comparative advantage** in borrowing in dollars.
B has a comparative advantage in borrowing in pounds.

B has a comparative advantage in borrowing in £.
B pays 2% more to borrow in dollars than A
B pays only .4% more to borrow in pounds than A:

<table>
<thead>
<tr>
<th></th>
<th>$</th>
<th>£</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company A</td>
<td>8.0%</td>
<td>11.6%</td>
</tr>
<tr>
<td>Company B</td>
<td>10.0%</td>
<td>2.0%</td>
</tr>
</tbody>
</table>

Variations of Basic Currency and Interest Rate Swaps

- Currency Swaps
  - fixed for fixed
  - fixed for floating
  - floating for floating
  - amortizing
- Interest Rate Swaps
  - zero-for floating
  - floating for floating
- For a swap to be possible, a QSD must exist.
  Beyond that, creativity is the only limit.

Risks of Interest Rate and Currency Swaps

- **Interest Rate Risk**
  - Interest rates might move against the swap bank after it has only gotten half of a swap on the books, or if it has an unhedged position.
- **Basis Risk**
  - If the floating rates of the two counterparties are not pegged to the same index.
- **Exchange rate Risk**
  - In the example of a currency swap given earlier, the swap bank would be worse off if the pound appreciated.
## Risks of Interest Rate and Currency Swaps (continued)

<table>
<thead>
<tr>
<th>Risk Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Credit Risk</strong></td>
<td>This is the major risk faced by a swap dealer—the risk that a counterparty will default on its end of the swap.</td>
</tr>
<tr>
<td><strong>Mismatch Risk</strong></td>
<td>It’s hard to find a counterparty that wants to borrow the right amount of money for the right amount of time.</td>
</tr>
<tr>
<td><strong>Sovereign Risk</strong></td>
<td>The risk that a country will impose exchange rate restrictions that will interfere with performance on the swap.</td>
</tr>
</tbody>
</table>

## Pricing a Swap

- A swap is a derivative security so it can be priced in terms of the underlying assets:
  - **How to:**
    - 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 swap gets valued just like two nests of currency forward contracts.

## 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.

## Concluding Remarks

- The growth of the swap market has been astounding.
- Swaps are off-the-books transactions.
- Swaps have become an important source of revenue and risk for banks.

## End Chapter Fourteen