

# 7

## The Interbank Market

### 7.1 Spreads and the Interbank Market

We will now take a look at the **Interbank market** and different kind of spreads. We explain some of the details using the Swedish market (as Riksbanken, the Central bank in Sweden<sup>1</sup>).

Banks can borrow under the marginal lending facility (Swedish: utlåningsfaciliteten) (if they made adequate security) in the National Bank at an interest rate, lending rate, which is a bit above (typically 0.75 %) the **repo rate**.<sup>2</sup> Banks with a surplus can use the National Bank deposit facility (Swedish: inlåningsfaciliteten) that provides a deposit rate a bit (typically 0.75 %) lower than the repo rate.

Since there is a quite large gap between deposit rate and lending rate, this gives a strong incitement for banks, to instead, settle directly with each other to get a better interest rate. This rate is called the **overnight rate** (O/N). The central bank tries to control this rate, via the repo rate. With this rate, the central bank signals where they want the O/N will be a week ahead.

If the banking system as a whole have a deficit or a surplus, the central bank implements a reverse every week. Imbalances may still occur day by day. To create balance and gain greater control over the O/N, the central bank also try on a daily basis, get the banks' total deficit is the same as the total surplus. This is done by fine-tuning operations, which lend money at the repo rate +0.10 % and lend at the repo rate -0.10 % to create a balance.

---

<sup>1</sup> The Swedish central bank is the first central bank in the world.

<sup>2</sup> The Swedish Repo Rate is the reference (policy) rate decided by the Central bank in Sweden.

Overall, the central bank therefore ensures that balance exists in the single payment system (in Sweden called RIX). Surplus and deficit held by individual banks, can however, been managed by the banks themselves. At the end of each day, banks that need to borrow use a bank with a surplus.

The O/N for today runs from today until tomorrow. **Tomorrow next** (tom next or T/N) runs from tomorrow until the next day. Next maturity of fixed income market is called the S/N (**spot/next**) which runs from the day after tomorrow and one business ahead, 1W runs from the day after tomorrow for a week. All days above are bank days.

### 7.1.1 TED-Spread and Other Spreads

XIBOR (the general Interbank Offer Rate) is the rate that banks can borrow from each other's. To assess how the market views the risk of lending to another bank, we put the XIBOR rate in relation to any other interest. The safest player on the market is the government because they can always pay debts by printing new money (debt monetization). Therefore, we compare the XIBOR rates by the interest rate on government securities with the same maturity, to see which risk premium imposed on bank loans. The difference in yield between 2 securities with similar characteristics is called a spread. The difference between a 3-month interbank rate and the rate on 3-month government securities is known as the **Treasury-Euro-Dollar (TED) spread**. TED denotes the spread between the Treasury bill yield and the Libor rate for the same maturity (usually 3 months). In [Fig. 7.1](#) we show the TED spread in USD<sup>3</sup> from the beginning of 2007 to the end of 2009. We observe the very high spread during the period of the financial crisis.

### 7.1.2 Overnight Indexed Swaps (OIS) and Basis Spread

A 12-month XIBOR rate reflects not only the expectations of the O/N that will prevail in the average for the next 12 months, but also a risk premium, which raises the rate of long-term loans. Therefore, it is easy to understand that the market is interested in interest-rate instruments

---

<sup>3</sup> Source, FRED, <https://fred.stlouisfed.org/> Federal Reserve Economic Data - St. Louis Fed

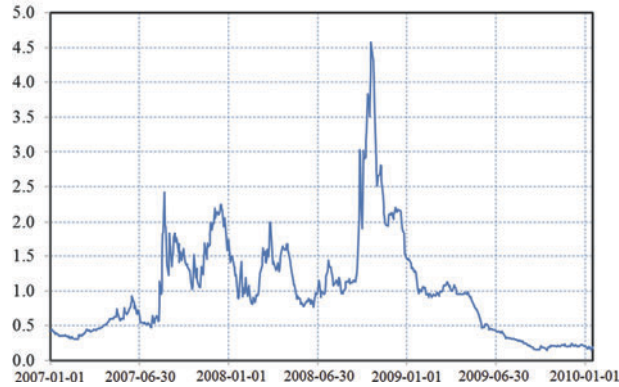


Fig. 7.1

for a period longer than O/N, but that keeps the same rate as the average for the O/N during the period. Such instruments are called as the overnight indexed swaps (OIS).

With an OIS, 2 parties may agree that *party 1* receives a fixed rate from *party 2* (the fixed leg of the swap) and *party 2*, a rate equal to the average of the O/N from *party 1* (the floating leg of the swap).

In several areas, currency swaps are based on the central bank policy rate. In Sweden, this rate is the repo rate, but unfortunately, Sweden does not have an OIS based on the repo rate. The closest we have is the STIBOR T/N *Average* (STINA) swaps. STINA is the average rate for the minimum rate on the STIBOR market. A STINA swap gives the holder of the floating leg the average rate of STIBOR T/N over the period of the swap.

#### Example 7.1.2.1

Given a 4-year to maturity bond with a principal 1000 and an annual coupon *Party 1* signs a 3-month STINA swap with *party 2* and receives a 4.6 % rate from *party 2*. *Party 2* receives STIBOR T/N from *party 1*. No payments are made during the term, but instead, after 3 months, the average interest rate for STIBOR T/N, is calculated and the difference against the swap are paid to the party who should have paid the lowest rate over the period. In that way, the contract is pretty riskless, since the maximum loss is the profit from the swap itself.

STIBOR T/N is closer related to the repo rate than the government securities. Therefore the STINA swaps better reflects the expectations of the repo rate than, for example, a Swedish 3-month Treasury bill. It is therefore interesting to complement the comparison between

STIBOR-interest and the interest rate on government securities (TED spread, and so on), with a spread calculation that sets STIBOR rate in relation to the STINA rate. This spread is “cleaner” in the sense of risk premium than the expected average of the repo rate. This spread is sometimes called **Basis spread**. The spread between STINA swap and government bond rate is called the **swap spreads**.

Unfortunately, this Basis spread is not “clean” in the sense that it would consist only of interbank risk premium. Remember that we have seen previously, that there is a risk premium built in STIBOR T/N. Basis spread contains thus the risk premium in the interbank market for the period you study, minus the expectations on the risk premium in STIBOR T/N compared to the repo rate. As long as we in Sweden have no repo-rate swap, we will get to live with this problem. Let us look at the numbers and calculate the Basis spread and TED spread at 2007-12-28. This is shown in [Table 7.1](#).

In [Fig.7.2](#) and [Fig.7.3](#) we show the market interest rates and the spreads in SEK 2007-12-28.

We see in [Fig.7.3](#) that the Basis spread indicates a great concern that the market does not believe the financial turmoil is heading off in the near future. The risk premium on interbank loans against STIBOR T/N market is much higher for longer maturities. This is what we saw from the spread between STIBOR and government securities (the TED spread and the TED spread curve).

In general, basis swap spreads reflect the underlying funding needs of the general banking community. Thus for basis swaps within a single currency the spread reflects the need for banks to preserve their liquidity (i.e. funding for long periods). This results in the fact that 6-month money is generally more expensive than rolled up 3-month money. This spread between swaps with different tenors is called a **Tenor spread**.

**Table 7.1** Market rates and their spreads in SEK 2007-12-28

Term	STINA	STIBOR	Treasury-bill	Basis-spread	TED-spread (SEK)	Swap-spread
1M	4.64	4.7	4.22	0.06	0.48	0.42
2M	4.65	4.808		0.16		
3M	4.73	5.103	4.345	0.37	0.758	0.39
6M	4.85	5.42	4.406	0.57	1.014	0.44
9M	4.885	5.603		0.72		
12M	4.92	5.725	4.561	0.81	1.164	0.36

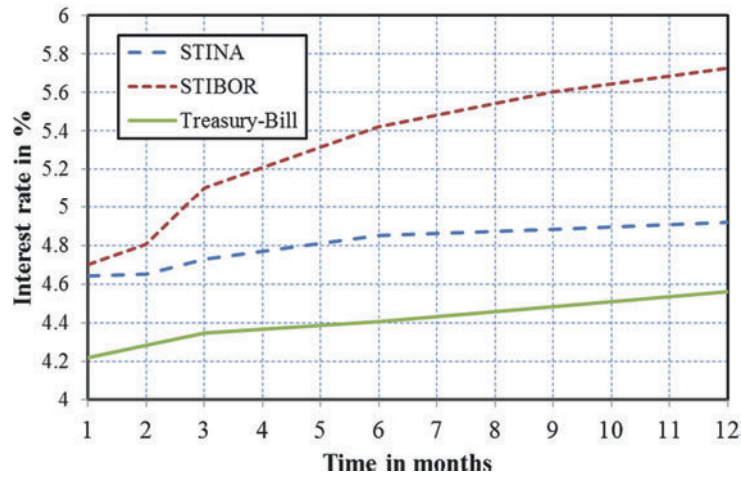


Fig. 7.2 The market rates in SEK 2007-12-28

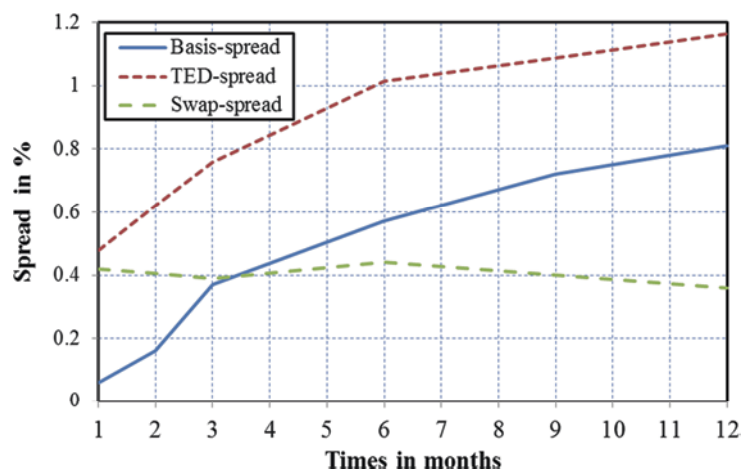


Fig. 7.3

For **cross currency basis spreads** it's similar. There is more demand for funding in one currency and more supply in another currency. For instance many Japanese banks have funding sources in Japanese Yen (JPY) but have commitments in USD. They therefore will swap their JPY for USD. The basis swap spread reflects this supply and demand situation. The same effect is seen in the FX swap market which is the other means of exchanging the funds.

### 7.1.3 Some Overnight Indices

**EONIA (Euro Overnight Index Average)** is an effective O/N interest rate calculated by the European Central Bank as a *weighted average of all overnight unsecured lending transactions in the interbank market*. It has been initiated within the euro area by the contributing panel banks. It is one of the 2 benchmarks for the money and capital markets in the euro zone (the other one being Euribor). The banks contributing to Eonia are the same as the Panel Banks quoting for Euribor. In Fig. 7.4 we show the Eonia rates between 1999-01-04 to 2016-08-12.

**SONIA** is the acronym for **Sterling Overnight Index Average**. It is the reference rate for O/N unsecured transactions in the Sterling market. Each London business day the Sonia fixing is calculated as the weighted average rate of all unsecured O/N sterling transactions brokered in London by WMBA members. The rate conventions are annualised rate, act/360, and 4 decimal places.

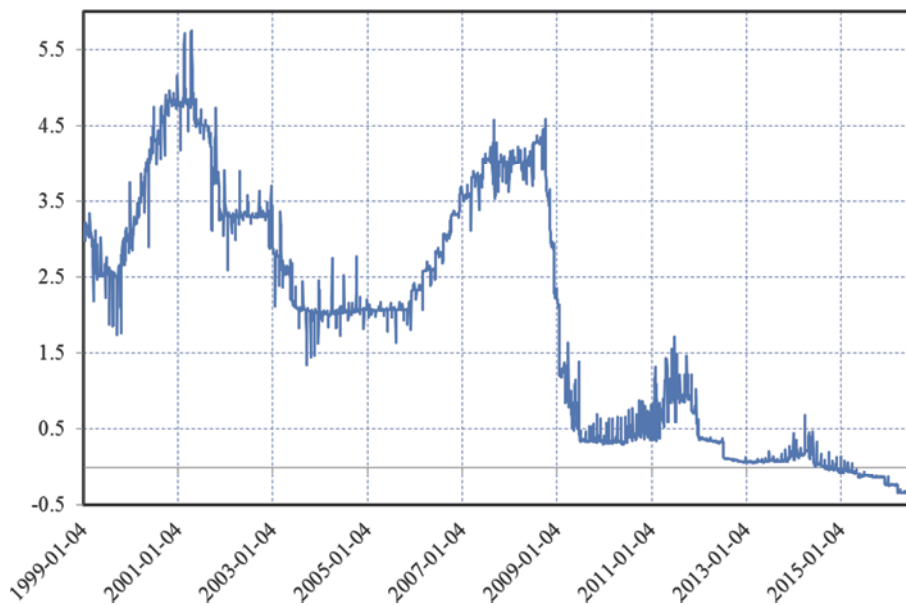


Fig. 7.4 The Eonia (EUR OIS) between 1999 and mid August 2016<sup>4</sup>

<sup>4</sup> Source, FRED, <https://fred.stlouisfed.org/> Federal Reserve Economic Data - St. Louis Fed

## 7.1 Spreads and the Interbank Market

**CHOIS** (based on **SARON, Swiss Average Rate Overnight**) is an O/N interest rates average referencing the Swiss Franc interbank repo market. It was launched by the Swiss National Bank (SNB) in cooperation with 6 Swiss Exchange. Since August 25 2009, SARON has replaced the previously used repo O/N index. The reference rate is based on CHF repo interbank market data provided by Eurex Zurich Ltd.

**TONAR** is the acronym for **Tokyo Overnight Index Average**. It is the reference rate for O/N unsecured transactions in the Japanese Yen.

### 7.1.4 Basis Swaps

Strictly speaking, a basis swap or a floating/floating cross currency basis swap, is a swap in which 2 streams of money market floating rates of 2 different currencies are exchanged.

In contrast to a standard interest rate swap fixed for floating, notional are exchanged at the starting of the swap and exchanged back at termination. Typical example of a basis swap is swapping dollar Libor versus Yen Libor.

By extension, basis swap refers to floating/floating (cross currency or not) swap in which 2 streams of floating rates are exchanged, regardless if these floating rates are in the same currency. Typical example of basis swap in the same currency are swapping dollar Libor for floating commercial paper, Prime Treasury bills or Constant Maturity Treasury rates or even 90 days Dollar Libor for 180 days Dollar Libor. In the case of a swap in the same currency, notional do not change hands as there is no currency exposure.

As far as the cross currency swap market is concerned, basis swap enables traders and investor to swap their interest rate risk exposure in another currency. Basis swap market reflects the global demand for swapping from one currency into another as well as the credit quality of the central bank. This is a huge market with billions of notional transaction every day. One of the most active markets is the Yen-Dollar market.

When an investor wants to swap his currency exposure into another one, he may go to the forward foreign exchange markets. However, this market is only liquid up to 2 to 3 years, after which the basis swap market is taking over. Basis swap market is an important component

to build a cross currency swap market used for cross currency swap pricing as well as other cross currency type transaction.

Basis swap should not be confused with:

- General cross currency swaps: the intersection between basis swap and cross currency swap lies in the floating for floating cross currency swap. However, a basis swap is not necessarily based on 2 currencies, while a cross currency swap is not necessarily floating for floating but can be fixed for floating, floating for fixed or fixed for fixed.
- Quanto- or differential-swap, which implies to pay in 2 currencies but with the same notional and no exchange of notional.

Like any standard swap, a basis swap can have tailor made notional such as amortising, accreting, or roller coaster notional. A rollercoaster swap is a swap with a notional principal that differs during various payment periods. In other words, it is a swap agreement in which counterparties agree to flexibility of payments.

#### 7.1.4.1 Pricing Methodology

The basis is more pronounced on the USD/JPY market, hence we will examine the case of the 10 year basis swap paying US Dollar 3-month Libor Flat versus receiving JPY 3-month Libor plus a spread. The market quotes this spreads as being 15 basis points (bps) running. This means that to enter into a swap where one would pay US Dollar 3-month Flat Libor, one would require receiving JPY 3-month Libor plus 15 bps.

At first sight, this may look strange to someone accustomed to plain vanilla interest rates as she has been always taught that a floating leg should always be at par. Hence the 2 legs, USD 3-month Libor and JPY 3-month Libor should be equal. However, one has to bear in mind that interest rate swap Libor are approximate averages of offer rates from different banking institution. Libor rates bare credit and liquidity risk. Hence a USD Libor rate may have a better credit and liquidity quality as the JPY Libor fixing, hence the spread required by USD investors to receive a worst currency. In addition, the basis swap market is very much driven by supply and demand for issuance. A spread of 15 bps means that there is little demand to receive JPY Libor, hence one has



## 7.1 Spreads and the Interbank Market

to pay a premium to convince investors to swap. To build a consistent methodology for pricing, one can take 2 approaches

- **Single interest rate curve method:** Build an interest curve that uses all the constraint of the forward foreign exchange market and the basis swap market to price consistently basis swaps. Although simple, this method has the disadvantage to oblige the trader to change curve when pricing a JPY leg in the JPY market as opposed to pricing a JPY versus USD swap. Interestingly, one can look at the discount factor difference between the JPY normal bootstrapped interest rate curve and the basis swap interest rate curve to quantify the basis swap market effect.
- **JPY Libor curve and spread curve used to account for the basis swap market:** One has first to create the normal interest rate swap curve by bootstrapping the domestic market. Then using this curve, one can bootstrap another curve called the basis swap spread curve that adjusts for credit quality to get the JPY basis swap leg (JPY plus 15 bps) to be at par. Basically this spread curve says that a 3-month JPY Libor leg is not at par and one need 15 bps to bring it at par. When pricing in the JPY domestic market, one only uses the standard interest swap curve. In this market, a leg paying JPY 3-month Libor is at par. When pricing a cross currency swap JPY versus USD, one has to apply to the JPY curve the basis swap spread curve to price correctly the JPY leg. More generally, one can build an interest rate infrastructure that uses standard Libor curve plus a funding curve or spread curve to account for various market effects like credit and counterparty risk, basis swap market, CMS and CMT adjustment and etc.

The existence of this basis swap curve implies the same swap could be at par for a JPY investor while not at par for a USD investor as they have a different view on credit quality of the Bank of Japan.