Monthly Cash Settlement of Fixed Income Forwards at NASDAQ OMX
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Introduction

Nordic Fixed Income Derivatives are traded in a market model where prices are negotiated outside the exchange and the trades are reported to NASDAQ OMX for clearing. When the trade is matched in the system NASDAQ OMX becomes the counterparty to both the buyer and seller i.e. central counterparty clearing. NASDAQ OMX Derivatives Markets is a secondary name to NASDAQ OMX Stockholm AB and is used for the derivatives trading and clearing operations.

We hope that this brochure will help you understand how the settlement for the Nordic Fixed Income forwards works at NASDAQ OMX. If you have any questions about the content of this brochure, please contact NASDAQ OMX or your bank/broker.
Monthly cash settlement

Nordic Fixed Income forwards are cash settled on a periodic basis. In practice, this means that all forwards positions are marked to market for monthly cash settlement using a market yield determined on the final business day of each month. The accumulated profits or losses are then settled on the third business day thereafter.

A general overview of the method by which the monthly cash settlement takes place is illustrated with the help of the following two examples. All times are denoted in Central European time.

**PERIODIC SETTLEMENT DAY AND SETTLEMENT DAY**

The day, in which the periodic cash settlement amount is calculated, is known as the periodic settlement day and is in normal circumstances the final business day of each month. The settlement day is three business days thereafter.

<table>
<thead>
<tr>
<th>PERIODIC SETTLEMENT DAY</th>
<th>BUSINESS DAY 0</th>
<th>BUSINESS DAY 1</th>
<th>BUSINESS DAY 2</th>
<th>BUSINESS DAY 3</th>
<th>SETTLEMENT DAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last business day of the month</td>
<td>A fixing yield is determined</td>
<td>The cash settlement amount is discounted using a rate determined from STIBOR at 11:05 a.m.</td>
<td></td>
<td></td>
<td>Third business day of the following month</td>
</tr>
</tbody>
</table>

**FIXING YIELD (FIX)**

A fixing yield is determined at the close of business on the periodic settlement day by calculating the median value of the average bid-ask yields published by the Interbank participants for each forwards contract. It is on the basis of this yield that the fixed income forwards are cash settled.

**SETTLEMENT AMOUNT**

The settlement amount calculated on the first periodic settlement day is equal to the difference between the fixing yield and the transaction yield for each trade. The calculated settlement amount is adjusted on the day after the periodic settlement day, whereby the calculated amount is discounted for the period from the settlement day to the final settlement day for each contract. The rate used to discount the calculated settlement amount is determined at 11:05 a.m. on the day after the periodic settlement day and is equal to the STIBOR rate for the period to maturity. The following formula is used when calculating the discounted amount.

\[
\text{Adjusted Settlement amount} = \frac{\text{Unadjusted settlement amount}}{1 + \left(\frac{r}{100}\right) \times \frac{d}{360}}
\]

\( r \) = the yield in percent that represents the STIBOR for the interest period.

In cases where the STIBOR for the interest period is not listed, the rate is determined by interpolation.

\( d \) = the actual number of days from the settlement day for periodic settlement until the final settlement day for the contract (interest period).

Due to the fact that the settlement amounts are discounted, the value of the position on the final settlement day is a known factor, assuming that the settlement amount is invested (or borrowed) at a rate, which is equal to the discount rate.

**MONTHLY CASH SETTLEMENT REPORT**

At each periodic settlement all transactions conducted during the period, as well as previously settled positions, are shown on one report. The report first reflects the accumulated profit or loss for previously settled positions for each forwards series. Thereafter, the profit or loss for each new transaction executed during the settlement period together with the clearing fee for such transactions is shown. The accumulated profit or loss, together with the fees per contract, is the sum to be discounted.
Example 1

MONTHLY CASH SETTLEMENT OF FORWARDS CONTRACTS BASED ON BONDS AND TREASURY BILLS

The following example illustrates the way in which the monthly cash settlement amount is calculated for contracts based on bonds and treasury bills. The following is assumed: On March 8, 100 June five year government bond forwards contracts (R5) representing a nominal amount of SEK 100 million at a transaction yield of 5.505 percent are bought. The contracts expire on June 19, which is an IMM-day. Due to the fact that OMX employs monthly settlement for R5 forwards, the position will be marked to market on the final business day of each month. In this example, monthly cash settlement will occur on March 28, April 30, and May 31.

MONTHLY CASH SETTLEMENT FOR THE PERIOD ENDING MARCH 28

At the first monthly cash settlement on March 28, the fixing yield is determined to be 5.540 percent at the close of business. Thereafter, the forwards position is valued based on the difference between the transaction yield of 5.505 percent, and the fixing yield of 5.540 percent. The difference reflects the accumulated loss for the position. On the following business day, April 2, the adjusted settlement amount is determined by discounting the calculated loss for the number of days between the settlement day for monthly cash settlement and the final settlement day for the contract, i.e. between April 4 and June 19. The discount rate used in the calculation is the STIBOR for the same period, 4.265 percent. Settlement day for the monthly cash settlement is two business days later, on April 4.

MONTHLY CASH SETTLEMENT FOR THE PERIOD ENDING APRIL 30

At the second periodic settlement on April 30, a fixing yield is calculated at the close of business as usual and the fix is determined to be 5.400 percent. The market value of the R5 position is calculated by taking the difference between the fixing yield for March, 5.540 percent, and the fixing yield for April of 5.400 percent. On the following business day, May 2, the adjusted settlement amount is determined by discounting the value for the number of days between the settlement day for monthly cash settlement and the final settlement day for the contract, i.e. between May 6 and June 19. The discount rate used in the calculation is the STIBOR for the same period, 4.401 percent. The settlement amount is settled two business days later on May 6.

* An example of the yield to price calculation is shown on page 6.
MONTHLY CASH SETTLEMENT FOR THE PERIOD ENDING MAY 31

Monthly cash settlement occurs at the end of May, using the same method as the April periodic settlement. The fixing yield for the May settlement is 5.398 percent, and the STIBOR for the period is 4.363 percent. The resulting discounted settlement amount for May is SEK +8,695.

EXPIRATION ON JUNE 13

At 11:05 a.m. on the expiration day of the June R5 contract, the fix is determined to be 5.293 percent. This fix is used both as the yield for which the final cash settlement occurs, as well as the yield for which delivery is made. On the final settlement day, June 19, the settlement amount is calculated by taking the difference between the fixing yield for the May periodic settlement, 5.398 percent, and the fixing yield for expiration, 5.293 percent, using the same methods as described earlier. The final cash settlement calculation results in a profit of SEK 458,390 for the period, to be received on the final settlement day. In addition, we will take receipt of the deliverable bond in exchange for payment based on the expiration fixing yield.

SUMMARY OF RESULTS

The result of individual settlement calculations are shown in the following table:

<table>
<thead>
<tr>
<th>Future contracts: R5 June</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periodic Settlement day</td>
</tr>
<tr>
<td>Fixing yield</td>
</tr>
<tr>
<td>March 28</td>
</tr>
<tr>
<td>April 30</td>
</tr>
<tr>
<td>May 31</td>
</tr>
<tr>
<td>Expiration day:</td>
</tr>
<tr>
<td>Fixing yield for expiration</td>
</tr>
</tbody>
</table>

YIELD CONVERSION FOR THE MARCH PERIODIC SETTLEMENT

The underlying for the R5 forwards contract is a fictive government bond, which is deemed to have a maturity of five years calculated from the final settlement day of the contract and a coupon of 6 percent. The coupon is assumed to be paid once per year.

\[
P = \frac{C}{(1 + r)} + \frac{C}{(1 + r)^2} + \frac{C}{(1 + r)^3} + \frac{C}{(1 + r)^4} + \frac{C + N}{(1 + r)^5}
\]

\[C = \text{the coupon rate in percent (6% for R5)}\]
\[N = \text{the nominal amount of the bond in percent (always 100%)}\]

The following formula is used for calculating the price of the bond (P):

\[
P = \frac{6}{(1 + 0.05505)} + \frac{6}{(1 + 0.05505)^2} + \frac{6}{(1 + 0.05505)^3} + \frac{6}{(1 + 0.05505)^4} + \frac{106}{(1 + 0.05505)^5}
\]

\[P = 102,113,500\]
Example 2

**MONTHLY CASH SETTLEMENT OF FORWARDS CONTRACTS BASED ON STIBOR-FRA**

For STIBOR-FRA contracts a different method is applied since the forwards contracts are based on a fictitious loan. The following is assumed: On March 4, 1,500 STIBOR-FRA forwards contracts representing a nominal amount of SEK 1,500 million at a transaction yield of 4.510 percent is sold. The contract matures on the final settlement day (IMM day) on June 19, and is based on a fictitious loan of three months, in this case 91 days for the period June 19 until September 18. Due to the fact that OMX employs monthly cash settlement for STIBOR-FRA forwards, the position will be marked to market on the final business day of each month. In this example, monthly cash settlement will occur on March 28, April 30, and May 31.

**MONTHLY CASH SETTLEMENT FOR THE PERIOD ENDING MARCH 28**

In connection with the first monthly cash settlement on March 28, the fixing yield is determined to be 4.535 percent at the close of business. Thereafter, the forwards position is valued based on the difference between the transaction yield of 4.510 percent, and the fixing yield of 4.535 percent. The difference reflects the accumulated loss for the position. On the following business day, April 2, the settlement amount is determined by discounting the calculated loss for the number of days between the settlement day for monthly cash settlement and the final settlement day for the contract, i.e. between April 4 and June 19. The discount rate used in the calculation is the STIBOR rate for the same period, 4.265 percent.

**MONTHLY CASH SETTLEMENT FOR THE PERIOD ENDING APRIL 30**

At the second periodic settlement on April 30, a fixing yield is calculated at the close of business as usual and the fix is determined to be 4.580 percent. Just as with the March periodic settlement, the market value of the STIBOR-FRA position is calculated by taking the difference between the transaction yield, 4.510 percent, and the fixing yield for April, 4.580 percent. The difference of SEK –262,379 represents the accumulated loss for the position from the transaction date. Since the accumulated loss was partially realized in connection with the March periodic settlement, the amount realized (SEK 93,717) must be deducted during the April settlement. On the following business day, May 2, an adjustment for the settlement period is made by discounting the accumulated loss of SEK 168,662 for the time period between the settlement day for monthly cash settlement and the final settlement day for the contract, i.e. between May 6 and June 19. The discount rate used in the calculation is the STIBOR rate for the same period, 4.401 percent, which results in the amount of SEK –167,760 to be realized. The settlement amount is settled two business days later on May 6.
MONTHLY CASH SETTLEMENT FOR THE PERIOD ENDING MAY 31

Monthly cash settlement occurs at the end of May, using the same method as the April settlement. The fixing yield for the May settlement is 4.500 percent, and the STIBOR for the period is 4.363 percent. The resulting adjusted settlement amount for May is SEK +299,361.

EXPIRATION ON JUNE 17

At 11:05 a.m. on the expiration day for the June STIBOR-FRA contract, the fix is determined to be 4.450 percent. The fixing yield is equal to 3 months STIBOR. This fix is the yield the final cash settlement will be based on. On the final settlement day, June 19, the settlement amount is calculated by taking the difference between the transaction yield, 4.510 percent, and the fixing yield for expiration, 4.450 percent. The difference of SEK 224,970 represents the accumulated profit for the position from the sale date. Since the accumulated profit has been partially realized in connection with earlier periodic settlements, the amount realized during the previous periodic settlement, SEK 37,491, must be deducted. This results in an amount of SEK 187,479 to be received on the final settlement day, June 19.

SUMMARY OF RESULTS

The results of the individual settlement calculations are shown in the following table:

<table>
<thead>
<tr>
<th>Periodic Settlement day</th>
<th>Fixing Yield</th>
<th>Total Cash Settlement Amount</th>
<th>Profit/loss realised previous periodic Settlement</th>
<th>Unadjusted Settlement Amount</th>
<th>STIBOR</th>
<th>Adjusted Settlement Amount</th>
<th>Settlement Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 28</td>
<td>4.335</td>
<td>–93,717</td>
<td>93,717</td>
<td>–93,717</td>
<td>4.265</td>
<td>–92,881</td>
<td>April 4</td>
</tr>
<tr>
<td>May 31</td>
<td>4.500</td>
<td>37,491</td>
<td>299,870</td>
<td>299,870</td>
<td>4.363</td>
<td>299,361</td>
<td>June 5</td>
</tr>
</tbody>
</table>

Expiration day: June 17

Fixing yield for expiration: 4.450

Unadjusted Settlement Amount: 224,970

Final Settlement day: June 19

Profit/loss realised previous periodic Settlement: –37,491

Adjusted Settlement Amount: 187,479

STIBOR: 4.401

Market value of 1,500 June STIBOR-FRA contracts at the transaction rate of 4.510 percent

Market value of 1,500 June STIBOR-FRA contracts at the April fixing yield of 4.580 percent

ACCUMULATED LOSS FOR THE POSITION FROM THE TRANSACTION DAY = –262,379

- Amount paid during the March periodic settlement +93,717

ACCUMULATED LOSS FOR THE POSITION DURING THE SETTLEMENT PERIOD = –168,662

Discounted in accordance with the formula on page 4 using the STIBOR for the period May 6 to June 19, or 44 days (4.401 percent), the resulting discounted settlement amount is SEK –167,760.
Want to know more?

This is a brief description of monthly cash settlement of Nordic Fixed Income Forwards. For more information about Fixed Income Forwards please visit NASDAQ OMX website nordic.nasdaqomxtrader.com/fixedincome.

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