

€ONIA Swap Index

**The derivatives market reference rate
for the Euro**

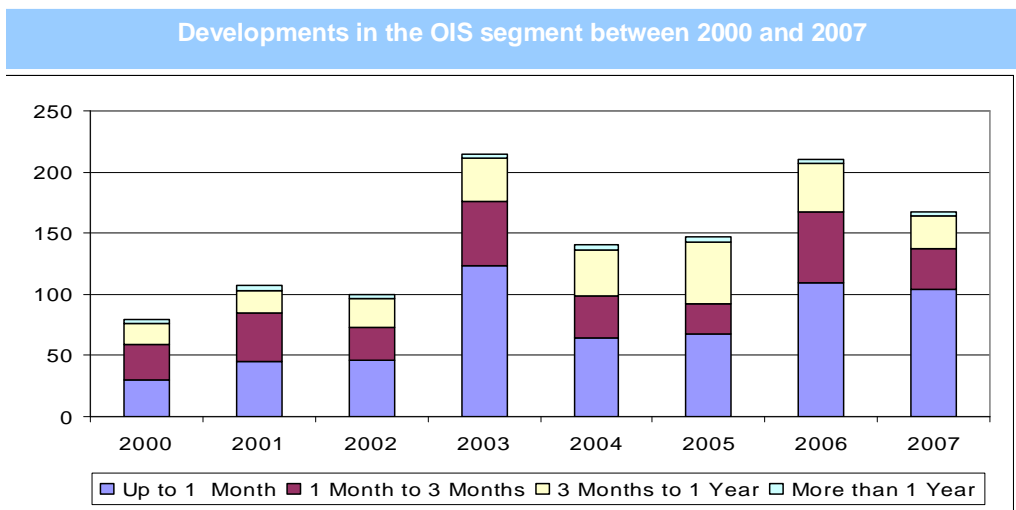
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Introduction

With the advent of the Euro, the transformation of numerous national markets into a single currency market has provided an excellent opportunity for the development of new benchmarks such as the EURIBOR¹ (unsecured) and EUREPO (secured) indices for the money market. This new environment led to an increasingly homogenous and integrated swap market in the euro area. The growth of the European swap market over the last seven years has also been accompanied by greater diversity in the range of actors using interest rate swaps.

The Euro Over-Night Index Average or EONIA swap market was one of the most dramatically affected sectors within the financial markets. There has been a dynamic growth in the size of the EONIA swap market in recent years. Tight bid-offer spreads and increasingly high daily volumes have built the basis for a very liquid product. Electronic trading platforms have created even greater price transparency. According to the European Central Bank's regular money market survey, total trading volume has more than doubled between 2000 and 2007. This sharp increase in volume and the fact that EONIA Swaps are the most liquid segment of the euro money market reflects the benchmark character the EONIA swap market plays within the euro money market derivative product range. Therefore EURIBOR ACI and the European Banking Federation (EBF) decided to introduce a new Index, the EONIA Swap Index. This new index was established on 20 June 2005, and will further stimulate the overnight index swap (OIS) swap market, with the development of new products derived from the EONIA Swap Index currently in progress.

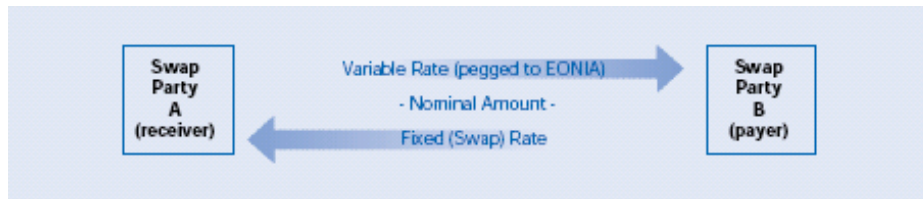


Note: The volume of overnight indexed swaps (OIS) in Q2 2002 is taken as the base (100). The panel comprised 85 banks in 2000 and 2001 and 114 banks from 2002 to 2007.

¹ Euribor®, EUREPO® and EONIA® are worldwide registered trademarks of Euribor FBE. All rights reserved. Additional information on these benchmarks can be found on www.euribor.org and www.eurepo.org.

What is an EONIA Swap?

An EONIA swap is similar to a plain vanilla interest rate swap transaction i.e. an exchange of a fixed rate interest cash flow for a variable rate cash flow or vice-versa. In essence, one interest rate is received, while at the same time the other one is paid. That is, at the time an EONIA swap is concluded, the parties determine the payer and the receiver of the fixed interest rate, with the variable interest rate being exchanged in the opposite direction. Upon settlement, only the net cash flows are paid one business day after maturity. The nominal amount on which the interest payments are calculated is not exchanged. The diagram below illustrates the structure of an EONIA Swap. For example, a payer in an EONIA Swap transaction pays a fixed rate and receives a floating rate pegged to the daily EONIA setting.



The fixed rate, often called the swap rate, and the nominal amount is agreed at the time the contract is concluded.

For calculating the variable rate the following formula shall be applied.

$$r = \frac{360}{n} \left[\prod_{i=t_s}^{t_e-1} \left(1 + \frac{r_i * di}{360} \right) - 1 \right] \quad (1)$$

- r Variable rate taking compound interest into account
- t_s Start date of the EONIA swap
- t_e End Date of the EONIA Swap
- r_i EONIA fixing rate on the i -th day
- di Number of days that the value r_i is applied (normally one day, three days for weekends)
- n Total number of days

Example

Two counterparties agree to enter into the following EONIA swap for a nominal of EUR 500 million. Counterparty A is the receiving party of the swap. A fixed rate of 3.85% is agreed over a term of seven days. Party B assumes the opposite position, paying the fixed rate and receiving the variable rate. The EONIA fixes at following (fictitious) levels:

Wednesday	3.82%
Thursday	3.82%
Friday (valid for three days)	3.82%
Monday	3.82%
Tuesday	3.81%

The variable rate could be calculated by using formula (1).

$$r = \frac{360[(1 + 0.0382/360)(1 + 0.0382/360)(1 + 0.0382 * 3/360)(1 + 0.0382/360)(1 + 0.0381/360) - 1]}{7} = 0.038196$$

A calculation of our example results in the following figures: the variable rate of the EONIA swap is 3.8196%. Considering the notional amount of EUR 500 million, party A would normally receive a fixed rate of EUR 374,305.56 (3.85% * 7/360 * EUR 500 million) and pays a variable rate of EUR 371,350.00 (3.8196% * 7/360 * EUR 500 million). But only the difference between these two figures is exchanged, so that A receives from B a payment of EUR 2,955.56.

EONIA Swap Index – The new benchmark

The EONIA Swap Index is the derivative market's new reference rate for the Euro, as sponsored by the EBF. It completes the range of existing benchmark indices for the unsecured (EURIBOR) and secured (EUREPO) cash markets.

The EONIA Swap Index is the mid-market rate at which EONIA swaps, as quoted by a representative panel of prime banks, which actively provide prices in the EONIA swap market. The index is calculated daily at 11:00 CET² and rounded to three decimal places on an actual/360 day count convention. The range of quoted maturities is 1, 2, and 3 weeks and monthly maturities between one and twelve month. Longer maturities for 15, 18, 21 and 24 months have been added in May 2007. These are quoted on act/360 basis with annual payment and the broken period at the beginning. The EONIA Swap Index reference rates are calculated and published by Reuters based upon the information of the participating panel banks on page: EONIAINDEX. They are also published on www.eoniaswap.org.

Banks may qualify for the EONIA Swap Index Panel if they meet the following criteria:

- They are active players in the Euro derivative markets either in the euro area or worldwide and have the ability to transact good volumes in EONIA Swaps, even under turbulent market conditions
- Panel banks must have a high credit rating high ethical behaviour and enjoy an excellent reputation
- Panel banks must disclose all relevant information requested by the Steering Committee

The number of panel banks will be sufficient to both represent the diversity of the EONIA swap market and guarantee an efficient manageable panel consisting of only prime banks. At present, 25 prime banks constitute the EONIA Swap Index Panel. These selected banks are obliged to quote the EONIA Swap Index for the complete range of maturities, in a timely manner, every business day with an accuracy of three decimal places. The EONIA Swap Index can point to a strict Code of Conduct which sets out the criteria for inclusion of banks in the panel. The Code of Conduct details the obligations resting on each bank, and outlines the tasks and composition of the Steering Committee which oversees the Index. This independent Steering Committee, which consists of 10 members, closely monitors all market developments and ensures, by reviewing panel banks' contributions on a regular basis, strict compliance with the Code of Conduct. It has the right to request information, remove or appoint panel banks.

² Until March 2008 daily fixings took place at 16:30 CET.

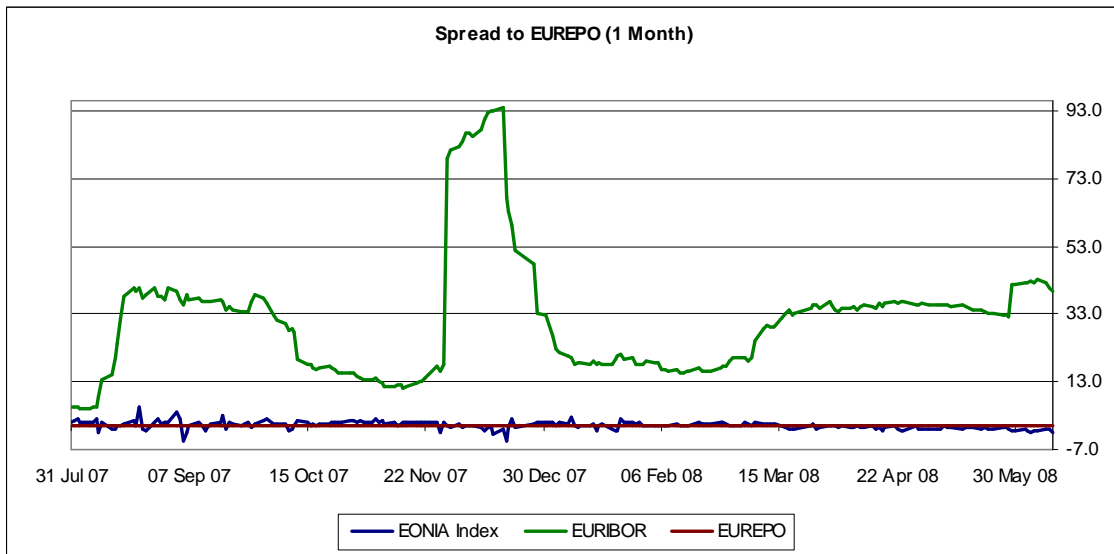
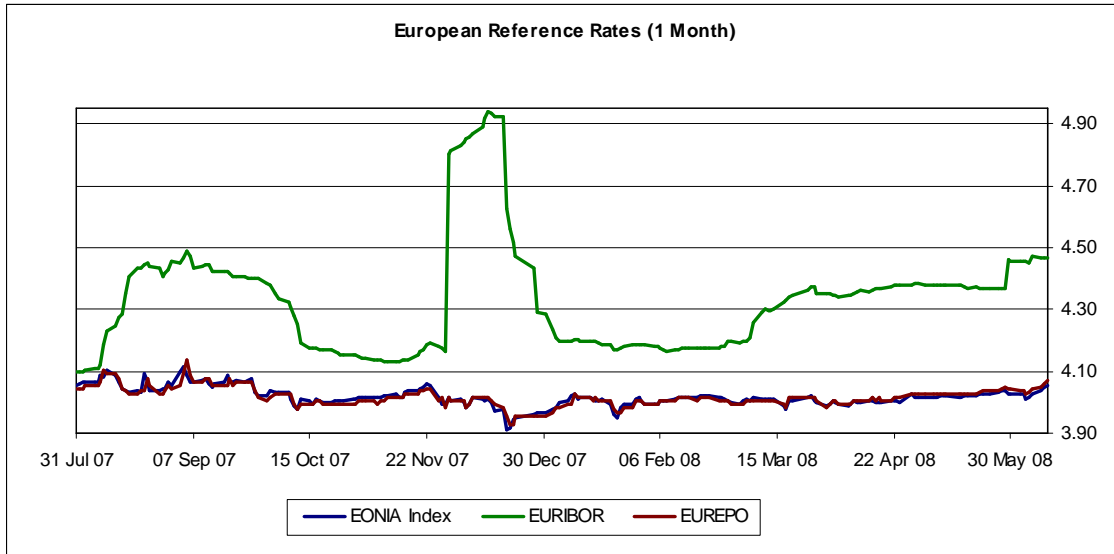
Potential uses and benefits of the new EONIA Swap Index are:

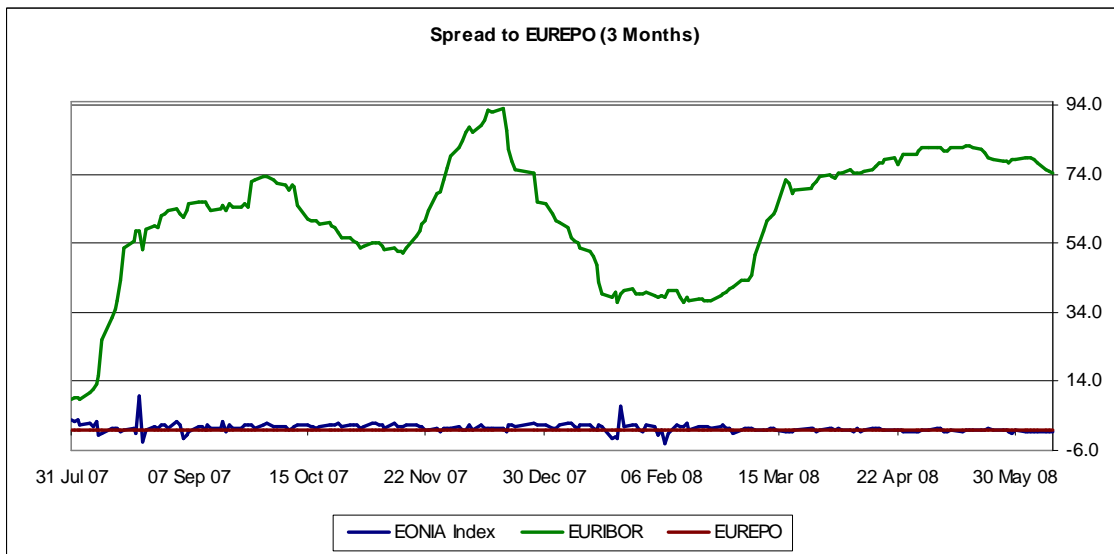
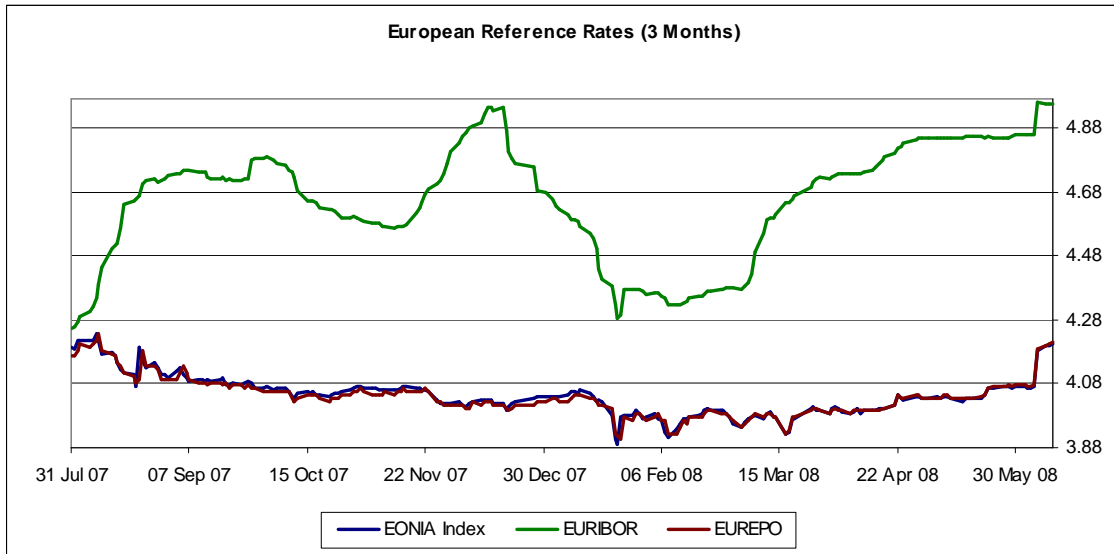
- New product developments and market enhancements, such as EONIA Swap FRA, EONIA Index OTC Option
- The Index may be used as an independent risk management and valuation tool. It sets the basis for market conformity checks and allows banks and their clients, for example money market funds, to run their revaluation against an official reference rate
- It serves as a benchmarking tool for the derivative markets, similarly to the EURIBOR and EUREPO indices at the short end of the European yield curves
- The EONIA Swap Index can also be used as a reference rate for longer dated interest rate swaps. A revival of the pre-euro French TAM (Taux Annuel Monetaire) swap market is possible. A T4M/TAM Swap was an Interest Rate Swap Transaction where one party pays a fixed rate and the other one the floating rate. The calculation of the floating leg was based on the average monthly money market rate for T4M Swaps and on the annual monetary rate for TAM transactions, which was based on the EONIA rate
- Additional flow volumes for the basis swap market are expected. This results from a precise basis perception of the market participants.

In sum the EONIA Swap Index serves a wide range of Global Market Business. It provides major opportunities for the participants in the financial markets to increase the professional set-up and profitability of their business.

All this information can be found on the EBF website: www.eoniaswap.org

Here is an overview of the recent spreads of the 2 key European reference rates:





EONIA FRA

EONIA FRAs have already been designed. An EONIA FRA is a trade where two counterparties are contracting an EONIA Swap rate and notional amount for an agreed period for a future date. Two business days before the value date of the EONIA Swap the contract will be fixed against the EONIA Swap Index. The contract will be settled in cash and the settlement amount will be the discounted value of the difference between the agreed FRA rate and the EONIA Swap Index (reference rate). No EONIA swap position will result out of the FRA deal.

On the fixing date, the cash settlement amount of the EONIA FRA buyer will be computed as follows:

$$SettlementPayment = \frac{(EONIAFRARate - EONIASwapIndex) \frac{days * nominal}{360}}{1 + EONIASwapIndex \frac{days}{360}} \quad (2)$$

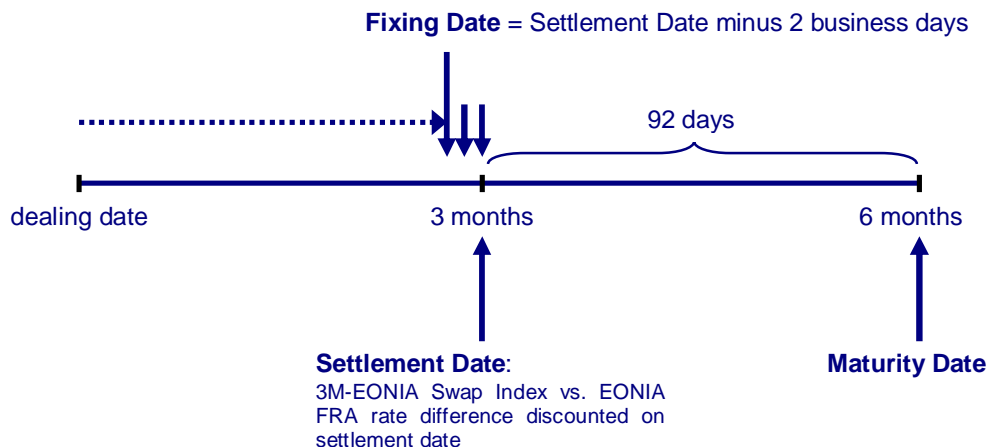
The following example should illustrate the potential use of an EONIA FRA. In this case Party A wants protection against falling interest rates for incoming cash flows in three months time for three months. The incoming cash flows are usually invested in the cash market. To solve this problem Party A has to sell a 3x6 EONIA FRA to lock in interest rates and stay flexible on daily liquidity fluctuations. Following situation is assumed:

PERIOD	o/n	1m	3m	6m
DAYS	1	31	92	184
RATE	3.820%	3.850%	3.900%	4.010%

Principal: EUR 10.000.000

3x6 Forward Rate: 4.079%

At the fixing date of the EONIA FRA, the agreed EONIA FRA Price is compared to the 3M-EONIA Swap Index.



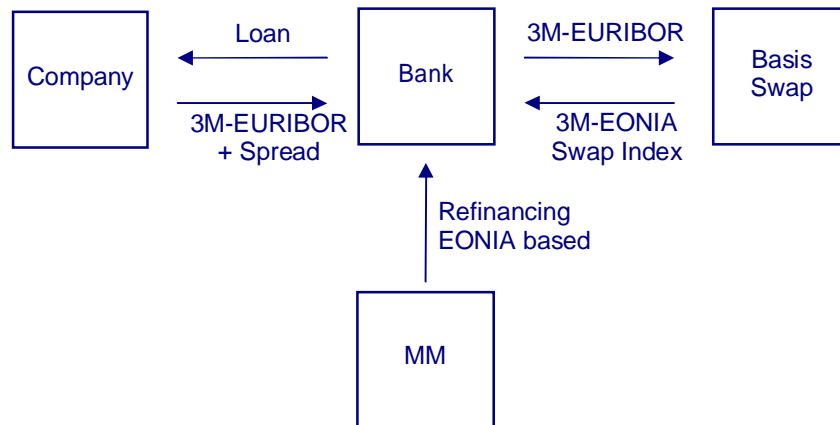
The table below shows calculated FRA settlement amounts in respect to different 3M-EONIA Swap Index values. A decrease/increase in the Index results in positive/negative payments on the settlement date. In the case of decreasing interest rates the effect of lower interest payments on the principal investment is offset by the positive EONIA FRA payout.

3M-EONIA Swap Index	3.700%	3.800%	3.900%	4.000%	4.079%	4.100%	4.200%	4.300%
P/L	9,594.83	7,061.43	4,529.30	1,998.46	0.00	-531.10	-3,059.38	-5,586.39

EONIA FRAs keep the operational costs at a minimum. Also the parties avoid unexpected performance volatility, which could occur if they had to physically enter into an EONIA Swap after trading a forward EONIA Swap (through reserve ends, tender underbidding etc.)

Basis Swaps

A basis swap is a floating-floating interest rate swap. Basis swaps between two floating indices from different segments of the money market are quite common. Basis Swaps could limit the risk that a company faces as a result of having lending or borrowing rates tied to a different reference index. Assume a bank lends money to a company at a variable rate that is tied to the European Interbank Offered Rate (EURIBOR) but the short-term liquidity management of the bank is benchmarked against EONIA rates. By entering into a EURIBOR – EONIA Swap Index Basis Swap the bank eliminates this kind of risk. The structure of this deal is displayed in the diagram below.



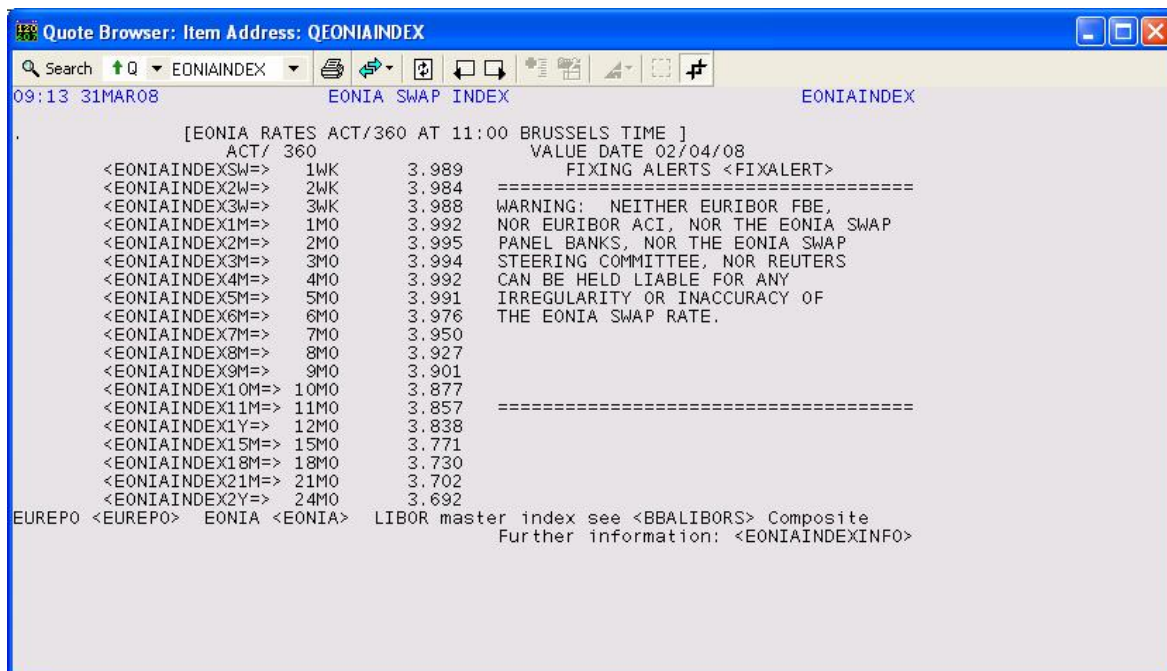
IRS vs. EONIA Swap Index

It can be imagined that a bank lends money to a company for a period of 12 months and receives a fixed rate at maturity. In our example, the bank prefers to receive a floating rate, e.g. the 1M-EONIA Swap Index, and thus enters into a fixed-floating interest rate swap.



Example

Suppose we have just received the following EONIA FIXINGS from REUTERS.



Quote Browser: Item Address: QEONIAINDEX

09:13 31MAR08 EONIA SWAP INDEX EONIAINDEX

[EONIA RATES ACT/360 AT 11:00 BRUSSELS TIME]
 ACT/ 360 VALUE DATE 02/04/08
 FIXING ALERTS <FIXALERT>

Term	Rate
<EONIAINDEXSW=> 1WK	3.989
<EONIAINDEX2W=> 2WK	3.984
<EONIAINDEX3W=> 3WK	3.988
<EONIAINDEX1M=> 1M0	3.992
<EONIAINDEX2M=> 2M0	3.995
<EONIAINDEX3M=> 3M0	3.994
<EONIAINDEX4M=> 4M0	3.992
<EONIAINDEX5M=> 5M0	3.991
<EONIAINDEX6M=> 6M0	3.976
<EONIAINDEX7M=> 7M0	3.950
<EONIAINDEX8M=> 8M0	3.927
<EONIAINDEX9M=> 9M0	3.901
<EONIAINDEX10M=> 10M0	3.877
<EONIAINDEX11M=> 11M0	3.857
<EONIAINDEX1Y=> 12M0	3.838
<EONIAINDEX15M=> 15M0	3.771
<EONIAINDEX18M=> 18M0	3.730
<EONIAINDEX21M=> 21M0	3.702
<EONIAINDEX2Y=> 24M0	3.692

WARNING: NEITHER EURIBOR FBE, NOR EURIBOR ACT, NOR THE EONIA SWAP PANEL BANKS, NOR THE EONIA SWAP STEERING COMMITTEE, NOR REUTERS CAN BE HELD LIABLE FOR ANY IRREGULARITY OR INACCURACY OF THE EONIA SWAP RATE.

EUREPO <EUREPO> EONIA <EONIA> LIBOR master index see <BBALIBORS> Composite
 Further information: <EONIAINDEXINFO>

What is the fair fixed rate of an IRS, as described above, for the period of 02 April 2008 to 02 April 2009 on a notional of € 1,000,000.00?

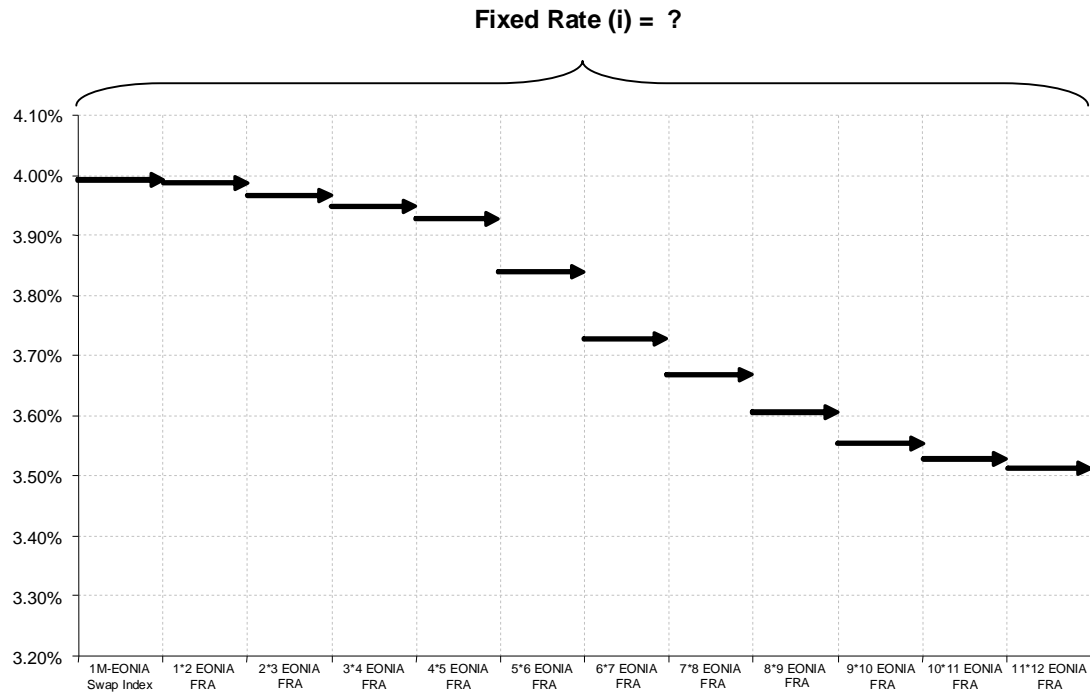
In a first step, we are creating a table that states the fixings, the exact start and end dates as well as the corresponding actual days for each period.

Start Date	End Date	Months	Actual Days	EONIA SWAP INDEX FIXINGS
02/04/2008	02/05/2008	1	30	3.992%
02/04/2008	02/06/2008	2	61	3.995%
02/04/2008	02/07/2008	3	91	3.994%
02/04/2008	04/08/2008	4	124	3.992%
02/04/2008	02/09/2008	5	153	3.991%
02/04/2008	02/10/2008	6	183	3.976%
02/04/2008	03/11/2008	7	215	3.950%
02/04/2008	02/12/2008	8	244	3.927%
02/04/2008	02/01/2009	9	275	3.901%
02/04/2008	02/02/2009	10	306	3.877%
02/04/2008	02/03/2009	11	334	3.857%
02/04/2008	02/04/2009	12	365	3.838%

Based on these figures, we can now price the actual EONIA FRAs:

	Start Date	End Date	Actual Days	Rate
1M - EONIA Swap Index	02/04/2008	02/05/2008	30	3.992%
1x2 EONIA FRA	02/05/2008	02/06/2008	31	3.985%
2x3 EONIA FRA	02/06/2008	02/07/2008	30	3.965%
3x4 EONIA FRA	02/07/2008	04/08/2008	33	3.947%
4x5 EONIA FRA	04/08/2008	02/09/2008	29	3.933%
5x6 EONIA FRA	02/09/2008	02/10/2008	30	3.834%
6x7 EONIA FRA	02/10/2008	03/11/2008	32	3.726%
7x8 EONIA FRA	03/11/2008	02/12/2008	29	3.670%
8x9 EONIA FRA	02/12/2008	02/01/2009	31	3.601%
9x10 EONIA FRA	02/01/2009	02/02/2009	31	3.558%
10x11 EONIA FRA	02/02/2009	02/03/2009	28	3.522%
11x12 EONIA FRA	02/03/2009	02/04/2009	31	3.508%

To make the results and our purpose more graphic, we included them in the chart below.



Since we have now calculated all consecutive FRAs, we can fix the cost of borrowing from month to month (i.e. the floating leg of the IRS) in advance. It is what leads to the fixed costs for the whole period.

Start Date	End Date	Actual days	Rate	Discount Factor	Portfolio at period begin	Interest	Portfolio at period end
02/04/2008	02/05/2008	30	3.992%	0.9967	€1,000,000.00	€3326.67	€1,003,326.67
02/05/2008	02/06/2008	31	3.985%	0.9966	€1,003,326.67	€3442.64	€1,006,769.31
02/06/2008	02/07/2008	30	3.965%	0.9967	€1,006,769.31	€3326.64	€1,010,095.94
02/07/2008	04/08/2008	33	3.947%	0.9964	€1,010,095.94	€3654.28	€1,013,750.22
04/08/2008	02/09/2008	29	3.933%	0.9968	€1,013,750.22	€3211.53	€1,016,961.75
02/09/2008	02/10/2008	30	3.834%	0.9968	€1,016,961.75	€3249.58	€1,020,211.33
02/10/2008	03/11/2008	32	3.726%	0.9967	€1,020,211.33	€3378.94	€1,023,590.28
03/11/2008	02/12/2008	29	3.670%	0.9971	€1,023,590.28	€3026.06	€1,026,616.33
02/12/2008	02/01/2009	31	3.601%	0.9969	€1,026,616.33	€3182.97	€1,029,799.31
02/01/2009	02/02/2009	31	3.558%	0.9969	€1,029,799.31	€3155.19	€1,032,954.50
02/02/2009	02/03/2009	28	3.522%	0.9973	€1,032,954.50	€2829.89	€1,035,784.39
02/03/2009	02/04/2009	31	3.508%	0.9970	€1,035,784.39	€3128.67	€1,038,913.06

As shown above, it would cost € 38,913.01 (the FV of the portfolio minus the starting notional) to fix the floating leg for the period of 02 April 2008 to 02 April 2009. The equivalent fixed rate for the whole period equals the effective “fair” fixed rate ($i=3.838\%$) that the bank has to pay to the IRS counterparty.

Again the advantage of trading a 12month vs 1month EONIA Swap Index IRS is to avoid daily reset risk on the EONIA (ON) Fixing (through reserve ends, tender underbidding etc.)

Advantages of EONIA Swap Index based IRS

For longer dated Interest Rate Swaps (2-10 years) the EONIA Swap Index can be used as a reference Rate to create an IRS market based on the new index. EONIA Swap Index based IRS could close the gap of the liquid pre-euro French T4M/TAM market. They can provide the same economic effect as T4M/TAM Swaps but without their downsides. In comparison to T4M/TAM transactions there is no need to compute daily fixings and valuations. Due to its simplicity EONIA Swap Index based IRS are simpler to administrate and therefore the cheaper alternative.

In terms of documentation and confirmation EONIA Swap Index based IRS are as easy to handle as EURIBOR Swaps.

EONIA Future

An EONIA Swap Index Future is similar to an EONIA FRA but traded on exchanges as a standardised product instead of Over-the-Counter (OTC) and is marked to market on a daily basis via a Clearing House.

The specifications of EONIA Swap Index Futures contracts traded on Liffe are shown in the table below:

Unit of Trading	€1,000,000
Delivery Months	Mar, Jun, Sep and Dec, and four serial months such that eight delivery months are available for trading with the nearest six delivery months being consecutive calendar months
Quotation	100.00 minus rate of interest
Minimum Price Movement Tick Size (Value)	0.005 (€12.50)
Last Trading Day	Two business days prior to the third Wednesday of the Delivery Month. On the Last Trading Day, trading in the front delivery month will cease at 10:00 London Time
Delivery Day	First business day after the Last Trading Day
Exchange Delivery Settlement Price (EDSP)	Is based on the Three Month EONIA Swap Index, as sponsored by the European Banking Federation (EBF), at 11.00 hours CET on the Last Trading Day.

To understand how EONIA Swap Index Futures work, consider for example a September 2008 Liffe Three Month contract:

On September 16, 2008, the settlement price is set equal to 100 minus the Three Month EONIA Swap Index level on the Last Trading Day, and there is a final cash settlement reflecting this price. The contract is designed so that a half basis point move in the Futures quote corresponds to a gain (when being long) or loss (when being short) of €12,50 per contract. In other words, a Three Month EONIA Swap Index Future contract allows an investor to lock in an EONIA Swap of €1 million for a future 3-month period starting on the Delivery Day.

$$€\text{million} * 0,00005 * 0,25 = €12,50$$

EONIA Swap Index Futures are useful in many respects:

- As a Hedging Tool
- Markets today have a wide and volatile spread between EONIA and Euribor. This makes EONIA Swap Index Futures attractive to short term money managers (Repo, Reverse Repo, Money Market Funds, Treasury) and 'spread' traders
- Asset allocation facilities allow inter-contract spread trading with other exchange-traded interest rate contracts like the Euribor Future
- Margin netting between EONIA Swap Index and Euribor Futures by Liffe
- Block Trading through wholesale trading facilities.

Outlook

The implementation of the EONIA Swap Index has created the potential for a number of products. The strong rise in EONIA Swap volumes in 2006 already implies an increasing number of market users of the underlying product due to higher transparency and the possibility for an official daily valuation process. This development is likely to continue with the revaluation curve now available up to 2 years.

At first, a commitment of the major market makers will be formed to start the EONIA FRA product, as the documentation framework is now in place (ISDA included the EONIA Swap Index in its "2006 Definitions").

An exchange traded futures contract on the EONIA Swap Index has just started as described above. Long term IRS markets and basis swaps should follow, once the index and the EONIA FRA and Futures products get more known by all market participants.

Options on the new index will be next and should offer additional products to position for a changing rate environment.

So, there is more in the pipeline to come. It's up to the markets to use the potential the new EONIA Swap Index is providing. A prosperous future for it is quite likely.

Disclaimer for Euribor ACI / EONIA Swap Index brochure
19 June 2008

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