



Hedging and Discounting Euro swaps with a secured benchmark

October 2015

Agenda

- Developments in European Interbank Funding
- ECB selects STOXX GC Pooling indices
- Volatility, drivers and impact of unsecured vs. secured basis
- Hedging the basis
- Appendix

EONIA interbank funding volumes drops to EUR 11bn

- The financial crises of 2008 showed that EURIBOR discounting of derivatives portfolios was flawed due to inherent credit risk
- Subsequently, EONIA, perceived as near risk free funding rate, was implemented at great one-off cost to some market participants (LIBOR/ OIS spread reached 364 basis points in October 2008)
- However, by 2015, EONIA funding volumes have frequently dropped to EUR 11bn
- An individual bank's financing can now directly impact the EONIA rate and consequently
 - OTC and On Exchange EUR derivatives valuations and
 - Variation Margin obligations
- Unsecured funding rates no longer mirror true funding behaviours and costs, nor do they reflect the ECB's liquidity provision adequately

However, 100% of EUR denominated derivatives reference EONIA directly or indirectly

Repo replaces unsecured interbank financing

- Currently, around 80-90% of interbank funding is on a collateralized basis and very short-term (80% up to 1 month) according to ECB/ ERC data
- Eurex Repo's regulated, anonymous GC Pooling interbank repo market is the Pan-European market place for short-term financing against HQLA eligible assets
- It has seen significant growth in members and volumes over recent years
- GC Pooling has developed from a funding/ investment platform for German banks to the focal point of European liquidity trading with
 - 121 members,
 - approx. EUR 150 billions outstanding repo notional, and is
 - cleared by Eurex Clearing AG.
- Mandatory clearing of IRS from 2016 onwards and cash Variation Margin requirement for uncleared derivatives from March 2017 should additionally increase repo financing/ investment needs by non-banks

GC Pooling dominates interbank financing market in Europe

Agenda

- Developments in European Interbank Funding
- ECB selects STOXX GC Pooling indices
- Volatility, drivers and impact of unsecured vs. secured basis
- Hedging the basis
- Appendix

STOXX GC Pooling benchmark repo index elected by ECB

- STOXX, the index provider, developed a series of IOSCO compliant short-term benchmark interest rates based on the significant trading volumes on GC Pooling in 2013
- Eurex introduced cash settled EUR Secured Funding Futures in November 2014 (OMEA <Cmdty> on Bloomberg) allowing to hedge short-term GC Pooling repo rates for up to 7 months
- The futures are based on the STOXX benchmark and supported by Goldman Sachs and Credit Suisse as market makers
- The ECB heavily used STOXX ' GC Pooling rates in their analysis of European Money Markets in their annual Money Market Survey (April 2015)
- In September 2015, the ECB announced the replacement of the Eurepo index with the STOXX GC Pooling rates

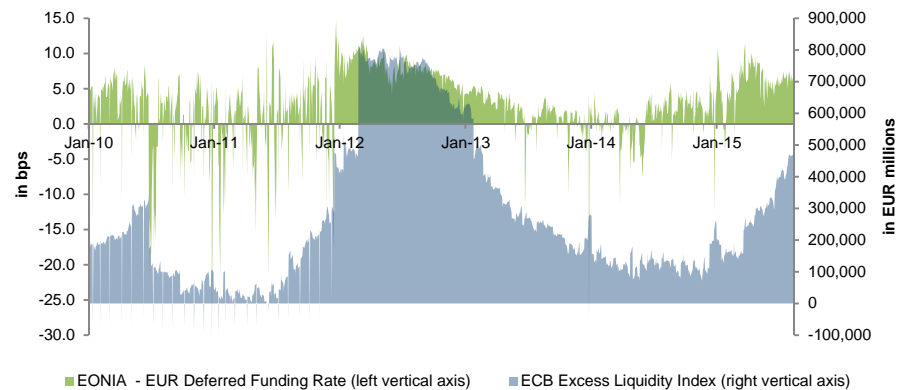
EUR Secured Funding Futures allow hedging of GC Pooling rates for a first time

Agenda

- Developments in European Interbank Funding
- ECB selects STOXX GC Pooling indices
- Volatility, drivers and impact of unsecured vs. secured basis
- Hedging the basis
- Appendix

Substantial unsecured vs. secured spread volatility

- The spread between unsecured (EONIA) and secured (STOXX GC Pooling Deferred Funding Rate), funding rates, currently at 6.9 bps, is highly volatile as seen below



Source: Bloomberg

- ∅ Secured rates can persistently deviate from unsecured rates
- ∅ EONIA does not capture ECB excess liquidity very well or only delayed
- ∅ EONIA discounting leads to systematic and significant loss for cleared In-the-Money IRS positions (pay EONIA vs. rec repo \approx 6.9 bps on daily m-t-m)

Historically, the unsecured vs. secured interest rate basis is highly correlated with ECB liquidity injections

Agenda

- Developments in European Interbank Funding
- ECB selects STOXX GC Pooling indices
- Volatility, drivers and impact of unsecured vs. secured basis
- Hedging the basis
- Appendix

EUR Secured Funding Futures prices point to large, persistent unsecured vs. secured interest rate basis

- Current indicative EUR Secured Funding Futures quotations by market makers in October 15 provide the following price information:

EUR Secured Funding Futures			Spread Between EONIA OIS Rate and EUR Deferred Funding Rate
Contract Expiry	Mid Repo Rate (in bps)	Bid/Offer (in bps)	EONIA OIS - Secured Funding Future Rate (in bps)
Oct-15	-0.185	3	5
Dec-15	-0.195	3	5.5
Jan-16	-0.19	3	4.5
Mar-16	-0.205	3	5.5
Apr-16	-0.215	3	5.5

- Each Future's contract expiry tracks the expected average daily repo rate over the respective ECB maintenance period ending in that month
- The market does not price in any additional liquidity measures by the ECB currently, whilst expected EONIA ECB Date OIS rates seem to have stabilized approx. 5.5bps above repo

However, additional ECB liquidity measures could lead to a further widening of the basis

Agenda

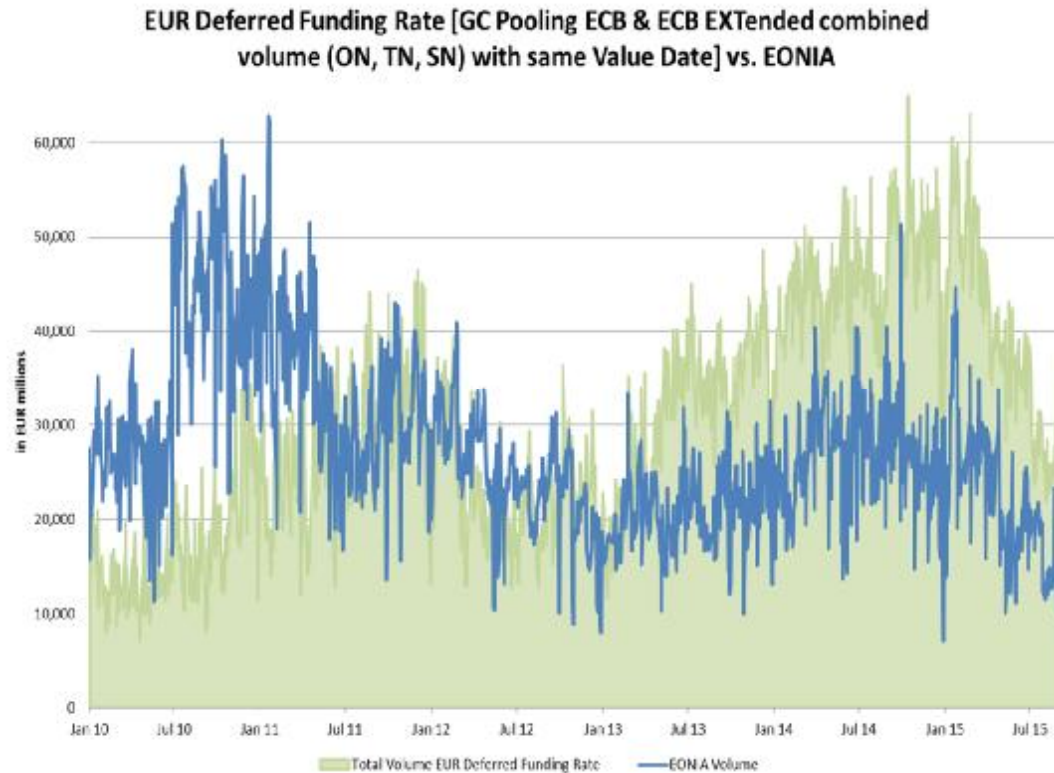
- Developments in European Interbank Funding
- ECB selects STOXX GC Pooling indices
- Volatility, drivers and impact of unsecured vs. secured basis
- Hedging and trading the basis
- Appendix

Appendix

STOXX GC Pooling Deferred Funding Rate

- EUR Secured Funding Futures reference the daily published STOXX GC Pooling Deferred Funding Rate (SGCPDFR Index on Bloomberg, .STXGCPDFR on Reuters) over an ECB maintenance period
- The STOXX benchmark rate has multiple advantages:
 1. 100% based on secured, actual repo transactions
 2. Only centrally cleared transactions captured
 3. Only GC transactions (20,000+ ISINs) and no special repo transactions considered
 4. Transactions anchored on a highly liquid, anonymous, electronic 121 participant interbank market
 5. Transparent, rules-based methodology from independent index provider
 6. Broad Pan-European market coverage

Short-term transactions on Eurex' GC Pooling repo market exceed unsecured market on a daily basis



- Short-term GC Pooling volumes are a multiple of EONIA cash volumes
- With EONIA cash volume at around EUR 11bn only, large individual transactions can impact EONIA fixings
- Collateral transformation requirements on Initial and Variation Margin for Buyside from mandatory Clearing should further reduce the market share of unsecured interbank funding
 - Reinvest/ fund cash VM via reverse/ standard short term repos
 - Cash/non-cash for IM due to negative rates and capital charges

Source: Bloomberg

Contract Specifications of cash settled EUR Secured Funding Futures (1/2)

Description	
Contract Standard	Trade volume weighted short – term secured GC Pooling repo interest rate.
Ticker	Eurex: FLIC, Bloomberg: OMEA <CMDTY>
Reference Rate	STOXX® GC Pooling EUR Deferred Funding Rate (SGCPDFR Index on Bloomberg, .STXGCPDFR on Reuters).
Contract Size	EUR 1,000,000
Price Quotation and Tick Size / Value	The Price Quotation is in per cent, with three decimal places, expressed as 100 minus the traded rate of interest. The Minimum Price Change is (0.005) per cent and the tick value is set to a constant value of EUR 5.83.
Delivery Months (number of listed futures at any time):	The 5 nearest European Central Bank (“ECB”) Reserve Maintenance Periods (“MP”), i.e. MP1....MP5, i.e. one future per MP. For the avoidance of doubt, the relevant dates for this contract are published by Eurex and only the periods published in the Eurex’ contract specifications shall be relevant for the user of the futures. A subsequent modification of the maintenance period dates or a cancellation of the period itself by the ECB shall be of no consequence.
Settlement type/ Settlement Day	Cash settled 1 business day after the last trading day.
Final Settlement Price (FSP)	<p>The Final Settlement Price is established by Eurex on the Last Trading Day after 19:00 CET; based on the compounded average of the STOXX® GC Pooling EUR Deferred Funding Rate as calculated by STOXX on a daily basis for the duration of the respective ECB Reserve Maintenance Period as defined in Eurex’ contract specifications. The Final Settlement Price (“FSP”) is determined by the following formula:</p> $FSP = 100 - \left[\frac{360}{N} \left(\prod_{i=1}^M \left(1 + \frac{F_i \cdot w_i}{360} \right) - 1 \right) \right] * 100$ <p>M = number of observations of the STOXX GC Pooling Deferred EUR Funding Rate in the accrual period N = number of calendar days in the accrual period F_i = the ith STOXX® GC Pooling EUR Deferred Funding Rate (in percent) in the accrual period w_i = the number of days that F_i is applied for, i.e. w_i represents the calendar days between the publication of the STOXX® GC Pooling EUR Deferred Funding Rate on day i and the next day when a STOXX® GC Pooling EUR Deferred Funding Rate is published.</p> <p>The final settlement price is rounded to three decimal places.</p>



Contract Specifications of cash settled EUR Secured Funding Futures (2/2)

Description	
Last Trading Day/ Time	18:00 CET, End Date of relevant ECB Reserve Maintenance Period.
Trade Entry Facilities	Available for Block Trade Service, Exchange for Swaps (EFS) Trade Services against Interest Rate Swap or other Money Market Futures, and Exchange for Physical (EFP) Trade Service against GC Pooling repo transaction (ECB or ECB EXTENDED basket) with matching notional.
Trading Hours	08:00 CET – 18:00 CET
Minimum Block Trade Size	300
Matching algorithm	Split time/pro rata (identical to our EURIBOR futures).

- Hedge Ratio

The EUR Secured Funding Futures have a standardised tick value assuming a ECB Reserve Maintenance Period of 42 days. Hence, a hedger should take into consideration in his calculation of a hedge ratio the difference of this standardised tick value relative to the actual basis point value of a position for a Reserve Maintenance Period of different length.

Participants can also hedge the spread between EONIA and EUR Deferred Funding Rate with new EONIA futures

- As of 4 May 2015, participants are able for the first time to hedge the spread between Eonia and STOXX® GC Pooling EUR Deferred Funding Rate by trading Eurex' new Eonia futures
- With the exception of the observation rate (EONIA), the new EONIA futures mirrors exactly the EUR Secured Funding Futures' contract specifications
- It hence provides not only outright but also spread trading opportunities for all participants including those that are currently restricted from trading EONIA swaps
- Participants will no longer be required to execute an EONIA overnight interest rate swap and will additionally benefit from the low capital costs associated with a listed future.

Methods of trading the Spread between EONIA and EUR Deferred Funding Rate

	Exchange for Swap (EFS)	Exchange for Physical (EFP)	
Description	Trading EUR Secured Funding Futures against EONIA Swap: - EONIA swap confirmation required - As little as one EUR Secured Funding Futures contract can be traded off order book	Trading EUR Secured Funding Futures against EONIA Futures: - One leg of the spread to be either block traded or traded in the regular order book - Flexibility on the other leg	Cross Trading: If the block trade level is too high, EONIA Futures can be traded against EUR Deferred Funding Futures as a cross trade on the order book whereby you enter a cross request that then needs to be fulfilled within 60 seconds
Advantages	- Flexibility in size - Swap leg could be traded anywhere	- Allows spread trading for participants unable to access the swap market - Cheap exposure to spread beta - Significant Cross Margining Efficiencies exist with Eurex Clearing's innovative PRISMA portfolio risk margining system	- Flexibility in size compared to block trades - Lower fees compared to off order book trades
Disadvantages	- Additional fees compared to on order book transaction - Higher margin requirements for OTC swaps - ISDA agreement needed	- Additional fees compared to on order book transaction - Which could be avoided by cross trading facility - If below block trade threshold of 300 contracts, execution of one of the legs becomes visible	- Trade can be picked up partially or in whole by a third party - But unlikely in an illiquid market
Initial Margin Requirements: Example*	The combination of the Secured Funding Futures with an equivalent OIS EONIA swap would be margined on a 5 day liquidation period.	The combination of the Secured Funding Futures with an equivalent EONIA Futures would be margined on a 2 day liquidation period.	
Assuming a short position in 1000 Front month EUR Secured Funding Futures contracts	Short position in 1000 Front month EUR Secured Funding Futures contracts combined with 1 billion EUR receiver OIS EONIA Swap with matching horizon:	Short position in 1000 Front month EUR Secured Funding Futures contracts combined with Long position in 1000 Front month EONIA Futures contracts:	
Initial Margin: 4.3bps (EUR 430,000)	Initial Margin in the portfolio context: 2.13bps (EUR 213,000)	Initial Margin in the portfolio context offers significant savings: 0.43bps (EUR 43,000)	

© Eurex 2015

Deutsche Börse AG (DBAG), Clearstream Banking AG (Clearstream), Eurex Frankfurt AG, Eurex Clearing AG (Eurex Clearing) as well as Eurex Bonds GmbH (Eurex Bonds) and Eurex Repo GmbH (Eurex Repo) are corporate entities and are registered under German law. Eurex Zürich AG is a corporate entity and is registered under Swiss law. Clearstream Banking S.A. is a corporate entity and is registered under Luxembourg law. U.S. Exchange Holdings, Inc. and International Securities Exchange Holdings, Inc. (ISE) are corporate entities and are registered under U.S. American law. Eurex Frankfurt AG (Eurex) is the administrating and operating institution of Eurex Deutschland. Eurex Deutschland and Eurex Zürich AG are in the following referred to as the “Eurex Exchanges”.

All intellectual property, proprietary and other rights and interests in this publication and the subject matter hereof (other than certain trademarks and service marks listed below) are owned by DBAG and its affiliates and subsidiaries including, without limitation, all patent, registered design, copyright, trademark and service mark rights. While reasonable care has been taken in the preparation of this publication to provide details that are accurate and not misleading at the time of publication DBAG, Clearstream, Eurex, Eurex Clearing, Eurex Bonds, Eurex Repo as well as the Eurex Exchanges and their respective servants and agents (a) do not make any representations or warranties regarding the information contained herein, whether express or implied, including without limitation any implied warranty of merchantability or fitness for a particular purpose or any warranty with respect to the accuracy, correctness, quality, completeness or timeliness of such information, and (b) shall not be responsible or liable for any third party's use of any information contained herein under any circumstances, including, without limitation, in connection with actual trading or otherwise or for any errors or omissions contained in this publication.

This publication is published for information purposes only and shall not constitute investment advice respectively does not constitute an offer, solicitation or recommendation to acquire or dispose of any investment or to engage in any other transaction. This publication is not intended for solicitation purposes but only for use as general information. All descriptions, examples and calculations contained in this publication are for illustrative purposes only.

Eurex and Eurex Clearing offer services directly to members of the Eurex exchanges respectively to clearing members of Eurex Clearing. Those who desire to trade any products available on the Eurex market or who desire to offer and sell any such products to others or who desire to possess a clearing license of Eurex Clearing in order to participate in the clearing process provided by Eurex Clearing, should consider legal and regulatory requirements of those jurisdictions relevant to them, as well as the risks associated with such products, before doing so.

Eurex derivatives are currently not available for offer, sale or trading in the United States or by United States persons (other than EURO STOXX 50® Index Futures, EURO STOXX 50® ex Financials Index Futures, EURO STOXX® Select Dividend 30 Index Futures, EURO STOXX® Index Futures, EURO STOXX® Large/Mid/Small Index Futures, STOXX® Europe 50 Index Futures, STOXX® Europe 600 Index Futures, STOXX® Europe 600 Banks/Industrial Goods & Services/Insurance/Media/Travel & Leisure/Utilities Futures, STOXX® Europe Large/Mid/Small 200 Index Futures, Dow Jones Global Titans 50 IndexSM Futures (EUR & USD), DAX®/MDAX®/TecDAX® Futures, SMIM® Futures, SLI Swiss Leader Index® Futures, MSCI World/Europe/ Europe Value/Europe Growth/Emerging Markets/Latin America/Emerging Markets EMEA/Emerging Markets Asia/China Free/India/Japan/Malaysia/South Africa/Thailand/AC Asia Pacific ex Japan Index Futures, TA-25 Index Futures, Daily Futures on TAIFEX VFutures, VSTOXX® Futures, Gold and Silver Futures as well as Eurex agriculture, property and interest rate derivatives).

Trademarks and Service Marks

Buxl®, DAX®, DivDAX®, eb.rexx®, Eurex®, Eurex Bonds®, Eurex Repo®, Eurex Strategy WizardSM, Euro GC Pooling®, FDAX®, FWB®, GC Pooling®, GCPI®, MDAX®, ODAX®, SDAX®, TecDAX®, USD GC Pooling®, VDAX®, VDAX-NEW® and Xetra® are registered trademarks of DBAG. Phelix Base® and Phelix Peak® are registered trademarks of European Energy Exchange AG (EEX). All MSCI indexes are service marks and the exclusive property of MSCI Barra. RDX® is a registered trademark of Vienna Stock Exchange AG.

IPD® UK Annual All Property Index is a registered trademark of Investment Property Databank Ltd. IPD and has been licensed for the use by Eurex for derivatives. SLI®, SMI® and SMIM® are registered trademarks of SIX Swiss Exchange AG.

The STOXX® indexes, the data included therein and the trademarks used in the index names are the intellectual property of STOXX Limited and/or its licensors. Eurex derivatives based on the STOXX® indexes are in no way sponsored, endorsed, sold or promoted by STOXX and its licensors and neither STOXX nor its licensors shall have any liability with respect thereto.

Dow Jones, Dow Jones Global Titans 50 IndexSM and Dow Jones Sector Titans IndexesSM are service marks of Dow Jones & Company, Inc. Dow Jones-UBS Commodity IndexSM and any related sub-indexes are service marks of Dow Jones & Company, Inc. and UBS AG. All derivatives based on these indexes are not sponsored, endorsed, sold or promoted by Dow Jones & Company, Inc. or UBS AG, and neither party makes any representation regarding the advisability of trading or of investing in such products.

All references to London Gold and Silver Fixing prices are used with the permission of The London Gold Market Fixing Limited as well as The London Silver Market Fixing Limited, which for the avoidance of doubt has no involvement with and accepts no responsibility whatsoever for the underlying product to which the Fixing prices may be referenced.

PCS® and Property Claim Services® are registered trademarks of ISO Services, Inc.

Korea Exchange, KRX, KOSPI and KOSPI 200 are registered trademarks of Korea Exchange Inc. BSE and SENSEX are trademarks/service marks of Bombay Stock Exchange (BSE) and all rights accruing from the same, statutory or otherwise, wholly vest with BSE. Any violation of the above would constitute an offence under the laws of India and international treaties governing the same. The names of other companies and third party products may be trademarks or service marks of their respective owners.