

EURO STOXX 50[®] Total Return Futures

Listed Solution for Implied Repo Trading

December 2017



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Product Summary

Key Drivers & Objectives

- Index Total Return Futures (TRF) are designed to offer a **listed solution for trading the implied equity repo rate (details on slides 7-8)**.
- **Mitigate capital, collateral and balance sheet pressures** due to the new bilateral margining rules for non-cleared OTC derivatives.
- Enhance **market transparency**, consolidate **liquidity** and bring **fungibility** to current TRS market.
- Offer **margin compression** and **increase operational synergies**, trading Eurex Index Futures and TRF on the same trading platform (T7).
- Attract **new clients** (pension funds, asset managers) eager to invest in **repo** as a **new asset class**.

Prerequisites

- **Simple & innovative product** which provides cost efficient access to the pay-out profile of a standard equity index total return swap:
 - **Buyer receives** the total equity performance of the index including distributions
 - Against that, **Buyer pays** for the funding cost associated with the equity index leg
 - TRF is quoted and traded in conventional **Spread** terms (+/- basis points)
- **Straightforward product** for members and template to be **used** for other underlying (e.g. other indices, stocks).

Your benefits trading Euro STOXX 50® Total Return Futures

Market Convention

- Trading as a TRF Spread expressed as annualised rate in (+/-) basis points

Ten Years Exposure

- Via a single TRF trade (21 quarterly expiries and 5 year-end months expiries listed at all times)

Price Transparency and Liquidity

- Price Transparency and Liquidity provided by market makers via the Eurex T7 System

Portfolio Margining

- High Netting effects TRF's with other Equity and Equity Index ETDs within PRISMA e.g. EURO STOXX Futures up to 80%

Mitigate Counterparty Risk

- Mitigate Counterparty Risk with Eurex Clearing and its lower counterparty risk weighting for RWA*

Reduce Capital Costs

- Reduce Capital Costs at Eurex Clearing with lower c-factor** on default fund.

Fully Fungible

- Fully Fungible product aiming to replicate in a cost-efficient way the payoff profile of OTC TRS.

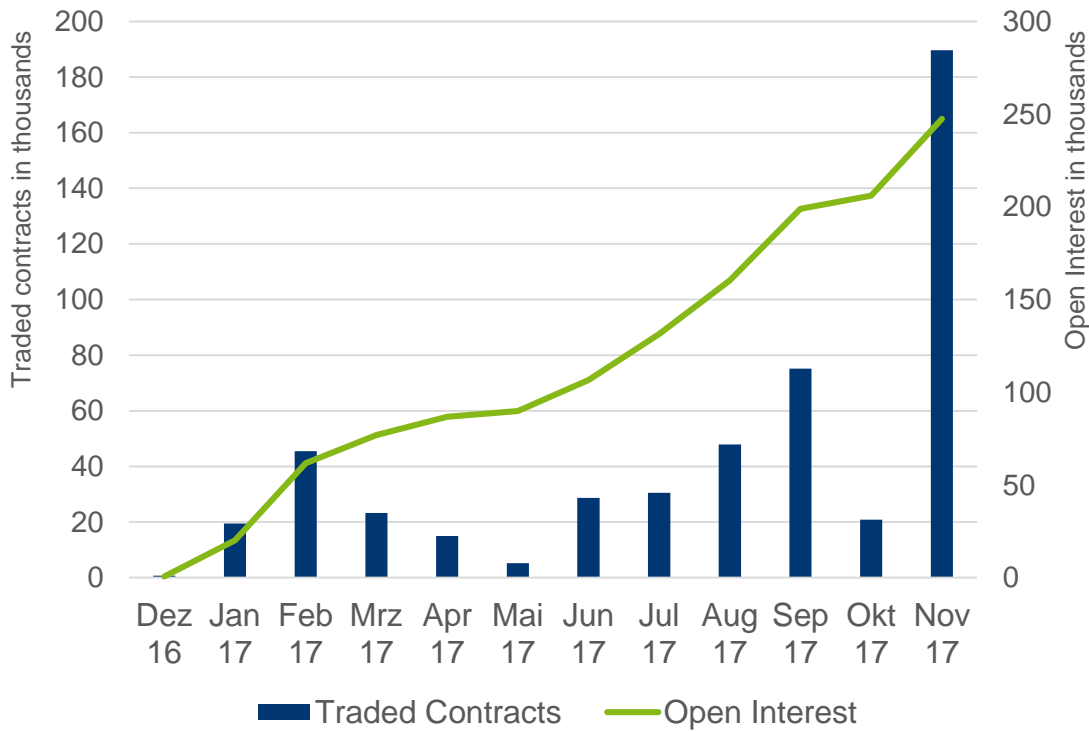


* RWA is risk-weighted assets and is used to determine a bank's minimum capital requirements

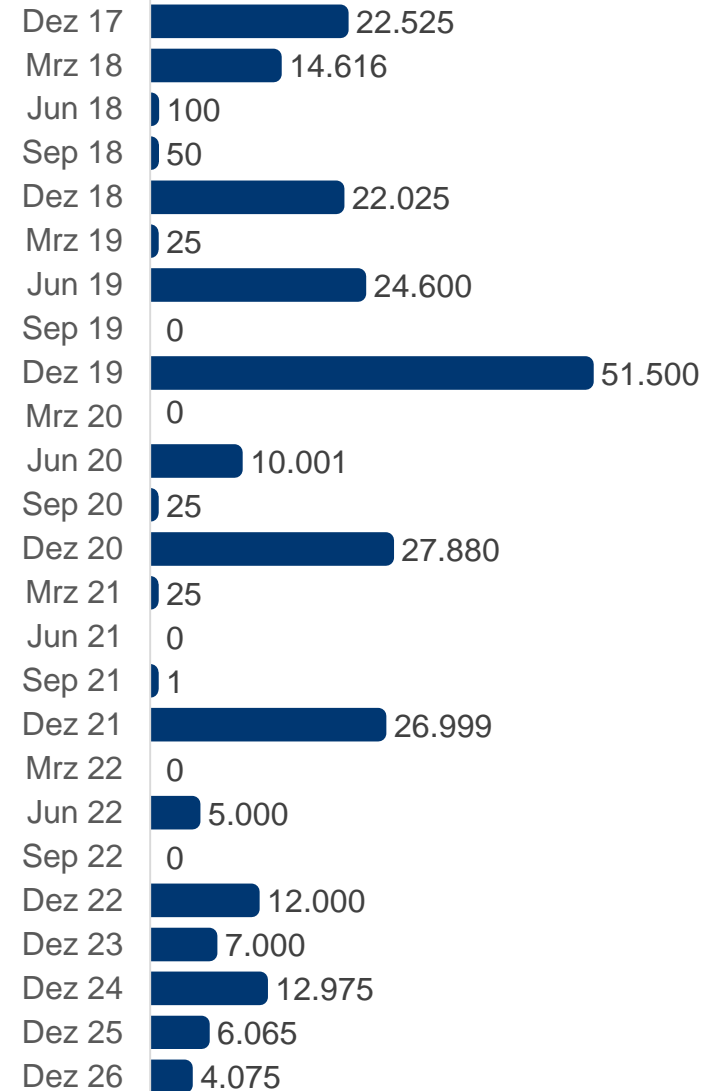
** c-factor is the risk weight applied to a bank's trade exposure to Eurex Clearing, the Central Counterparty (CCP)

Volumes Since Launch

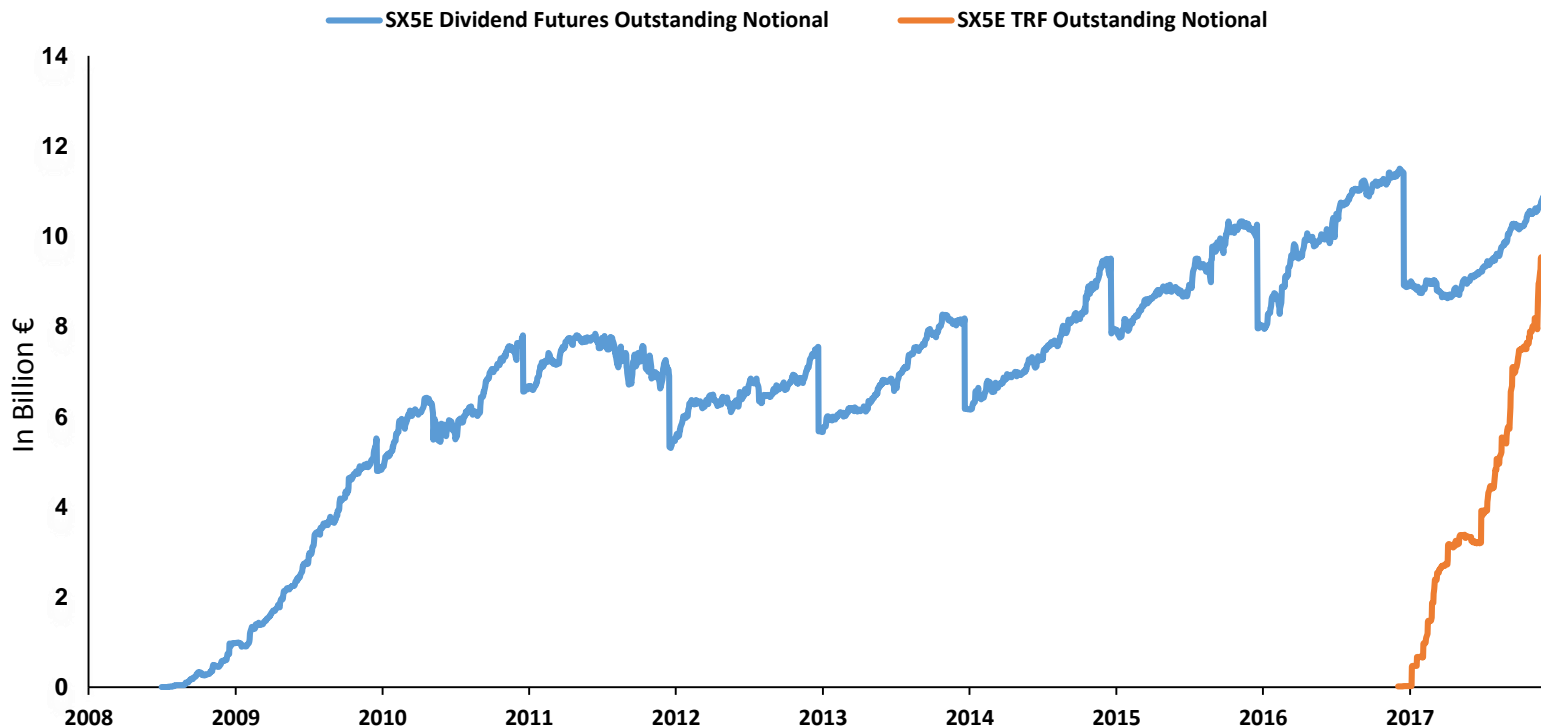
- +18,3 bn EUR notional traded with a significant end client participation
- The number of active members is continuously increasing
- +501,000 traded contracts since launch
- 20 out of 26 maturities already traded



Open Interest per maturity



EURO STOXX 50® Index Dividend Futures versus EURO STOXX 50® Total Return Futures - Outstanding Notional



About Implied Repo Rate (1)

- The equity repo rate is not just the cost to go short a security, it is at the confluence of derivative pricing, financing needs, new regulation and collateral management.
- Repo is the remainder component of an equity forward's price after spot, interest rate and dividend risks have been stripped out.

$$F_T = S_0 \times (1 + r - (\text{repo} + \text{dividend yield}))^T$$

The diagram illustrates the components of the forward price equation. Arrows point from the terms in the equation to boxes below: S_0 to 'Spot price', r to 'Interest rate', $(\text{repo} + \text{dividend yield})$ to a box containing 'Repo', and 'dividend yield' to 'Dividends'. The 'Repo' box is highlighted with a white border.

- The TRS spread represents the cost of carrying the underlying. Since the seller of TRS loans out the underlying and receives repo, the spread should be equal to “– repo” :

The lower the repo, the higher the spread of a TRS

Being “**Short**” a TRS means being “**Long**” the Implied Repo

About Implied Repo Rate (2)

Virtually every directional derivative has a repo exposure

Derivatives that have a short repo exposure : Derivatives that have positive delta

- Long future or forward
- Long call / Short put
- Long a Total Return Swap
- Any exotic option that is long the market

Derivatives that have a long repo exposure : Derivatives that have negative delta

- Short future or forward
- Long put / Short call
- Short a total return swap
- Any exotic option that is short the market

The repo exposure term is the maturity of the derivative.

- This creates a term structure of repo rates given a range of derivatives maturities

Product Structure (1/2)

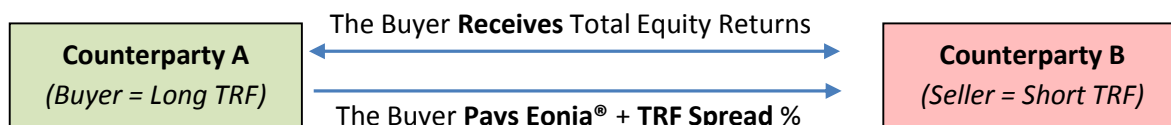
Product Structure

- **Total Return Futures structure ("TR Futures / TRF")**
 - **Total Return Futures** based on:
 - EURO STOXX 50® Index (SX5E)
 - (a new) EURO STOXX 50® Dividend / Distribution points index (SX5EDD) and
 - Eonia®
 - **"Pay-as-you-go" structure** with daily distributions and funding paid out via the variation margin.
 - **TRF Spread** executed in basis points via the T7 trading system is converted in index points in order to determine the futures price in index points
 - **Order book and off-book trading** (via Trade Entry Services) within the Eurex T7 trading system via two trade types:
 - Trade at Index Close (**TAIC**) with an equity strike level based on index close (e.g. SX5E Close).
 - Trade at Market (**TAM**) based on custom-defined equity strike level provided by the investor.

Product Structure (2/2)



- TRF contracts will represent the theoretical exposure to the underlying index (i.e. its component basket) at trade date assuming holding to expiry.
- The holder of a long position will receive the distributions associated with holding the cash basket, against which they will pay the funding associated with this purchase.
- The cost of funding will be made up in part by the overnight funding rate (Eonia®) and the traded TRF Spread. This spread represents the additional rate required by the seller over Eonia®, until expiry.



- TRF will be quoted and traded in **spread terms** to insulate the financing component in a transparent manner for the dealers / clients who want to play the repo rate:

$$\text{(Equity Performance + Distributions)} = \text{(Funding + TRF Spread)}$$

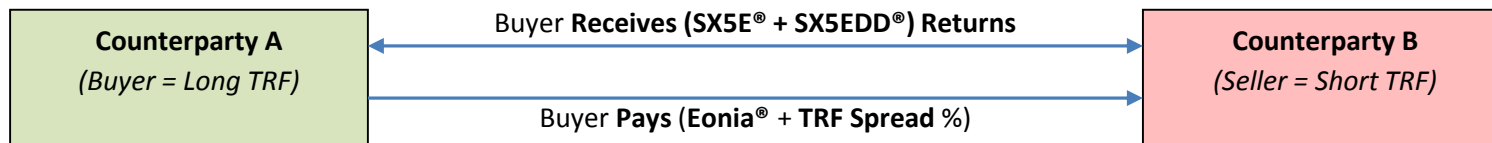
$$\Rightarrow \text{“Quoted” TRF Spread} = \text{Equity Performance + Distributions} - \text{Funding}$$

- The Traded Basis will be converted in conjunction with the accrued distributions and accrued funding into a Traded Futures price.
- Total returns will be incorporated into the Daily Settlement price and the daily profit and loss will be paid as a daily cash-flow via the regular variation margin process.

TRF Product Specifications

Specification	EURO STOXX 50® Total Return Futures (TESX)	Bloomberg: VHOA <Index> Reuters: : 0#TESX:
Underlying Indices	EURO STOXX 50® Index (SX5E), EURO STOXX 50® Distribution Index (SX5EDD) and Eonia®	
Contract Multiplier	EUR 10 per index point	
Quotation (TRF Spread) <i>(basis points)</i>	TRF Spread as annualised rate expressed in basis points with one decimal (+ / - / 0)	
Minimum TRF Spread Change	+/- 0.5 basis points (1 basis point = 0.0001)	
TRF Spread Conversion	The TRF Spread will be converted within the T7 system into TRF futures prices expressed in index points	
Trade Types <i>(TAIC vs. TAM)</i>	<ul style="list-style-type: none"> Trade at Index Close (“TAIC”) with a strike price based on Close SX5E index Trade at Market (“TAM”) with a custom-defined strike price 	
Accrued Distributions & Funding	The distribution and funding rate payments will be accumulated from launch and will be added to the TRF futures price in index points. The daily changes in the distributions and funding payments are paid out daily via the variation.	
Contract Months	9 years and 11 months: the 21 nearest quarterly months as well as up to the next 5 succeeding year-end months	
Settlement	Cash settlement, payable on the first exchange day following the Final Settlement Day	
Daily Settlement TRF Spread <i>(basis points)</i>	<p>Used to calculate the daily settlement price and determined as follows:</p> <ul style="list-style-type: none"> The TRF Spread traded via the closing auction between 17:25 – 17:30 CET. If no trades - will be determined based on the average bid-ask spread. If no average bid-ask spread, then will be determined as the volume-weighted average TRF Spread of all transactions executed during the last 30 minutes of continuous trading If no price can be determined according to the above the Daily Settlement TRF Spread will be determined based on a theoretic (fair) TRF Spread for the respective contract 	
Last Trading Day	The Eurex trading day immediately preceding the Expiration day	
Expiration Day	3 rd Friday of each quarterly expiration month if this is an exchange day; otherwise the immediately preceding exchange day	
Final Settlement Price <i>(index points)</i>	Established by Eurex on Expiration Day and it is based the following components: Final Settlement Price of the EURO STOXX 50® Index Futures (FESX), accrued distributions and accrued funding until the expiration date	
Trading Hours	<ul style="list-style-type: none"> Order book (TAIC): 07:30 – 17:30 CET / Off-book (TAIC & TAM): 07:30 – 22:00 CET 	

Motivation & Examples



Motivation for Buyers (Long Equity)

- TRFs offer immediate exposure to the EURO STOXX 50® Index without requiring the full capital
- TRFs allow synthetic buying of the underlying assets without the need for portfolio management of the individual components

Motivation for Sellers (Long Repo)

- TRFs offer the ability to transfer the market risk of the portfolio of an investor
- TRFs offer the ability to benefit from short term repo rate movements e.g. from high repo rates when there is a strong negative outlook on the index

Examples

Insurance Company

- Insurance companies often buy downside portfolio protection e.g. long dated out-of-the money puts. They may wish to hedge their repo risk by selling the long-term implied repos

Bank

- Banks often sell structured products such as auto-callables where they in effect buy cancellable long-term puts. If the market goes down this extends likely duration and hence they become short longer forwards. They may wish to hedge by selling the medium to longer term repos.

ETF Provider

- May wish to substitute cash replication with synthetic exposure to the index as this will reduce inventory and collateral management whilst locking in repo rate. The CCP mitigates the counterparty risk

Asset Manager

- An asset manager may believe that the repo curve is too steep and they can take advantage by selling the longer dated TRF and buying shorter date to take advantage of the difference

Margin Offsets (1)

Eurex can offer significant margin offsets between TRF and equity derivatives in PRISMA. The majority of delta for TRS are done using listed equity index products such as index futures, synthetics forward (using listed options) and dividend futures.

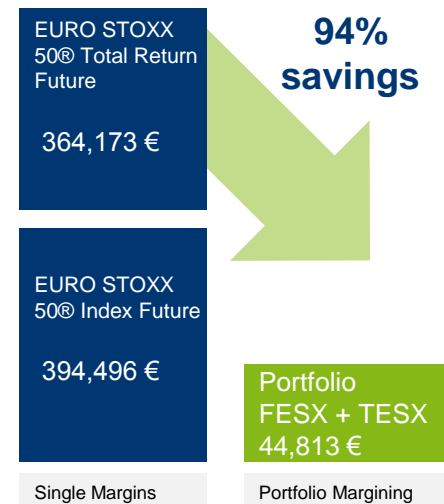
Portfolio	Product Long	Product Short	# Long	#Short	IM	IM %	Portfolio effects
FESX 1st	FESX 1st		1		2.429	8,12 %	
FESD 1st	FESD 1st		1		99	0,83%	
TRF 1st	TRF 1st		1		2.735	6,99%	
TRF 21st	TRF 21st		1		2.923	7,25%	
FESX 1st - TRF 1st	FESX 1st	TRF 1st	1	1	444		86%*
TRF 1st – TRF 5th	TRF 1st	TRF 5th	1	1	56		94%*
TRF 1st – TRF 21st	TRF 1st	TRF 21st	1	1	235		91%*
TRF 3rd – TRF 7th	TRF 3rd	TRF 7th	1	1	43		94%*
TRF 7th - TRF 3rd, FEXD 2nd	TRF 7th	TRF 3rd , FEXD 2nd	20	10 & 1	27.539		66%

Disclaimer:

- * In compliance with regulations, margin savings are capped at 80%, the exceedance is charged via supplementary margin.
- The calculations have been derived using the envisaged configurations (e.g. Liquidity Add-On, vola floor) and a holding period of 3 days.
- Please keep in mind, that the figures are not productive and should be used as indication only. Especially for the FEXD and the TRF only approximate figures have been determined, since they are not launched in Prisma yet.

Margin Offsets (2)

- This is a practical example for both 5 million EUR notional long EURO STOXX 50® index futures (FESX) versus 5 million EUR notional short EURO STOXX 50® Total Return Futures (TESX)



Name	Eurex	Long	Short	Exp. Date	Initial Margin (in EUR)	Liquidity add on (in EUR)	Margin Total (in EUR)	Portfolio Margin Total (in EUR)	Margin savings
EURO STOXX 50® Index Future	FESX	164	0	2017/03/17	393,267	1,229	394,496	44,813	94%
Total Return Future	TESX	0	164	2017/03/17	357,322	6,850	364,173		

Disclaimer:

- * In compliance with regulations, margin savings are capped at 80%, the exceedance is charged via supplementary margin.

Trade Life Cycle

- The handling of Total Return Futures is similar to **basis trading** as the order entry, execution and settlement is based on the **TRF Spread** (i.e. financing cost / Repo), expressed as an annualised rate in +/- basis points*.
- The **main steps** regarding the trade and post-trade workflow are the following:

Order Entry

- **Step 1:** The members submit the orders by specifying the “**Traded TRF Spread**” (basis points) for the respective contract month (e.g. **+ 60.5 bps** for DEC16 expiry).

Trade Execution

- **Step 2:** Once the order is executed at the TRF spread, the Eurex system calculates the “**Traded Futures Price**” based on the:
 - Equity index and Traded Basis.
 - Accrued Distributions and Accrued Funding.

Note: The Traded Basis is determined based on the conversion of the Traded TRF Spread from basis points into index points.

Clearing

- **Step 3:** The executed trade is cleared immediately via Open Offer based on the respective “**Traded Futures Price**”.

M-to-M / Daily P/L

- **Step 4:** The “**Daily Futures Settlement Price**” is calculated EOD based on the:
 - Close SX5E and Daily Settlement Basis.
 - Accrued Distributions and Accrued Funding.

Note: The Daily Settlement Basis is determined based on the conversion of the Daily Settlement TRF Spread from basis points into index points.
- **Step 5:** The **Daily Profit/Loss (Variation Margin)** is calculated based on the settlement prices.

Expiration

- **Step 6:** At the contract expiration, any remaining open position will be marked-to-market and cash settled based on the “**Final Futures Settlement Price**” (i.e. EDSP of FESX futures):
 - At expiration the Traded Basis is zero, hence only the equity index level is taken into consideration.

Pricing

Pricing for new contracts:

Pricing is configured on standard Eurex elements

- Transaction (Trade) Fee
- Cash Settlement Fee

Assumption is that initial trade migration will be similar to on-boarding of TRS i.e. large bilaterally negotiated trades introduced using TES – hence Block Trade Fees are equivalent to Orderbook.

Contract	Account	Orderbook	Block Trades
Total Return Futures (Transaction Fee) on STOXX Indices	A / M / P	EUR 0.60	EUR 0.60
Total Return Futures (Cash Settlement) on STOXX Indices	A / M / P	EUR 0.60	EUR 0.60

In addition there is an implementation of a (position) Maintenance Fee which is incorporated due to the potential that positions will be both long term (up to 10 years) and be retained as Open Interest in Clearing (equivalent to an underlying TRS)

Contract – Maintenance Fee	Account	Standard Fee per Contract
Total Return Futures (Transaction Fee) on STOXX Indices	A / P	EUR 0.002 Daily (EUR 0.73 p.a.)

Maintenance Fee:

A fee holiday for maintenance fees from launch until 31st December 2017 will be offered to members as an additional incentive. Product Development will re-evaluate if an extension of this fee holiday is necessary. The current assumption that the maintenance fee will be technically implemented by January 2018 by the MIFID/MIFIR project and can be charged from then on.

Further Information

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Eurex Trade Entry Services / Multilateral Trade Registration (MTR):
<http://www.eurexchange.com/exchange-en/products/eurex-trade-entry-services/multilateral-trade-registration>

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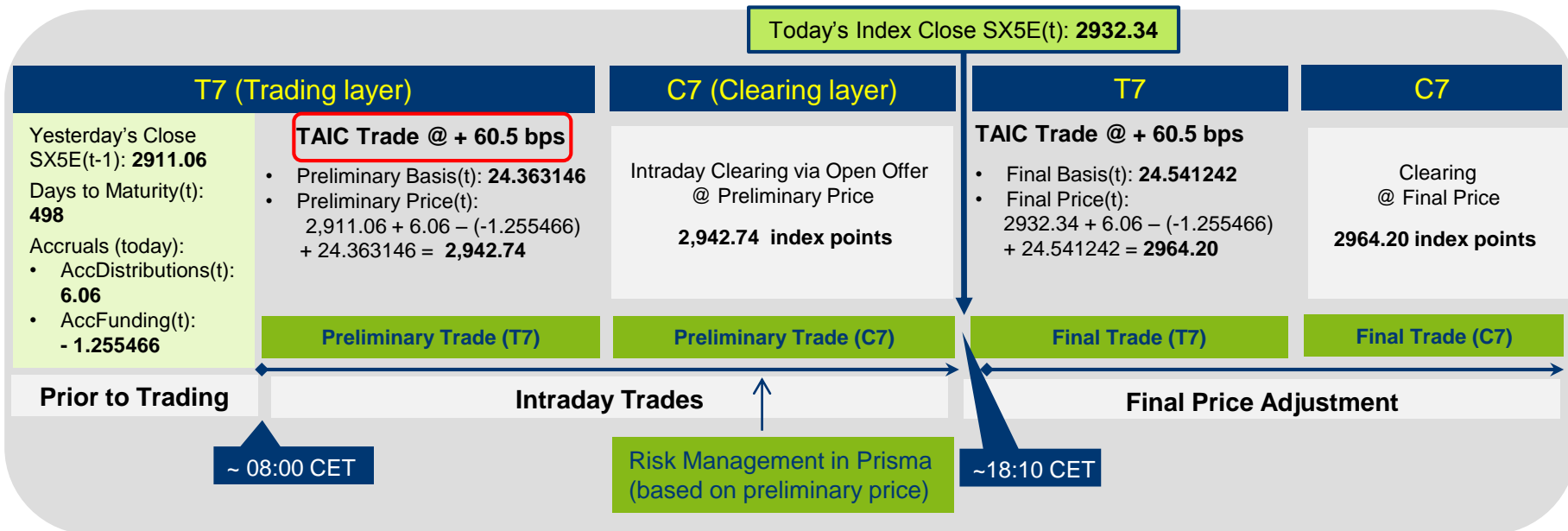
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Back-up

Example: TAIC Trade Workflow

- Until the SX5E Close is known, the TAIC trades are priced as preliminary trades (based on the Index Close value of previous day)
- C7 sends confirmation about the transaction at the preliminary clearing price
- C7 to settle TAIC into the same TRF product code (i.e. TESX) at the final settlement price in index points



- ❑ On T7 side, there will be 2 ETI messages:
- One intraday message:
 - Booking In of the **"Preliminary Trade"** (one deal ID).
 - One combined message when conversion is done from Preliminary to Final Price:
 - Booking In **"Final Trade"** (different deal ID from the Preliminary trade) and Booking Out **Preliminary Trade**.

- ❑ On C7 side, there will be 3 FIXML messages:
- One intraday message:
 - Booking In **"Preliminary Trade"** (suffix "0000").
 - Two messages when conversion is done from Preliminary to Final Price:
 - Booking Out **"Preliminary Trade"** (suffix "0001")
 - Booking In **Final Trade** (suffix "0002").

Distribution Index & Extraordinary Handling

SX5EDD Distribution Index

- As of 30th September a new index has been distributed by STOXX to cover all gross dividends and additionally the amounts deducted due to taxation of special cash and stock distributions
- EURO STOXX 50® Distribution Points index (SX5EDD) published with 2 decimals. Available on Bloomberg & Reuters – details <https://www.stoxx.com/index-details?symbol=SX5EDD>
- No (periodic) reset to zero of SX5EDD and shall not be adjusted with negative distribution points in case of cancellation of the distributions
- The base date from (but excluding) 18 Dec 2015 such that SX5EDD should coincide with the date when the existing SX5ED dividend index is reset to zero in December 2015

Delays / Corrections of SX5E

- The trade processing for TAIC shall be done after the confirmation by STOXX of the official closing level and its input and validation by Market Supervision of the Close SX5E in the T7 system
- Should a correction occur on the same day, the respective level should be reflected in the TAIC trade levels as well. However any amendment after finalisation will require a cash adjustment to be applied

Market Disruption

- Eurex can decide to suspend the TAIC trades in the order book should one of the SX5E index constituents be closed, but still to allow off-book trades (both TAIC and TAM)
- Eurex may decide to suspend of market makers' obligations
- Equity strike is not adjusted in case of TAIC (i.e. the published value for the Close SX5E shall be used)

Distribution Recovery

- As noted the new distribution SX5EDD index will not be adjusted (i.e. no negative index points applied in case of a distribution cancellation)
- No adjustment of the futures prices so as not to impact the other parties which entered after the ex-date
- The relevant period is between the distribution ex-date and the cancellation date. The impacted parties are the holders of the open interest (long & short) at the close of business on the day before ex-date (i.e. COB Ex-Date – 1)
- Any compensation shall be done by Eurex via a cash instruction with a separate booking code

Member Impact (1/2)

Access

- No new membership license for TRF required
- All trading members will have access to TRF (should the respective clearing members enable their trading members for the product)

Accruals

- Daily cash-flows approach based on “**accruals handling**”:
 - The **total** distributions / funding will start accruing into the **traded futures price** from launch
 - The **daily** distributions / funding will be effectively paid out via the daily **variation margin** (as P&L)
- No change in the calculation of the variation margin as the accruals amounts are included

Double Notation

- TRF trades entail **double notation** as they are executed based on the **TRF Spread** in basis points:
 - Traded TRF Spread can take positive or **negative** values. The internal systems used for listed derivatives would potentially have to be updated to cope with TRF handling
- Once the trade is matched, the T7 trading system will perform a conversion from basis points (“**trading notation**”) into index points (“**clearing notation**”)
 - Note: the clearing system receives the trades with (positive) futures prices in index points

Trade at Index Close vs. Trade at Market

- TRF handling entails two types of trades using the same product code:
 - **Trade at Index Close** (TAIC) based on daily index close of the EURO STOXX 50® (SX5E)
 - **Trade at Market** (TAM) based on a pre-agreed (custom strike) EURO STOXX 50® index level
- In case of **TAIC trades**, the handling entails a Preliminary trade and a Final trade:
 - The preliminary feedback from the vendors is that this handling can be supported (i.e. FIS & ION)
 - However, additional IT build effort might be needed on members side

Member Impact (2/2)

Regulatory Reporting

- It is envisaged that the **Traded TRF Spread** is not required in the clearing layer for regulatory reporting purposes (similar to Variance Futures)
- Therefore only the derived Traded Futures Price will be required for regulatory reporting purposes

Portfolio Margining / Risk Systems

- TRF are envisaged to be included in the existing **equity liquidation group (PEQ01)** within PRISMA
 - Initial margin offsets with all equity futures and options included in the liquidation group
 - Dividend futures and options will also be included in the PEQ01 with Prisma Release 5.0
 - Portfolio simulations via Margin Calculator in production based on Prisma methodology*
- TRF needs to be implemented in member's **internal risk systems**

Index Disruption

- In the case of the late delivery of an SX5E index close or in the case that an index is subsequently amended – meaning that TAIC and/or TAM trades and/or the Daily Settlement Price is incorrect
 - Eurex will introduce a cash adjustment in respect of the incorrect calculations of traded futures price and any adjustment made to the daily settlement price in respect of open positions

Distribution Cancellation / Recovery

- In the unlikely event of a dividend cancellation in SX5E (i.e. a dividend has gone ex- but is subsequently not fully paid) – then a cash compensation process shall be done by Eurex:
 - Process will use existing handling in case of **wrong final settlement prices** on the expiration day
Note: the new distribution SX5EDD index will not be adjusted (i.e. no negative index points)
 - No retroactive adjustment of the daily TRF settlement prices will be done by Eurex so as not to impact the other parties which have traded after the ex-date
- The relevant period is between the **distribution ex-date** and the **cancellation date**:
 - The **impacted parties** are the holders of the open interest (long & short) at the close of business on the day before ex-date (i.e. CoB Ex-Date – 1)
 - The **long position** holders as of **Ex-Date – 1 (CoB)** would be debited the cash amount corresponding to the distributions not effectively received (and credited to short position holders)
- Impacted parties will be similarly **notified** as with existing handling for incorrect final settlement prices:

Member Readiness Key Questions

Trading vs. Clearing Notation

- **Question 1:** Can your internal systems cope with the double notation (i.e. conversion from TRF Spread in basis points into TRF futures price in index points)?

Negative Quotations

- **Question 2:** Can your internal systems cope with the negative quotations (i.e. TRF Spread)?

Accruals Breakdown

- **Question 3:** Would your internal systems require the breakdown of the accruals in the Clearing or back office layer (i.e. Accrued Distributions and Accrued Funding)?
(note: IT build impact on ISVs)

TRF Spread Reporting

- **Question 4:** Would your internal systems require the TRF Spread in the Clearing/Back Office layer?

TAIC

- **Question 5:** Can your internal systems handle TAIC with Preliminary and Final trade processing?

Risk Systems

- **Question 6:** Will your internal risk systems be able to cope with TRF as a listed product?