

Portfolio Margining Benefits

Unparalleled Capital Efficiencies for Interest Rate Swap Portfolios

Portfolio Margining IRS and CME Group Futures

Unparalleled Margin Efficiencies for a Capital Constrained World

Background

- CME Group has administered a range of cross-margining programs for more than 20 years
- IRS portfolio margining for Clearing Members was launched in May 2012, and the solution became available to customers in November 2012

Broad Adoption From Market Participants

- **15 Clearing Members** are now live with IRS portfolio margining, and over **660 accounts** are benefitting from the solution
- Total Risk Reductions now account for over **\$2.13 billion in initial margin savings**

Scope of the Solution

- Achieve capital savings across a diverse portfolio of:
 - ✓ 24 cleared OTC IRS currencies
 - ✓ OTC Swaptions
 - ✓ 6 CBOT Treasury Futures
 - ✓ CME Eurodollar Futures
 - ✓ MAC Swap Futures
 - ✓ Fed Fund Futures

Invoice Spreads are a Highly Capital Efficient Method of Achieving Swap Spread Exposure

Invoice Spreads are trades between swaps and futures, that proxies the swap spread

- ✓ Invoice spreads are packaged trades involving a CBOT Treasury future and a matching interest rate swap
- ✓ Terms of the swap are designed to match the attributes of the future, including a duration-neutral notional value, effective date matching the last delivery date of the future, and maturity date matching the cheapest-to-deliver security
- ✓ This is a highly active market, daily volume exceeds \$5 billion notional (50,000 futures equivalents)

Receive Fixed (Long) *Dec2017 5-Year CBOT Treasury Future*
Pay Fixed *Dec2017 5-Year Invoice Swap*

Invoice Spreads are a highly capital efficient trading mechanism

- ✓ Regulatory changes have increased for off-balance sheet unfunded products as an unfunded vehicle for exposure
 - Capital requirements create significant cost implications holding securities
 - Increased repo costs and securities margining increases further, making futures a cost effective vehicle
 - Futures liquidity and trading activity has expanded, including recent success of Ultra 10Y contract
- ✓ With invoice spreads, both the swap leg and the futures leg are off balance sheet, as opposed to swap spreads where the cash Treasury leg consumes balance sheet and increases cost to trade
- ✓ Additionally, clearing both legs of this trade at CME Clearing enables significant margin efficiencies

Invoice Spread Strategy <i>(\$1M DV01 each)</i>	Margin if Cleared Separately	CME Portfolio Margin	Margin Savings	Savings Percentage
2YR (TU) Treasury vs IRS	40,903,813	13,604,549	27,299,263	67%
5YR (FV) Treasury vs IRS	44,558,116	8,736,394	35,821,721	80%
10YR (TY) Treasury vs IRS	46,583,879	12,050,244	34,533,635	74%
Ultra 10YR (UXY) Treasury vs IRS	46,586,965	10,886,514	35,700,451	77%
Treasury Bond (US) vs IRS	53,595,599	19,608,733	33,986,866	63%
Ultra Treasury (WN) vs IRS	53,379,866	15,501,401	37,878,465	71%
30 Day Fed Funds (FF) vs OIS	16,688,286	3,848,458	12,839,828	77%

Eurodollar Convexity Bias Margin Savings Analysis

Capital Efficiencies of Clearing IRS with CME Eurodollar Futures

- Eurodollar Convexity Bias Strategies have grown in popularity as volatility has returned to the short end of the curve, and clients can capitalize on CME portfolio margining of IRS and Eurodollars
- Daily volume now averages \$24 billion notional per day, which is more than double 2017 levels, and significantly larger than volumes before CME launched interest rate swap clearing

*Below are examples of popular Eurodollar Convexity Bias strategies with \$1 million DV01 in each strategy. Portfolio margining IRS with CME Eurodollars results in **indicative margin savings of 64%-89%**.*

Eurodollar Convexity Bias Strategy	Margin if Cleared Separately	CME Portfolio Margin	Margin Savings	Savings Percentage
White (1st year) vs IRS	32,979,034	5,794,912	27,184,122	82%
Red (2nd year) vs IRS	43,959,455	6,940,247	37,019,208	84%
Green (3rd year) vs IRS	53,686,233	9,911,671	43,774,563	82%
Blue (4th year) vs IRS	57,736,710	13,300,279	44,436,432	77%
Gold (5th year) vs IRS	54,570,965	19,846,739	34,724,225	64%
Two Year vs IRS	36,818,766	5,383,207	31,435,559	85%
Three Year vs IRS	40,957,211	4,445,782	36,511,429	89%

Swaptions Clearing - The Most Capital Efficient Solution

Savings Analysis For 8 Portfolios of Swaptions and Swaps

Portfolio	Margin Savings*
1Y5Y Long Payer ATM Swaption Delta Hedged using Swap	89%
1Y5Y Short Payer ATM Swaption Delta Hedged using Swap	81%
1Y5Y Long Receiver ATM Swaption Delta Hedged using Swap	87%
1Y5Y Short Receiver ATM Swaption Delta Hedged using Swap	81%
2Y30Y Long Payer ATM Swaption Delta Hedged using Swap	88%
2Y30Y Short Payer ATM Swaption Delta Hedged using Swap	82%
2Y30Y Long Receiver ATM Swaption Delta Hedged using Swap	91%
2Y30Y Short Receiver ATM Swaption Delta Hedged using Swap	86%

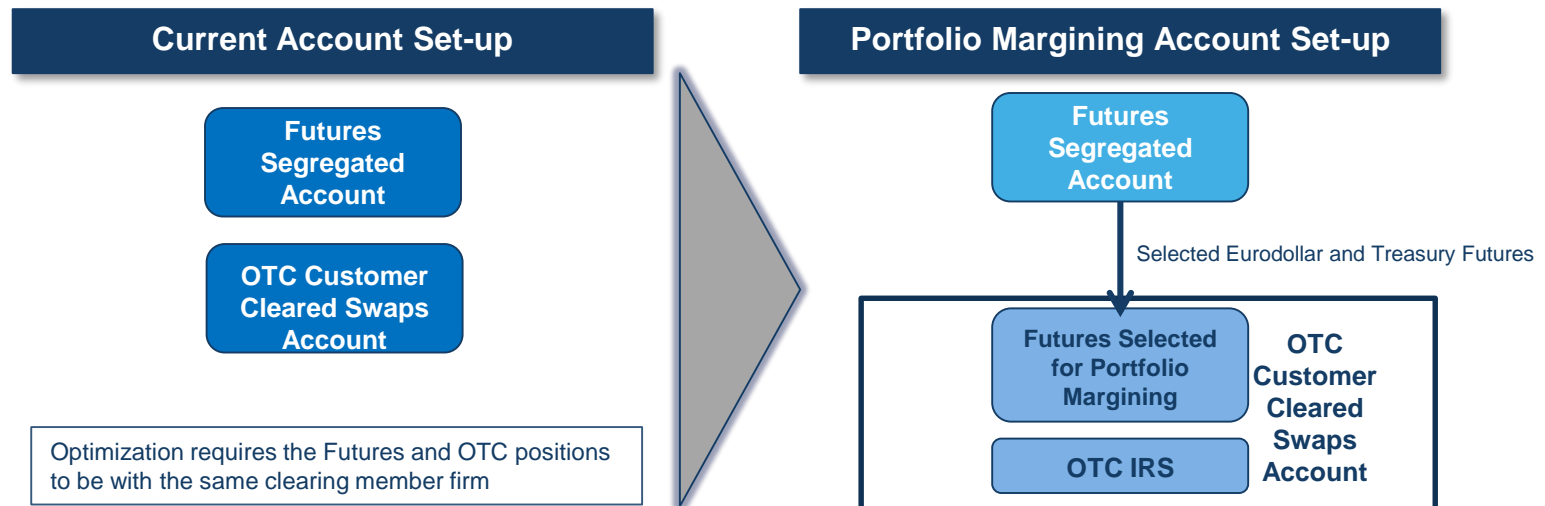
* Savings = 1 – Portfolio Margin / (Swaption Margin + Swap Margin).

** Results are calculated as of September 2015. Values do not include transaction costs and are subject to change, depending on market volatility.

Portfolio Margining – Operational Highlights

CME Margin Optimizer

- Ultimate objective of CME optimization is to minimize the portfolio risk and reduce margins for participants
- CME Margin Optimizer: specifies the ideal allocation of eligible Interest Rate Futures to move from the customers Futures seg account to their OTC cleared sequestered account
- Clearing Members can use this tool to facilitate portfolio margining for both their clients and their house accounts
- The tool automates the selection of futures to move and creates a transfer message that is produced and can be easily copied and sent to CME to make the change for the books and record at the Clearing House
- 5 inputs are required (4 by CME and 1 by the FCM that is utilizing the Optimizer)
 - CME: Delta Ladder, SPAN, Base Curve, Scaled Log Return Files
 - FCM: Futures Position File



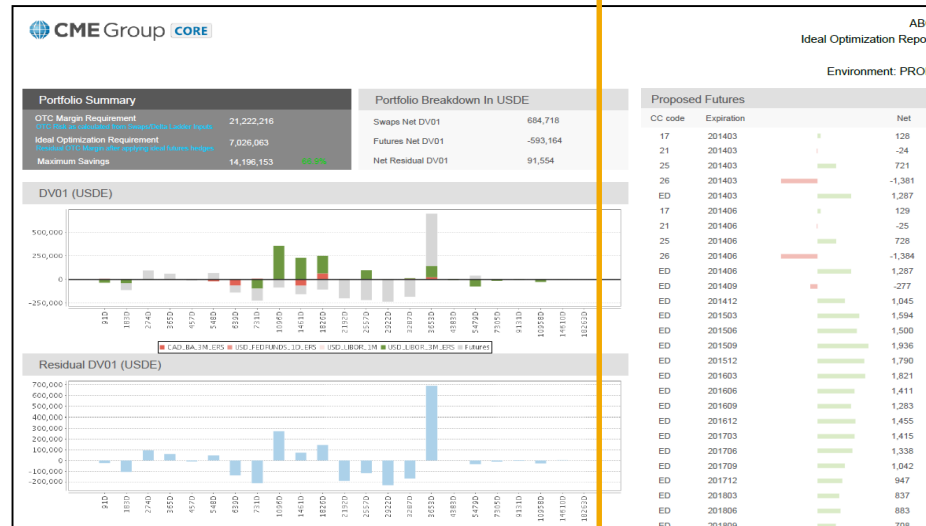
Portfolio Margining Tools

Additional Features

CME CORE

- **CME CORE: Clearing Online Risk Engine**
- Ideal business user solution for Portfolio Margin Savings analysis
- Allows firms to calculate their margin for their portfolios
 - Can upload exact portfolio via a portfolio upload or enter trades manually
- Once run, CME CORE calculates the portfolio margin savings between OTC IRS and Interest Rate Futures
- Reports breakdown position transfers in PDF and CSV file format

- **Enhanced Margin Optimization:** Optimize portfolios using IRS trades in addition to Delta Ladders and Futures
- **Ideal Optimization Analysis:** Run new reports detailing which futures best hedge your OTC risk
- **Streamline Margin Calculations:** Upload and margin any combination of IRS trades, IRS delta ladder and futures



Margin Optimization Report

CC code	Expiration	Net
17	201403	128
21	201403	-24
25	201403	721
26	201403	-1,381
ED	201403	1,287
17	201406	129
21	201406	-25
25	201406	728
26	201406	-1,384
ED	201406	1,287
ED	201409	-277
ED	201412	1,045
ED	201503	1,594
ED	201506	1,500
ED	201509	1,936
ED	201512	1,790
ED	201603	1,821
ED	201606	1,411
ED	201609	1,283
ED	201612	1,455
ED	201703	1,415
ED	201706	1,338
ED	201709	1,042
ED	201712	947
ED	201803	837
ED	201806	883
ED	201809	728

Clearing Online Risk Engine (“CORE”) Margin Tool

CME CORE Capabilities

CME PRODUCTS SUPPORTED

Futures and Options

Agriculture, Energy, Equity Index, FX, Interest Rates, Metals

Interest Rate Swaps

FX Non-Deliverable Forwards, Cash-Settled Forwards and Options

FUNCTIONALITY

Optimizer for Portfolio Margining

Interest Rate Portfolio Margining

Portfolio/Trade Editing

Portfolio/Trade History(out to 30 days)

Incremental Margin

Estimator/Delta Ladders

- Ideal business user solution for Portfolio Margin Savings Analysis
- Allows firms to calculate their margin for their portfolios by either a portfolio upload or entering trades manually
- Once run, CME CORE calculates the portfolio margin savings between OTC IRS and Interest Rate Futures
- Margin reports can be extracted in convenient PDF or CSV format
- Enhanced Analytics includes:
 - Real-Time Positions - Access to CME OTC IRS cleared positions throughout the day providing a simple way to calculate margin requirements and perform “what if” margin analysis
 - Real-Time Margin Dashboard - Actively updated margin requirements across accounts providing the ability to anticipate overnight funding costs

<http://www.cmegroup.com/education/featured-reports/cme-core-clearing-online-risk-engine.html>

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Futures trading is not suitable for all investors, and involves the risk of loss. Futures are a leveraged investment, and because only a percentage of a contract's value is required to trade, it is possible to lose more than the amount of money deposited for a futures position. Therefore, traders should only use funds that they can afford to lose without affecting their lifestyles. And only a portion of those funds should be devoted to any one trade because they cannot expect to profit on every trade. All references to options refer to options on futures.

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