

Advisory Notice

Clearing House

TO: All Firm Personnel

FROM: Clearing House Department

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SUBJECT: **NYBOT and Margining Options on Futures Calendar Spreads in SPAN®**

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Introduction

The New York Board of Trade has advised CME of its plan to introduce options on futures calendar spreads next year. In calculating performance bond requirements for these products, NYBOT plans to use a feature of SPAN® called **super-intercommodity spreading**.

Although this feature has been part of SPAN for some time, and has been supported in PC-SPAN®, this will be the first time it has been used for any listed product. In addition, an important enhancement has been made to the SPAN algorithm and to PC-SPAN, to allow the specification of different credit rates for each leg of a delta-based spread. This advisory outlines how these products will be defined in NYBOT's daily SPAN files, and how processing for them will work using super-intercommodity spreading.

Some background about margining options on combinations

There are two other methods which have been used in SPAN for margining options on combinations:

- **Delta-split-allocation:** this method works well for **an option on a strip of futures** – for example, a call option which is exercised into purchasing one future in each of a set of consecutive calendar months. With delta-split-allocation, the option is scanned like any other product, but its position delta is spread out to each of the underlying futures.
- **Split-allocation:** this method works well for **an option on a futures intercommodity spread** – for example, a call option which is exercised into purchasing a future in one commodity and selling a future in another, related commodity. With this method, the entire option position is decomposed into positions in its underlying legs.

For **options on futures calendar spreads**, however, **super-intercommodity spreads** provide more appropriate results than either delta-split-allocation or split-allocation.

Super-intercommodity spreading

In SPAN we define **groups** of spreads, with the specific spreads in each group processed sequentially according to their assigned priority number. Until now, the three groups used have been **intracommodity spreads**, **intercommodity spreads**, and **interexchange spreads**:

- **Intracommodity spreads** (also called intermonth spreads) are delta-based spreads in which all legs are contained within the same combined commodity. In SPAN, the scanning process provides perfect credits for calendar spread positions within the same combined commodity. **Intracommodity spreads** are typically used to take away some of that perfect credit (by assessing a charge) for products where the scanning process is too generous.
- **Intercommodity spreads** are evaluated after all intracommodity spreads have been processed, using only position delta left over from intracommodity spreading, and are used to provide credits for offsetting positions between related products within the same exchange or clearing organization.
- **Interexchange spreads** are evaluated after all normal intercommodity spreads have been processed, using only position delta left over after intercommodity processing. They are used to provide credits for offsetting positions on different exchanges or clearing organizations, typically in the absence of any formal cross-margining or risk-sharing agreement between those two organizations.

Super-intercommodity spreads are just like any normal intracommodity or intercommodity spread. The difference is that the spreads in this group are evaluated **first -- before** any normal intracommodity spreads are processed.

Because these spreads are evaluated first, they will use up position delta which, if not used up, could have resulted in other, more expensive spreads being formed.

How NYBOT will define these products

The product type will be **OOC**, for option on combination. The underlying product type will be **CMB**, for combination. For each product on which calendar spread options are defined, there will be a new combined commodity for the options on combinations.

For example, today there is a **CT** combined commodity, containing two products – normal **CT** futures, and **CT** options on futures. Now, in addition, there will be a **CTS** combined commodity, for the options on combinations, and their underlying futures calendar-spread combinations.

The **CTS** combined commodity will contain eight product families:

- **CT1** options on combinations, and **CT1** combinations, where there is a single expiration between the nearby and the deferred month of the futures calendar spread
- **CT2** options on combinations, and **CT2** combinations, where there are two expirations between the nearby and the deferred month of the futures calendar spread
- **CT3** options on combinations, and **CT3** combinations, where there are three expirations between the nearby and the deferred month of the futures calendar spread
- **CT4** options on combinations, and **CT4** combinations, where there are four expirations between the nearby and the deferred month of the futures calendar spread

A typical **CT1** option series might be defined as the **200412 options on the 200412C1 underlying combination**. In other words:

- These are the December 2004 options.
- The underlying combination is known as the December C1 combination.
- The underlying futures months of this combination are December 2004 and March 2005.

Exactly as with any type of options on combinations, the type X, Y and Z records will be provided in the SPAN files:

- A type X record will identify **CT1** as the code for an option on a combination, but the combination margining method code will be blank, indicating that this product is processed using neither delta-split-allocation nor split-allocation.
- A type Y record will identify that the **CT1** option on combination has as its underlying a futures calendar spread also denoted by **CT1**.
- Then for each specific **CT1** futures calendar spread combination, there will be two type Z records, one identifying the nearby month and another identifying the deferred month.

Note that the X, Y and Z records are provided for information and for running option exercise and assignment, to provide a programmatic means of identifying the two futures comprising the calendar spread. Because neither delta-split-allocation nor split-allocation is being used, these records drive no processing in SPAN.

Negative strike prices and negative underlying prices

Because these are options on futures calendar spreads, their strike prices may be positive or negative. Similarly, the settlement prices for the underlying combinations may be positive or negative.

In the expanded-format SPAN file, on the type "82" record for an option, byte 119 contains the sign of the strike price, either a plus or minus sign.

On the type "82" record for the futures calendar spread combination itself, byte 118 contains the sign for the settlement price, either a plus or minus sign.

How Intercommodity Spread Tiers Are Defined

Type S records will be provided for the normal **CT** combined commodity, and the new **CTS** combined commodity, with method code **20**, indicating that intercommodity spread tiers are defined.

Within the normal **CT** combined commodity, each futures month will be its own tier.

Similarly, within the **CTS** combined commodity, each period code provided for the combinations, will be its own tier. For example, there will be separate intercommodity spread tiers for each of period codes **200412C1, 200412C2, 200412C3, 200412C4, 200503C1, 200503C2, 200503C3, 200503C4**, etc.

How Super-Intercommodity Spreads Are Represented in the SPAN File

On the type 6 (intercommodity spread) records in the expanded-format SPAN file, byte 110 identifies the **Spread Group**, with blank meaning normal intercommodity spreads, and **S** identifying super-intercommodity spreads.

NYBOT will provide the type 6 records for the super-intercommodity spreads in the SPAN file, before all type 6 records for normal intercommodity spreads. These will be defined as using intercommodity spread method 20 -- in other words, where the legs of the spread reference specific intercommodity spread tiers.

NYBOT will also take advantage of a new ability to define credit rates separately for each leg of an intercommodity spread. A new field in byte 122 of the type 6 record, currently not used, will contain a **Y** indicating that credit rates are defined separately for each leg, with the specific leg credit rates provided in the bytes immediately following.

Other than being defined as being in the super-intercommodity spreads group and having a credit rate defined for each leg, there is nothing special about these intercommodity spreads. They are method 20, tiered intercommodity spreads for which a credit is calculated using the weighted-futures-price-risk method, **exactly analogous** to the tiered intercommodity spreads present since November 2003 in the CBOT-CME combined SPAN files.

How NYBOT will define super-intercommodity spreads

NYBOT will provide a series of three-legged super-intercommodity spreads. For example, a typical spread might have the following three legs:

- Leg 1: the special **CTS** combined commodity, for the tier representing the **200412C1** period, on the A side, at a 100% credit rate, versus
- Leg 2: the normal **CT** combined commodity, for the tier representing the **200412** period, on the B side, at a zero percent credit rate, versus
- Leg 3: the normal **CT** combined commodity, for the tier representing the **200503** period, on the A side, at a zero percent credit rate.

This spread will provide a credit for a long position in call options on the Dec-March spread, versus a short position in Dec and a long position in March.

How the SPAN portfolio performance bond calculation is affected

Scanning

The scanning process is unaffected. Both the normal **CT** combined commodity and the special **CTS** combined commodity will use normal, non-tiered scanning, and this will yield the scan risk for **CT** and the scan risk for **CTS**.

Position Delta and Delta Periods

There is nothing special in determining the array of delta periods represented for the normal **CT** combined commodity. For the special **CTS** combined commodity, the normal logic is used to look at the period codes of the combinations, and to create a delta period for each such period code. Thus, the array of delta periods will contain the following values:

- 200412C1
- 200412C2
- 200412C3
- 200412C4
- 200503C1
- 200503C2
- 200503C3
- 200503C4
- Etc.

For the options on combinations, the position delta is calculated exactly as for any normal option, and it is aggregated to the period code of the underlying combination, exactly as it would be for an option on a future. The only difference here is the special value for the period code of the underlying combination.

So for example, the delta for a position in a 200412 CT1 option on the 200412C1 combination, would aggregate to the 200412C1 delta period. Again, exactly as position delta aggregates for any normal option on combination.

Aggregation of Delta from Periods to Tiers

Once position deltas have been calculated and aggregated to the delta periods, the values for the delta periods are then aggregated to the intracommodity spread tiers and the intercommodity spread tiers. This is standard SPAN functionality, operating without modification.

Note that NYBOT will define one or more specific intracommodity spread tiers for the **CTS** combined commodity. As explained above, there will be as many specific **intercommodity** spread tiers as there are specific period codes defined for the calendar spread combinations. And of course there is always the overall ("tier zero") intracommodity spread tier, across all expirations, and the analogous overall intercommodity spread tier.

Regardless of whether the tier is intracommodity or intercommodity, and specific or generic, the starting long delta for the tier is always the sum of all period deltas within that tier which are positive, and the starting short delta for the tier is always the absolute value of the sum of all period deltas within that tier which are negative.

Determination of Weighted Price Risk for the specific and overall intercommodity spread tiers

Weighted price risk (the price risk per delta available to be offset by intercommodity spreading) is then evaluated for the specific and overall intercommodity spread tiers for the **CT** and **CTS** combined commodities. This is standard SPAN functionality, operating without modification.

Evaluation of Super-Intercommodity Spreads

Now here is the key point. Because NYBOT has defined **super intercommodity spreads**, these are evaluated **before** any intracommodity spreads are processed.

The actual evaluation process is identical to that for any tiered intercommodity spreads. For each such spread, you determine whether remaining delta for the particular intercommodity spread tiers referenced in the spread definition, is sufficient to form any spreads, and if so, how many such spreads. If any spreads can be formed, then for each leg:

- You determine the amount of delta which has been consumed by the spread for this leg.
- You multiply the delta consumed by the spread, times the weighted price risk for that leg, times the credit rate for that leg, yielding the particular credit realized by this spread for this leg.
- You remove delta consumed by the spread, from the delta period comprising this leg, from the specific intercommodity spread tier comprising this leg, from the overall intercommodity spread tier for this, and from the intracommodity spread tier containing this leg.

This is standard SPAN functionality, operating exactly as for any tiered intercommodity spread, with the single exception of the new ability to have a different credit rate for each leg of the spread.

Intracommodity spread processing

After all super-intercommodity spreads have been evaluated, you perform normal intracommodity spread processing, for each combined commodity, without modification.

Normal intercommodity and interexchange spread processing

Similarly, intercommodity spreading and interexchange spreading is then performed, without modification. NYBOT will probably provide non-tiered intercommodity spreads between the **CT** combined commodity and other related combined commodities.

Finalization of the SPAN performance bond requirement

The total intercommodity spread credit for the **CTS** combined commodity, will be the sum of all intercommodity spread credits calculated from super-intercommodity spreading, normal intercommodity spreading, and interexchange spreading. And similarly for the **CT** combined commodity. The SPAN performance bond requirement for the two combined commodities is then calculated without modification.

The bottom line: how it will work

All of the options on cotton calendar spread combinations will be scanned together. Thus, the scanning process will take into account, and provide credits for, offsetting positions within these option positions.

The super-intercommodity spreads between **CTS** and **CT** will provide credits appropriately recognizing the very low risk of a position where an option on a calendar spread is offset against an opposing position in that calendar spread.

These super-intercommodity spreads will also consume delta that might otherwise have resulted in the formation of intracommodity spreads within **CTS** or within **CT**, and thus preclude a calendar spread charge from being assessed.

Any delta not so consumed will be available for the formation of normal intracommodity spreads, with the associated charges assessed, and for risk offsets through normal intercommodity spreads.

The bottom line: impacts to SPAN implementations

The key impact to firm bookkeeping systems is the ability to process the super-intercommodity spreads themselves – the group of intercommodity spreads that are evaluated **before** any intracommodity spreads and before regular intercommodity spreads.

Fundamentally, all delta-based spreads in SPAN work the same way, regardless of what spread group they are in (super-intercommodity, intracommodity, normal intercommodity, interexchange): evaluate how many spreads can be formed, determine for each leg how much delta has been consumed, remove the delta consumed from the delta periods and the tiers. The key point is always to keep the delta numbers for the periods and the tiers in sync, regardless of whether the spread leg is referencing a delta period, a specific intracommodity or intercommodity spread tier, or the generic (overall) intracommodity spread tier or intercommodity spread tier.

A secondary impact is the ability to support different credit rates for the different legs of an intercommodity spread.

Firms should also make sure their bookkeeping systems can process the underlying contract period codes with the **C** in the seventh byte – for example, **200412C2**. Remember that contract period codes are simply alphanumeric strings. In CME's XML-based SPAN files, for example, we do something similar with weekly currency options, providing period codes in the form **200412W1**, **200412W2**, etc., meaning the first week of December, the second week of December, etc.

Last but not least, because these are options on combinations, their strike price may be either positive or negative, and firms should ensure that their systems can handle negative strike prices. Similarly, the settlement prices for the underlying combinations may be either positive or negative.

Sample SPAN and portfolio files

The following sample files are available on the Internet at <ftp.cme.com/pub/span/data/nyb/test/super>:

- **nyb_20040823_ofs_testing.pa2** – a sample expanded-format SPAN file illustrating super-intercommodity spreads for options on futures calendar spreads, and
- **NYBOT – Example1.pos** through **NYBOT – Example4.pos** – sample XML-format PC-SPAN position data files, illustrating the calculations for the four portfolios defined below

PC-SPAN version 4.05

PC-SPAN version 4.05 is now available to registered users, through your normal logon at the PC-SPAN software distribution website at www.cme-ch.com/pcspan. New copies may be purchased at www.digibuy.com.

The only new features are the ability to define different credit rates for different legs of an intercommodity spread, and a new report listing super-intercommodity spreads which have been defined.

Examples

Example 1: Simple short at-the-money call

1 Short -.75 Call CT1 200410

This portfolio is margined like any other outright option position.

The SPAN Risk for this portfolio is (does not include Available Net Option Value that would be subtracted from the SPAN Risk to come up with Total Requirement):

CTS	Scan Risk	\$242
	Intracommodity Spread Charge	\$0
	Spot Charge	\$0
	Intercommodity Spread Credit	\$0
	<i>Super-Inter Spread Credit</i>	\$0
	<u>SOM Charge</u>	<u>\$25</u>
	SPAN Risk:	\$242

Short Option Value for this portfolio is \$135 which is added to the SPAN Risk of \$242 to come up with **\$377 Total Requirement**

Example 2: Simple short at-the-money put

1 Short -.75 Put CT1 200410

This portfolio is margined like any other outright option position.

The SPAN Risk for this portfolio is:

CTS	Scan Risk	\$253
	Intracommodity Spread Charge	\$0
	Spot Charge	\$0
	Intercommodity Spread Credit	\$0
	<i>Super-Inter Spread Credit</i>	\$0
	<u>SOM Charge</u>	<u>\$25</u>
	SPAN Risk:	\$253

Short Option Value for this portfolio is \$170 which is added to the SPAN Risk of \$253 to come up with **\$423 Total Requirement**

Example 3: Synthetic futures spread offset by futures spread

1 Short -.75 Call CT1 200410
1 Long -.75 Put CT1 200410
1 Long CT 200410
1 Short CT 200412

This is an almost risk-less portfolio. The synthetic futures spread position in the CT1 commodity offsets with positions in the outright futures contracts. Tier deltas for inter tiers and weighted futures price risks will be calculated as follows:

<u>CC</u>	<u>Tier</u>	<u>Tier Delta</u>	<u>Weighted Futures Price Risk</u>
CTS	T1	-1	\$300
CT	T1	1	\$1,200
CT	T2	-1	\$1,200

The following Super Inter-Commodity spread is applied:

<u>CC</u>	<u>Tier</u>	<u>Side</u>	<u>Ratio</u>	<u>Credit</u>
CTS	T1	A	1	100%
CT	T1	B	1	0%
CT	T2	A	1	0%

Full credit will be given to the CTS leg of \$300 while consuming Inter and Intra delta on each leg. **This will eliminate the INTRA spread charge in CT. This is the most significant point in the utilization of Super Inter-Commodity spreads.** The resulting SPAN Risk will be equal the Short Option Minimum defined for CTS. This example shows a perfect offsetting position between CT1 and CT.

The SPAN Risk for this portfolio is:

<u>CC</u>	<u>Requirement</u>	<u>Amount</u>
CTS	Scan Risk	\$0
	Intracommodity Spread Charge	\$0
	Spot Charge	\$0
	Intercommodity Spread Credit	\$0
	<i>Super-Inter Spread Credit</i>	\$0
	SOM Charge	\$0
	SPAN Risk:	\$0
CT	Scan Risk	\$300
	Intracommodity Spread Charge	\$0
	Spot Charge	\$0
	Intercommodity Spread Credit	\$0
	<i>Super-Inter Spread Credit</i>	(\$300)
	SOM Charge	\$25
	SPAN Risk:	\$25

Available Net Option Value for this portfolio is \$0 which is subtracted from the SPAN Risk of \$25 to come up with **\$25 Total Requirement**

Example 4: Synthetic butterfly spread offset by futures butterfly spread

1 Short -.75 Call CT1 200410
1 Long -.75 Put CT1 200410
1 Long -1.75 Call CT1 200412
1 Short -1.75 Put CT1 200412
1 Long CT 200410
2 Short CT 200412
1 Long CT 200503

This is an almost risk-less portfolio. The synthetic butterfly spread position in the CT1 commodity offsets with the futures butterfly spread position in the outright futures contracts. Tier deltas for inter tiers and weighted futures price risks will be calculated as follows:

<u>CC</u>	<u>Tier</u>	<u>Tier Delta</u>	<u>Weighted Futures Price Risk</u>
CTS	T1	-1	\$300
CTS	T3	1	\$300
CT	T1	1	\$1,200
CT	T2	-2	\$1,200
CT	T3	1	\$1,200

The following Super Inter-Commodity spreads are applied:

<u>CC</u>	<u>Tier</u>	<u>Side</u>	<u>Ratio</u>	<u>Credit</u>
CTS	T1	A	1	100%
CT	T1	B	1	0%
CT	T2	A	1	0%
CTS	T3	A	1	100%
CT	T2	B	1	0%
CT	T3	A	1	0%

The first spread will provide a spread credit of \$300 leaving the remaining inter tier deltas as:

<u>CC</u>	<u>Tier</u>	<u>Remaining Tier Delta</u>	<u>Weighted Futures Price Risk (Super-Scanning)</u>
CTS	T1	0	\$300
CTS	T3	1	\$300
CT	T1	0	\$1,200
CT	T2	-1	\$1,200
CT	T3	1	\$1,200

The second spread will provide a spread credit of \$300 leaving the remaining inter tier deltas as:

<u>CC</u>	<u>Tier</u>	<u>Remaining Tier Delta</u>	<u>Weighted Futures Price Risk (Super-Scanning)</u>
CTS	T1	0	\$300
CTS	T3	0	\$300
CT	T1	0	\$1,200
CT	T2	0	\$1,200
CT	T3	0	\$1,200

Once again the Intra tier deltas are consumed in CT eliminating the CT Intracommodity Spread Charge.

The SPAN Risk for this portfolio is:

CC	Requirement	Amount
CTS	Scan Risk	\$0
	Intracommodity Spread Charge	\$0
	Spot Charge	\$0
	Intercommodity Spread Credit	\$0
	<i>Super-Inter Spread Credit</i>	\$0
	SOM Charge	\$0
	SPAN Risk:	\$0
CTS	Scan Risk	\$600
	Intracommodity Spread Charge	\$0
	Spot Charge	\$0
	Intercommodity Spread Credit	\$0
	<i>Super-Inter Spread Credit</i>	(\$600)
	SOM Charge	\$50
	SPAN Risk:	\$50

Available Net Option Value for this portfolio is \$0 which is subtracted from the SPAN Risk of \$50 to come up with **\$50 Total Requirement**

For more information

For further information about super-intercommodity spreading in SPAN and PC-SPAN, please contact CME's Dmitry Glinberg, 312-648-8680, dglinberg@cme.com.

For further information about NYBOT's options on futures calendar spreads and specific plans for their margining, please contact New York Clearing Corp's Fred Oltarsh, 212-478-4122, foltarsh@nybot.com.

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