

DATE: November 30, 2017

TO: Clearing Firm Staff

FROM: CME Clearing

ADVISORY #: 17-461

**SUBJECT: Price Precision Extension, and Reduction to Minimum Tick for
Certain Treasury Contracts**

In the fourth quarter of 2018, CME Clearing will begin supporting an increase to the maximum precision of trade and/or settlement prices for futures and options. Currently, prices are supported with a maximum precision of seven decimal places. With this enhancement, prices will be supported to a maximum precision of nine decimal places. In addition to CME's clearing applications, the corresponding enhancements will be applied in CME Globex, in streamlined SBE market data, on CME Clearport, and on CME's STP API.

The first contracts affected will be CBOT Two-Year Note Treasury futures, where prices are quoted in 32nds and fractions thereof. Pending regulatory approval, in the fourth quarter of 2018, the minimum price increment for the 2 Year Treasury Note futures, future spreads and inter-commodity spreads will be reduced from **1/4th of 1/32nd (0.0078125)** to **1/8th of 1/32nd (0.00390625)**. With this change, fully decimalized prices will require eight decimal places of precision.

Although no changes are planned at this time to the tick rule for the options on the Two-Year Note futures, generically CME's systems will support prices for futures quoted in 32nds and fractions thereof, out to **one-sixteenth of a 32nd**. For options, CME's systems will support prices quoted in 64ths and fractions thereof, out to **one-eighth of a 64th**. CME may introduce such products in the fourth quarter of 2018. For these, fully decimalized prices will require nine decimal places of precision.

Please note that clearing firm bookkeeping systems may have special processing associated with Treasury future and option prices. Also, heretofore, no more than seven decimal places have been required to express the maximum precision of any CME Group futures or options price.

In FIXML

CME Clearing uses FIXML, the XML vocabulary for the international FIX standard, for trade and position-related messages and files such as trade confirmation messages, giveup messages, the trade register file, and price and contract data.

Trade and settlement prices in FIXML are expressed in pure decimal, and, like any XML vocabulary, have no maximum limit on the number of decimal places.

Hence, there are no changes *per se* to all of the trade-related FIXML messages, to the FIXML-format Trade Register file which firms use for balancing and reconciliation, to the FIXML-format Settlement Price files, and to the FIXML-format Product Reference files (which provide product referential data including tick rules.)

With these changes, prices will at first require up to 8 decimal places of precision, and then up to 9 places.

In positional-format settlement price files and SPAN files

CME Clearing also publishes settlement price files and SPAN files in a positional format, with prices in these files expressed in a seven-digit format (often referred to as the “TCC” format or the “legacy” format). For example, for the settlement price file for CBOT contracts, the filename would typically be **cbt.settle.s.txt**.

For Treasury futures, prices in TCC-format are in “fractional decimal” format, where (a) there are three implied decimal places, (b) the first two decimal places represent the whole number of 32nds, and (c) the third decimal place represents the truncated decimal representation of the fraction of a 32nd.

For example, let’s take a price of 109 and 13 and one-quarter 32nd’s. In TCC “fractional decimal” format, this is represented as 0109132, where 109 is the integer portion of the price, 13 (the first two of the final three digits) is the whole number of 32nd’s, and the final digit 2 is the truncated decimal representation of 0.25, the fraction of a 32nd.

Currently, for Treasury futures, that final digit of a TCC-format price may be 0, 2 (for 0.25 of a 32nd), 5 (for half of a 32nd), or 7 (for 0.75 of a 32nd.) For options on Treasury futures, currently, the final digit may be either 0 or 5 (for half of a 64th.)

In the first phase of this project, where the tick value is being halved, and in order to minimize the need for changes to existing systems which read TCC-format prices, the increased precision will be handled simply by introducing additional allowable values in that final digit of the price.

For example, currently, here are examples of possible values for prices for Two-Year Note futures:

<u>Price description</u>	<u>TCC format</u>	<u>FIXML format</u>
109 and 13 32nd's	0109130	109.4062500
109 and 13 and one-quarter 32nd's	0109132	109.4140625
109 and 13 and one-half 32nd's	0109135	109.4218750
109 and 13 and three-quarter 32nd's	0109137	109.4296875

And with the first phase of this project, where the tick is being halved, here are the revised examples:

<u>Price description</u>	<u>TCC format</u>	<u>FIXML format</u>
109 and 13 32nd's	0109130	109.40625000
109 and 13 and one-eighth 32nd's	0109131	109.41015625
109 and 13 and two-eighth 32nd's	0109132	109.41406250
109 and 13 and three-eighth 32nd's	0109133	109.41796875
109 and 13 and four-eighth 32nd's	0109135	109.42187500
109 and 13 and five-eighth 32nd's	0109136	109.42578125
109 and 13 and six-eighth 32nd's	0109137	109.42968750
109 and 13 and seven-eighth 32nd's	0109138	109.43359375

In other words, in that final digit of the TCC format for a Treasury future, we currently support 0, 2, 5 or 7, meaning 0.00, 0.25, 0.50, or 0.75 of a 32nd. With the change, we will also support 1, 3, 6 or 8, meaning 0.125, 0.375, 0.625 or 0.875 of a 32nd.

Similarly, here are examples of current possible values for prices for options on Two-Year Note futures:

<u>Price description</u>	<u>TCC format</u>	<u>FIXML format</u>
5 and 57 64th's	0005570	5.890625000
5 and 57 and one-half 64 th	0005575	5.898437500

And in the first phase of this project, where the tick is being halved, here are examples of possible values for such option prices:

<u>Price description</u>	<u>TCC format</u>	<u>FIXML format</u>
5 and 57 64th's	0005570	5.890625000
5 and 57 and one-quarter 64 th	0005572	5.894531250
5 and 57 and one-half 64 th	0005575	5.898437500
5 and 57 and three-quarter 64 th	0005577	5.902343750

If your code is reading TCC-format prices for Treasury futures, the primary task is to make sure you can read, and correctly value, prices with 1, 3, 6 or 8 in that final trailing digit. Analogously for TCC-format prices for options on Treasury futures, the task is to make sure you can read and correctly value prices with 2 or 7 in that final trailing digit.

In the first phase, the “alignment code” provided on the type “P” record in the SPAN file for each of the Treasury futures contracts will not change from its current value of “C”. The business meaning of this value is precisely as described above: the first four digits represent the integer portion of the price, the fifth and sixth are the whole number of 32nd's, and the seventh is the truncated decimal representation of the fraction of a 32nd.

Analogously, the alignment code for the Treasury options will not change from its current value of “K”, meaning that the first four digits represent the integer portion of the price, the fifth and sixth the whole number of 64th's, and the seventh is the truncated decimal representation of the fraction of a 64th.

In the second phase of the project, where contracts are introduced with price precision out to one-sixteenth of a 32nd, we will switch to a pure decimal representation of the price in the positional-format SPAN files and settlement price files, in a manner exactly identical to the representation of prices in FIXML-format data. Therefore, in the “PA2”-format SPAN file:

- Prices will be provided in the “high-precision” price field on the type “81” record, in the 14 bytes from position 109 through position 122.
- The “high-precision settlement price flag” field in position 123 of the type “81” record will contain the value **Y**, meaning that the price can **only** be read from the high-precision price field.

- The settlement price decimal locator in the three bytes from positions 34 through 36 of the type “P” record will contain **009**, meaning that there are nine implied decimal places in that high-precision price field.

Detailed record layouts for the positional-format SPAN files can be found at:

<https://www.cmegroup.com/confluence/display/pubspan/Risk+Parameter+File+Layouts+for+the+Positional+Formats>

On the positional-format settlement price file, in an exactly analogous manner, the High-Precision Settlement Price Flag in position 127 of the type “9” record will contain “Y”, meaning that the settlement price can be read only from the High-Precision Settlement Price field in positions 113-126, and that the high price and low price must be read from the analogous high-precision fields in positions 128-141 and 142-155, respectively. The detailed layout for the positional-format Settlement Price file is at:

http://www.cmegroup.com/clearing/files/s_setlmtpricelayout.pdf

XML-format SPAN files

Prices for Treasury contracts in the so-called “customer-level” XML-format SPAN files are formatted exactly as in the positional-format files, except that they have a decimal point. For example, a price of 109.138 would mean 109 and 13 32nd's and 0.875 (seven eighth's of a 32nd.)

Prices for the Treasury contracts in the “clearing-level” XML-format SPAN files are in pure decimal.

Additional documentation

The CME Globex Notice for these changes is at:

<http://www.cmegroup.com/notices/electronic-trading/2017/11/20171127.html>

See the section “New - Price Precision Extension – 2018”

The CME Globex Client Impact Document (CLIMP) for these changes is at:

<https://www.cmegroup.com/confluence/display/EPICSANDBOX/Price+Precision+Extension>

The CME Clearport Notice is at:

<http://www.cmegroup.com/notices/clearport/2017/11/20171130gui.html>

The CME Clearport API Notice is at:

<http://www.cmegroup.com/notices/clearport/2017/11/201711320api.html>

The CME STP API Notice is at:

<http://www.cmegroup.com/notices/stp/2017/11/20171130.html>

Sample files and testing opportunities

Sample data, including trade messages, trade register files, product reference files, and settlement price files and SPAN files, in both XML and positional format, illustrating the greater degree of precision, will be available at:

<ftp://ftp.cmegroup.com/pub/span/data/cme/test/twoyear>

We will publish updates to this advisory as sample datafiles are made available and the needed systems enhancements to CME Clearing's applications become available in the "New Release" testing environment.

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