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The Treasury Futures Delivery Process, 8th Edition

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Treasury futures are contracts for future sale and purchase of U.S. Treasury bonds or notes. Anyone holding a position in an expiring Treasury futures contract during its delivery month must be prepared to fulfill the contractual obligation either to deliver or to take delivery of contract grade Treasury securities.

This note offers a practical introduction to the Treasury futures delivery mechanism.[1]

Why physical delivery matters

Physical delivery is at once pivotal and rare. Pivotal, because the prospect of it forges a fast link between futures prices and cash market prices of contract grade notes and bonds. Rare, because the Treasury futures complex is neither intended nor organized to serve as a primary marketplace for transfer of ownership of Treasury securities.

Hedgers – those who use Treasury futures chiefly to shed interest rate risk exposure, not to acquire it – are seldom interested in using futures as a means of transacting Treasury securities. For this reason, hedgers typically liquidate their outstanding futures positions before the contracts enter their delivery cycle.

Most such liquidations are rolled. That is, trades to liquidate exposures in expiring contracts are combined with trades to initiate corresponding new positions in contracts for the next (deferred) delivery month. For example, a market participant holding a long position in expiring futures for June delivery and wanting to maintain the futures exposure instead of taking the position to delivery, can roll by selling their June contract holdings while simultaneously establishing a new long position in futures for September delivery, equivalent in scale to the liquidated June futures position. Rolling is so prevalent that only a small share of Treasury futures held by market participants go to physical delivery, historically around 2.8 percent. (See **Exhibit 1** on page 2 and **Physical delivery in historical overview** on page 23.)

1 *All rules and procedures for Treasury futures contracts, including those for making or taking delivery, are established by the Board of Trade of the City of Chicago, Inc. ("CBOT" or "exchange"), one of four designated contract markets owned and operated by CME Group Inc., subject to regulation by the U.S. Commodity Futures Trading Commission ("CFTC").*

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Exhibit 1: Treasury futures delivery activity, Dec 1990 – Dec 2022

The historical analysis of delivery months for all but two contracts is from Dec 1990 through Dec 2022, inclusive. For Long-Term Bond (UB) futures, median values for delivery months are from Mar 2010 through Dec 2022, inclusive. For Ultra 10-Year futures, median values for delivery months are from Mar 2016 through Dec 2022, inclusive.

FUTURES PRODUCT (CME GLOBEX/CLEARPORT PRODUCT CODE)	PHYSICAL DELIVERIES AS PERCENT OF MATURE OPEN INTEREST
ULTRA U.S. TREASURY BOND FUTURES (UB/UBE)	1.5
U.S. TREASURY BOND FUTURES (ZB/17)	1.9
20-YEAR U.S. TREASURY BOND FUTURES (TWE/TWE)	
ULTRA 10-YEAR U.S. TREASURY NOTE FUTURES (TN/TN)	1.4
10-YEAR T-NOTE FUTURES (ZN/21)	2.8
5-YEAR T-NOTE FUTURES (ZF/25)	3.4
3-YEAR T-NOTE FUTURES (Z3N/3YR)	
2-YEAR T-NOTE FUTURES (ZT/26)	6.3
TOTAL	**2.8**

Note: The measure of activity shown is physical deliveries in proportion to mature open interest. For a futures contract for a given delivery month, "physical deliveries" is the number of contracts that go to delivery, and "mature open interest" is the median daily level of open interest during the 42 exchange business days ("business days") ending on and including the contract's First Position Day, i.e., the second business day before the first business day of the contract delivery month. (In effect, "mature open interest" is the representative level of open interest in the contract during the two months preceding its delivery month.) For UB futures, the data set comprises 52 delivery months, and for TN, the data set comprises of 28 delivery months. For each other futures product shown, the corresponding data set comprises 129 delivery months. Data for 3-Year Treasury Note futures and 20-Year Treasury Note futures, introduced in July 2020 and March 2022, respectively, are included in calculation of the Total, but the product-specific result is not shown. It is based on a relatively small sample, reflecting the behavior of a comparatively very new product, and is therefore unrepresentative.

What is deliverable?

The terms and conditions of each Treasury futures contract specify its deliverable grade, the securities that a short position holder is permitted to deliver at contract expiration for sale to a long position holder. All such deliverable grade securities are fixed-principal notes or bonds issued by the U.S. Department of the Treasury, paying fixed semi-annual coupon interest.[2]

Any Treasury security may be tendered for delivery in fulfillment of an expiring contract, provided that it meets the contract's criteria for delivery suitability. Typically, several securities are eligible. From one contract delivery month to the next, their number may vary, depending on the frequency and pattern of issuance by the U.S. Treasury. Criteria for delivery eligibility are summarized in **Exhibit 2** on page 3 and in **Appendix: Treasury futures contract specifications** on pages 26-27.[3]

2 *Because delivery eligibility is limited to fixed-principal notes or bonds, contract deliverable grades exclude Treasury inflation protected securities. Similarly, because delivery-eligible notes or bonds must pay fixed coupon interest, contract deliverable grades exclude Treasury floating rate notes. All securities eligible for delivery are obligations of the U.S. Treasury Department, backed by its full faith and credit. The same guarantee does not apply to Treasury futures contracts, which are not obligations of the U.S. Treasury Department.*

3 *Please note that the rounding conventions used for determining remaining term to maturity differ between contracts. From the 10-Year T-Note Future rulebook: "For the purpose of determining a U.S. Treasury note's eligibility for contract grade, its remaining term to maturity shall be calculated from the first day of the contract's named month of expiration, and shall be rounded down to the nearest three-month increment (e.g., 6 years 10 months 17 days shall be taken to be 6 years 9 months). New issues of U.S. Treasury notes that satisfy the standards in this Rule shall be added to the contract grade as they are issued." For any Treasury futures product, the definitive statement of contract terms and conditions is found in the corresponding chapter of the CBOT Rulebook, available at: http://www.cmegroup.com/rulebook/CBOT/.*

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Exhibit 2: Deliverable grades for Treasury note and bond futures

FUTURES PRODUCT	CONTRACT SIZE ($ FACE VALUE)	DELIVERABLE GRADE	CBOT RULEBOOK CHAPTER
ULTRA U.S. TREASURY BOND FUTURES (UB/UBE)	100,000	Treasury bonds. Remaining term to maturity: at least 25 years.	40
U.S. TREASURY BOND FUTURES (ZB/17)	100,000	Treasury bonds. Remaining term to maturity: at least 15 years and less than 25 years.	18
20-YEAR U.S. TREASURY BOND (TWE/TWE)	100,000	Treasury bonds. Remaining term to maturity: at least 19 years 2 months and not more than 19 years 11 months	25
ULTRA 10-YEAR U.S. TREASURY NOTE (TN/TN)	100,000	Treasury notes. Remaining term to maturity: at least 9 years 5 months and not more than 10 years.	26
10-YEAR T-NOTE FUTURES (ZN/21)	100,000	Treasury notes. Remaining term to maturity of at least 6 years, but less than eight years	19
5-YEAR T-NOTE FUTURES (ZF/25)	100,000	Treasury notes. Original term to maturity: not more than 5 years 3 months. Remaining term to maturity: at least 4 years 2 months.	20
3-YEAR T-NOTE FUTURES (Z3N/3YR)	200,000	Treasury notes. Original term to maturity: not more than 7 years. Remaining term to maturity: not less than 2 years 9 months and not more than 3 years.	39
2-YEAR T-NOTE FUTURES (ZT/26)	200,000	Treasury notes. Original term to maturity: not more than 5 years 3 months. Remaining term to maturity: at least 1 year 9 months and not more than 2 years.	21

The role of the clearing firm

The exchange clearing house, CME Clearing, is solely responsible for processing Treasury futures contract deliveries.[4] The physical delivery process takes three exchange business days ("business days") to accomplish, ensuring adequate time for the participants, the futures seller making delivery, the futures buyer taking delivery, their respective CME Clearing member firms, and CME Clearing itself to make necessary notifications and arrangements.

Adherence to this three-day timetable is critical. Unlike settlement practices in the cash government securities market, *the Treasury futures delivery process does not support any failure-to-deliver capability*. Any failure to meet delivery obligations in complete accord with contract terms and all other applicable exchange rules and procedures can result in significant economic and regulatory penalties, both to the failing party and to the failing party's clearing firm.[5]

CME Clearing member firms play a central role in the process because *deliveries are facilitated by and occur between clearing firms acting as agents for those who hold accounts with them. Contract deliveries do not occur directly between account holders themselves.*

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4 *CME Group Inc. ("CME Group") is the parent company of Chicago Mercantile Exchange Inc. ("CME Inc."). CME Inc. operates a registered Derivatives Clearing Organization ("DCO"). CME Clearing (or "the Clearing House"), a division of CME Inc., is one of the world's leading central counterparty clearing services. CME Clearing provides clearing and settlement services for exchange-traded and cleared swaps derivatives. CME Clearing applies robust risk management standards and applicable Commodity Futures Trading Commission ("CFTC") customer protection standards for all products it clears.*

5 *See Rule 714 for Failure to Deliver and Rule 715 for Failure to Accept Delivery or Remit Full Payments, CBOT Rulebook Chapter 7, available at: http://www.cmegroup.com/rulebook/CBOT/I/7/7.pdf.*

Each clearing firm is responsible to the exchange and to CME Clearing for guaranteeing the performance of its account holders in meeting the obligations of delivery in at least three ways:

(1) Prior to the last day of trading in an expiring Treasury futures contract, each clearing firm must ensure that each account on its books who holds an open position in the contract is capable of physical delivery. Absent satisfactory assurance from an account owner, the clearing firm is responsible for orderly liquidation of the account owner's open position prior to termination of trading in the contract.[6]

(2) The short clearing firm, i.e., the clearing firm making delivery on a short position, is responsible for (a) ascertaining that the account holders who are the ultimate owners of the short position have furnished deliverable grade Treasury securities on time and in sufficient quantity to meet contract requirements and (b) distributing to those account holders the monies it receives in payment for the securities it delivers.

(3) The long clearing firm, i.e., the clearing firm taking delivery on a long futures position, is responsible for (a) assigning Treasury securities it receives in delivery to the account holders who are the ultimate owners of the long contract position[7] and (b) collecting from those account holders the monies required to pay the invoice amounts for the securities delivered.

If an account holder fails to fulfill their obligations in a Treasury futures contract delivery, the account holder's clearing firm is itself financially responsible to CME Clearing. Never in the modern history of the exchange has a clearing firm failed to meet these responsibilities. A well-run clearing firm typically takes extra precaution to ensure their fulfillment. For example, although no regulation nor exchange rule requires it, and although the timetable for physical delivery does not strictly necessitate it (see **The timetable for delivery** on page 6), many clearing firms require that any account holder planning to make delivery on a short futures position must have the requisite quantity of deliverable grade securities in hand (i.e., "in the box") prior to declaring intent to deliver.

6 *See Rule 716 for Duties of Clearing Members, op cit.*

7 *Discussed more fully in **How the clearing member firm finishes the job**, on pages 18, is how the clearing firm meets its responsibility to allocate delivered Treasury securities among its account holders eligible to take delivery.*

The CME Clearing guarantee

If a clearing member firm fails to guarantee the performance of an account that has defaulted on a delivery, then CME Clearing becomes the guarantor of goodness of delivery.[8]

Where a long clearing firm whom CME Clearing has assigned to take delivery fails to do so, or fails to make timely payment in delivery, the short clearing firm tendering such delivery should immediately notify CME Clearing, which shall debit the account of the long clearing member by an amount sufficient to complete the delivery.[9]

Limits upon the guarantee[10]

If a clearing member fails to fulfill its delivery obligations in respect of a Treasury futures contract, the sole obligation of CME Clearing "is to pay reasonable damages proximately caused by such delivery obligation failure…"

CME Clearing's payments for "reasonable damages" expressly exclude all the following:

- Payment for any damages greater than the difference between the delivery price of the specified Treasury security and the reasonable market price of such security at the time that delivery would have been contractually required.
- Making or taking delivery of the actual Treasury security.
- Payment for any damages relating to the accuracy, genuineness, completeness, or acceptability of certificates, instruments, or other similar documents.
- Payment for any damages relating to the failure or insolvency of banks, depositories, warehouses, or similar organizations or entities that may be involved with a delivery.

Related responsibilities on the part of clearing firms

The CME Clearing guarantee entails requirements for clearing firms to make timely notification and timely remedy:

- ***Notification*** – CME Clearing has no obligation or liability to any clearing member (or any other person) relating to a failure to fulfill a Treasury futures delivery obligation, unless the non-defaulting clearing member notifies CME Clearing of such failure as soon as possible, but in no event later than 60 minutes after the time the delivery obligation was to have been fulfilled.
- ***Remedy*** – Any contract delivery obligation that one clearing member fails to fulfill to another clearing member shall be deemed an obligation of the defaulting clearing member to CME Clearing. Any such obligation must be fulfilled to CME Clearing within 60 minutes of the time it was required to be fulfilled to the non-defaulting clearing member.

8 *The authoritative statement of CME Clearing's guarantee, as it applies to Treasury futures, is set forth in Chapter 7 of the CBOT Rulebook.*

9 *See Rule 715 for Failure to Accept Delivery or Remit Full Payment, op cit.*

10 *See Rule 714 for Failure to Deliver, op cit.*

The timetable for delivery

The process of delivery on an expiring futures contract arises from the interaction of two distinct but complementary functions: (a) the clearing firm's declaration of long positions and (b) the clearing firm's declaration of intent to deliver on short positions and its subsequent fulfillment of delivery.

Declaration of long positions[11]

Before the delivery process can begin, each clearing firm must declare to CME Clearing its long positions in the expiring contract. This occurs initially on ***First Position Day***, two business days before the first business day of the expiring contract's delivery month. On each day thereafter until the end of the contract delivery month, no later than 8:00 p.m. Central time, each clearing firm is required to report to CME Clearing all open long positions in the expiring contract. Each position aggregates its component long holdings according to the origin of the account owners (where "origin" denotes either customer accounts or the clearing firm's own house accounts) and according to the vintage date of the account owner's long holdings (i.e., the date on which the long holdings in it were initially acquired).

Example: A clearing firm carries accounts who have entered long positions in December 2022 Treasury "Ultra" 10-Year Treasury Note (TN) futures on two dates –

Fri, October 7, 2022	8 customer accounts	2 house accounts
Fri, October 21, 2022	5 customer accounts	1 house account

On Tuesday, November 29, 2022, the First Position Day for December 2022 contract deliveries, the clearing firm must report to CME Clearing two position statistics for the 7 October vintage date: "customer", the total number of TN contracts bought on that date and still held by eight customer accounts; and "house", the total number of TN contracts bought on that date and still held in two of the clearing firm's house accounts. The clearing firm also reports two position statistics for the October 21 vintage date: "customer", the total number of TN contracts bought on that date and still held by five customer accounts; and "house", the number of contracts bought on October 21 and still held in one of the clearing firm's house accounts.

The delivery timetable – declaration of intention to deliver, and delivery on short positions

Each Treasury futures contract delivery is accomplished through a three-day process in which (1) CME Clearing receives notification from a short clearing firm of a short position holder's intention to make delivery, and then matches the short clearing firm to a long clearing firm who becomes obligated to accept delivery, (2) the two clearing firms exchange information as to the Treasury securities that will be delivered by the short clearing firm and the invoice amounts that will be paid by the long clearing firm, and (3) the delivery is fulfilled.

Much of what makes the process financially interesting, especially for cash-futures arbitrage, concerns when and with what the short position holder opts to fulfill delivery.

Timing of delivery

The account owner carrying a short position in an expiring futures contract holds the right to decide when to deliver, provided the account owner makes delivery during the interval between the first delivery day and the last delivery day defined by the contract terms.

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11 *See Rule 807 for Open Long Positions During Delivery Month, available at: https://www.cmegroup.com/content/dam/cmegroup/rulebook/CBOT/I/8.pdf.*

Quality of delivery

The short holder of an expiring futures contract also owns the right to choose which Treasury issue they will deliver. Provided that the issue meets contractual standards for delivery eligibility, the long clearing firm assigned to take delivery must accept the seller's selection, as delivered by the seller's clearing firm.

At any given moment prior to futures contract expiration, some deliverable grade issues will be more economical than others for a short holder to acquire to deliver. Market participants thus tend to track the price movements and the availability of the ***cheapest to deliver*** ("CTD") issue – the contract grade issue that is least expensive to purchase for making delivery – as well as the price movements and availability of other delivery-eligible issues that appear likely to come into play as close alternatives to the CTD issue.

For a given Treasury futures contract, CTD status may pass from one delivery-eligible Treasury security to another, especially in volatile market conditions. Irrespective of how quickly or slowly CTD status migrates among the contract's deliverable issues, at any given moment the contract price tends to reflect (a) the prevailing prices of the deliverable grade issue(s) that market participants expect will play a material role in the delivery process, (b) the cost of financing ownership of any such issue(s) until the expected futures delivery date, and (c) the levels of volatility in (a) and (b).

Which deliverable grade issue is CTD (or second cheapest to deliver, or third CTD, and so on) depends entirely upon market forces. Although exchange rules define the Treasury securities that are eligible for delivery, at no point does the exchange name which issue is most economical, or "cheapest," or "best" to deliver.

The following paragraphs discuss each of the three steps. Exhibit 3 summarizes the process.

Intention Day

On the first day of the process, ***Intention Day***, the owner of a short position in an expiring contract instructs their clearing firm that they intend to make delivery. The clearing firm must inform CME Clearing no later than 6:00 p.m. CT.

For Ultra U.S. Treasury Bond (UB/UBE) futures, U.S. Treasury Bond (ZB/17) futures, 20-Year U.S. Treasury Bond (TWE/TWE) futures, 10-Year T-Note (ZN/21) futures, or Ultra 10-Year U.S. Treasury Note (TN/TN) futures, a short clearing firm can declare intent to deliver at any time from the second business day prior to the delivery month (***First Intention Day***) through, and including, the second business day before the last business day of the delivery month (***Last Intention Day***).

For 5-Year T-Note (ZF/25) futures, 3-Year T-Note (Z3N/3YR) futures, and 2-Year T-Note (ZT/26) futures, First Intention Day is the second business day prior to the first business day of the delivery month. Last Intention Day is the first business day of the next following calendar month. (See **Similarities and differences among contract critical dates** on page 10.)

For all Treasury futures, First Intention Day for short clearing firms coincides with First Position Day for long clearing firms.

CME Clearing then matches a long clearing firm (or firms) to the short clearing firm that has declared intention to deliver. (How this works is discussed in ***Matching longs to take delivery from shorts***, on page 11.) By 10:00 p.m. CT, both the short clearing firm and the long clearing firm(s) are notified, via electronically delivered assignment notice reports, of the parties to whom they've been matched. The same information is published around 10:00 p.m. CT in the Exchange's Issues and Stops Report on www.cmegroup.com.

Invoice Day

On the second day, known as Notice of Intention Day, or simply ***Invoice Day*** – the short clearing firm prepares an invoice for the long clearing firm(s) to whom it has been matched to make delivery, detailing the features of the Treasury securities that will be delivered, including CUSIP numbers, coupon rates, maturity dates, and the invoice amounts as determined on the basis of the appropriate futures contract price. (See ***Invoicing for Treasury futures deliveries*** on page 20.) Short clearing member firms must confirm all invoice details to CME Clearing by 2:00 p.m. CT (or by 3:00 p.m. CT on ***Last Notice Day***, the business day following Last Intention Day). At 4:00 p.m., CME Clearing runs all invoices and provides them to the long clearing firm(s) matched to take delivery from the short clearing firm making delivery.

By 4:00 p.m. CT, the long clearing firm must provide the short clearing firm with delivery instructions (e.g., name, address, and Fed wire and contact details) for the bank to which the Treasury securities will be delivered.

In fulfilling any single Treasury futures contract the short clearing firm must deliver $100,000 face value (or $200,000 face value in the case of ZT futures or Z3N futures) of one and only one Treasury issue.

Fractional delivery is not permitted. For example, the short position holder making delivery on an expiring ZB futures contract cannot deliver a mixed portfolio of Treasury bonds comprising $40,000 face value of one CUSIP and $60,000 face value of another CUSIP.

However, a short clearing firm making delivery on multiple lots of an expiring contract may deliver different securities into different contract lots, provided that all such securities are deliverable grade. For example, a short delivering on 20 expiring ZF futures may use $1.8 million face value of one Treasury note to fulfill 18 contracts and $200,000 face value of another Treasury note to deliver into the remaining two contracts.

Delivery Day

By 10:00 am CT on ***Delivery Day***, the third and final day of the process, the short clearing firm must have the Treasury securities that it named for delivery on the previous Notice Day in its bank account. The securities are then delivered to the long clearing firm's bank account, upon which the long clearing firm remits the correct invoice amount to the short clearing firm. The process must be completed by 1:00 p.m. CT.

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Exhibit 3: The delivery timetable for Treasury futures

All times refer to CT.

	SHORT CLEARING FIRM	CME CLEARING	LONG CLEARING FIRM
FIRST POSITION DAY/INTENTION DAY	By 6:00 p.m., two business days prior to the first delivery day allowed for delivery on an expiring futures contract (i.e., first business day of delivery month), the short clearing firm notifies CME Clearing that it intends to make delivery on a treasury contract.		By 8:00 p.m., two business days prior to the first delivery day allowed for delivery on an expiring futures contract (i.e., first business day of delivery month), clearing firms must begin reporting to CME Clearing all open long positions, grouped by account origin (customer or house) and position vintage date.
DAY 1: INTENTION DAY	By 6:00 p.m., the short clearing firm notifies CME Clearing that it intends to make delivery on an expiring contract. Once CME Clearing has matched the short clearing firm to long clearing firm(s) for delivery, this declaration cannot be reversed.	At 8:00 p.m., CME Clearing matches the delivering short clearing firm to the clearing firm(s) with long positions having the oldest vintage date(s), and then informs the short (long) party that the opposite party will take (make) delivery. After assignment, clearing firms are provided assignment notification reports to buyers and sellers notifying them of their delivery assignment	By 8:00 p.m., clearing firms report to CME Clearing all open long positions in the expiring futures contract, grouped by account origin (customer or house) and position vintage date.
DAY 2: INVOICE DAY	By 2:00 p.m. (3:00 p.m. on Last Notice Day), using calculations based on the expiring contract's Intention Day settlement price, the short clearing firm must confirm invoice details with CME Clearing.	At 4:00 p.m., CME Clearing runs invoices and provides them to long clearing firm(s) matched to take delivery from the short clearing firm making delivery.	By 4:00 p.m., the long clearing firm assigned to take delivery provides the name and location of its bank to the short clearing firm making delivery.
DAY 3: DELIVERY DAY	Short and long clearing firms have until 9:30 a.m. to resolve invoice differences. By 10:00 a.m., the short clearing firm deposits Treasury securities for delivery into its bank account, and it instructs its bank to transfer the securities, via Fed wire, to the long clearing firm's account no later than 1:00 p.m.		By 7:30 a.m., the long clearing firm makes funds available, and notifies its bank to remit the funds upon accepting Treasury securities. By 1:00 p.m., the long clearing firm's bank has accepted the Treasury securities and has remitted the invoice amount via Fed wire to the short clearing firm's bank account.

Operational details are subject to change, insofar as CME Clearing periodically reviews the physical delivery process and, when necessary, modifies it to enhance its efficiency. For current information, please consult CBOT Rules.

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Similarities and differences among contract critical dates

For all Treasury futures:

First Intention Day, also known as First Position Day, is the second business day before the first business day of the expiring contract's delivery month. First Notice Day is the next business day thereafter. First Delivery Day is the first business day of the contract delivery month.

For Ultra U.S. Treasury Bond futures (UB/UBE), U.S. Treasury Bond futures (ZB/17), 20-Year U.S. Treasury Bond futures (TWE/TWE), Ultra 10-Year U.S. Treasury Note futures (TN/TN), and 10-Year T-Note futures (ZN/21):

- Centralized, competitive trading and block trading terminate at 12:01 p.m. CT on the seventh business day before the last business day of the delivery month.
- EFRP trading is permitted for position liquidation only until noon CT on the fifth business day before the last business day of the delivery month.
- Last Intention Day is the second business day before the last business day of the delivery month, Last Notice Day is the next-to-last business day, and Last Delivery Day is the last business day.

For 5-Year T-Note futures (ZF/25), 3-Year T-Note futures (Z3N/3YR), and 2-Year T-Note futures (ZT/26):

- Centralized, competitive trading and block trading terminate at 12:01 p.m. CT on the last business day of the expiring contract's named delivery month.
- EFRP trading is allowed for position liquidation only until noon CT on the first business day of the next following calendar month.
- Last Intention Day is the first business day of the next following calendar month. Last Notice Day and Last Delivery Day are the ensuing second and third business days, respectively.[12]

Exhibit 4 illustrates these distinctions with contract critical dates for June 2022 delivery. For interpretation, it is useful to recall that Monday, May 30, 2022, was Memorial Day, and that Monday, July 4, 2022, was Independence Day, both U.S. government securities market (and exchange) holidays.

Exhibit 4: Contract critical dates for Treasury futures for delivery in June 2022

CONTRACT CRITICAL DATE	UB, ZB, TN, AND ZN	ZF, Z3N, AND ZT
FIRST INTENTION/POSITION	Fri, May 27	Fri, May 27
FIRST NOTICE/INVOICE	Tue, May 31	Tue, May 31
FIRST DELIVERY	Wed, June 1	Wed, June 1
LAST TRADING DAY (CME GLOBEX, BLOCK TRADES)	Tue, June 21	Thu, June 30
LAST TRADING DAY (EFRPS)	Thu, June 23	Fri, July 1
LAST INTENTION	Tue, June 28	Fri, July 1
LAST NOTICE/INVOICE	Wed, June 29	Tue, July 5
LAST DELIVERY	Thu, June 30	Wed, July 6

12 *Why the difference in delivery timetables? Each month, the U.S. Treasury sells a new 5-Year Note and a new 2-Year Note. Each such newly-issued note is dated as of the last day of its auction month. If the last day of the auction month is a U.S. government securities market business day, then the note is also issued on its "dated" date. If not, the note is issued on the first U.S. government securities market business day of the following month. (The "dated" date and the "issue" date are specified in the U.S. Treasury Department's announcement of the sale of any new note or bond.) To permit delivery eligibility for notes that are auctioned during an expiring Treasury futures contract's delivery month, and that are dated as of the last day of the contract's delivery month, the interval for making delivery extends to include the first three business days of the calendar month following the contract's named delivery month.*

Matching longs to take delivery from shorts

At the end of each Intention Day during a Treasury futures contract delivery month, CME Clearing matches long positions to short positions that have been declared for delivery. Before delving into details of the match process, it is useful to define "position."

> *From CME Clearing's standpoint*, a short position is defined by a unique combination of two identifiers: the clearing member firm that carries the position, and the position's origin (either the clearing firm's house account or its customer accounts). A long position is defined by a unique combination of three identifiers: clearing firm, origin, and position vintage (the date on which the position was established or, equivalently, the length of time the position has been held).
>
> *From the clearing firm's standpoint*, the short position on any given Intention Day is either the sum across all of the firm's customer accounts or the sum across the firm's house accounts of futures contracts held short for which position holders have declared intent to deliver. A long position is the sum, for each vintage date and origin category, of all outstanding long positions in the expiring contract that are held by the clearing firm's accounts.

Overview

CME Clearing matches longs to accept delivery from short intentioners (the clearing firms carrying short positions that have declared intent to deliver) without regard to which Treasury issue or issues will be delivered. The short position owner on whose behalf a clearing firm has declared intent to deliver is not obliged to identify which Treasury issue or issues they will tender for delivery until Notice Day, the day after long clearing firms have been matched to take delivery from short intentioners.

Matching proceeds in three stages. The first is to determine the pool of long positions to be matched with short intentioners. To assemble the eligible long position pool, CME Clearing begins with the long position(s) having the oldest vintage date. If necessary, it supplements these with some or all of the long position(s) having the next oldest vintage date. It repeats this step until it has established a pool of long positions that exactly matches the number of contracts declared for delivery by short intentioners.

In the second stage, long positions get matched to short positions declared for delivery based on size. Two clearing member firms will be matched automatically if the aggregate of short positions declared for delivery at one equals the aggregate of long positions eligible to take delivery at the other.

In the third stage, matching is on the basis of random selection. CME Clearing begins by randomly choosing a short position, then randomly selecting long positions in sufficient number to match the number of contracts in the short position. It repeats this until all short intentioners are matched with long positions.

The following hypothetical example illustrates:

Stage 1: Determination of the eligible long position pool

On a given Intention Day during a Treasury futures contract's delivery month, five clearing firms – F, G, J, K, and M – declare intent to deliver on short positions totaling 3,150 contracts (Exhibit 6).

Exhibit 6: Clearing firms declaring intent to deliver on short positions

CLEARING FIRM AND ACCOUNT ORIGIN	NUMBER OF CONTRACTS DECLARED FOR DELIVERY
F – HOUSE	900
G – CUSTOMER	100
J – CUSTOMER	1,000
K – CUSTOMER	150
M – CUSTOMER	1,000
TOTAL	**3,150**

CME Clearing must assemble a pool of long positions, totaling 3,150 contracts, to take delivery from these short intentioners. Recall that by 8:00 p.m. CT all clearing firms have reported to CME Clearing their outstanding long positions, aggregated by account origin and vintage. Suppose that on this particular Intention Day, the long positions associated with the oldest three vintage dates are as shown in Exhibit 7. (Date 1 represents the oldest vintage, Date 2 the second oldest, and so on.)

Exhibit 7: Long positions reported by clearing firms, sorted by vintage date

VINTAGE DATE AND TOTAL POSITIONS (CONTRACTS)		CLEARING FIRM AND ACCOUNT ORIGIN	POSITION SIZE (CONTRACTS)
DATE 1	1,150	H – Customer	150
		J – Customer	50
		J – House	950
DATE 2	150	L – Customer	150
DATE 3	9,000	G – House	1,000
		M – Customer	5,000
		M – House	3,000

To build the eligible long position pool, CME Clearing begins with long positions entered on the oldest vintage date, Date 1. There are three, totaling 1,150 contracts, not enough to match all short positions declared for delivery. CME Clearing moves on to the second oldest vintage date, Date 2, for which there is only one long position for 150 contracts. Adding this to the Date 1 positions brings the eligible long position pool to four pieces, totaling 1,300 contracts, still insufficient.

CME Clearing proceeds to long positions entered on Date 3, for which there are three, totaling 9,000 contracts. Faced with more contracts than the 1,850 it needs to top up the eligible long position pool, CME Clearing resolves the difference by extracting a prorated share of contracts from each of the Date 3 positions, as illustrated in Exhibit 8. Any prorated amount involving a fractional number of contracts gets rounded down to the nearest integer number of contracts. As shown in the right-hand column, proration and rounding achieves allocation of 1,849 contracts, one contract short of the required 1,850.

Exhibit 8: Prorating long positions for assignment to the eligible long position pool

CLEARING FIRM AND ACCOUNT ORIGIN	POSITION SIZE (CONTRACTS)	SHARE OF DATE 3 TOTAL (PERCENT)	PRORATED SHARES OF 1,850 CONTRACTS REQUIRED TO COMPLETE ELIGIBLE LONG POSITION POOL	PRORATED SHARES OF 1,850 CONTRACTS ROUNDED DOWN TO NEAREST INTEGER NUMBER OF CONTRACTS
G – HOUSE	1,000	11	0.11 x 1,850 = 203.5	203
M – HOUSE	3,000	33	0.33 x 1,850 = 610.5	610
M – CUSTOMER	5,000	56	0.56 x 1,850 = 1,036	1,036
TOTAL	**9,000**	**100**	**1,850**	**1,849**

For the one futures contract left out by rounding, CME Clearing makes assignment by randomly choosing one of the pieces involved in the proration process – the house account at firm G, or the house account at firm M, or customer accounts at firm M – with each candidate having one chance in three of being drawn. Assume the winner of the draw is the piece representing the house account at firm M; as the recipient of the left-over contract, its assignment becomes 611 contracts instead of 610.[13] Thus, from the three long pieces in the 9,000-contract total, CME Clearing has identified what fraction of each will enter the 1,850-contract portion of the total that moves on to delivery.[14]

The eligible long position pool, now complete, is shown in Exhibit 9. It contains seven pieces totaling 3,150 contracts, precisely enough to match the 3,150 contracts in the five short positions declared for delivery.[15]

CME Clearing is now equipped to match the five short intentioners (Exhibit 6) with the seven pieces in the eligible long position pool (Exhibit 9). The process proceeds in two stages.

13 *The object of the random draw is not the entire rounding remnant, but each contract in the rounding remnant. If, for instance, the proration and rounding process had resulted in a rounding remnant of three contracts instead of one, then the random draw described above would have been repeated three times, once for each contract.*

14 *To be clear, CME Clearing has established nothing more than fractional portions. For each of the three long pieces, the relevant clearing member firm is responsible to determine precisely which individual account holdings within the long position will have a place in the corresponding fraction, i.e., which account holdings will go on to participate in the eligible long position pool in delivery, and which will be relegated to the unused portion.* ***How the clearing member firm finishes the job*** *on page 18 discusses this responsibility and its importance.*

15 *The fate of the unused portions of the three positions involved in the proration process is explained in* ***What happens to the long position stack?*** *on page 17.*

Exhibit 9: The eligible long position pool, ordered by vintage date

CLEARING FIRM, ACCOUNT ORIGIN, AND VINTAGE	ELIGIBLE PIECE (CONTRACTS)
H – CUSTOMER – DATE 1	150
J – CUSTOMER – DATE 1	50
J – HOUSE – DATE 1	950
L – CUSTOMER – DATE 2	150
G – HOUSE – DATE 3	203
M – CUSTOMER – DATE 3	611
M – HOUSE – DATE 3	1,036
TOTAL	**3,150**

Stage 2: Assignment of longs to shorts by size matching

Initially, pairs of clearing member firms are matched directly in any instance where the total number of short contracts declared for delivery at one equals the total number of long contracts eligible to take delivery at the other. On each side, long and short, the clearing firm's total encompasses contracts held in both house accounts and customer accounts. Likewise, where a clearing firm carries long positions with different vintage dates, its total long position is aggregated across vintage dates (Exhibit 10).

Exhibit 10: Size matching of clearing member firms

CLEARING FIRM	TOTAL CONTRACTS DECLARED TO MAKE DELIVERY	TOTAL CONTRACTS ELIGIBLE FOR ASSIGNMENT TO TAKE DELIVERY
F	900	
G	100	203
H		150
J	1,000	1,000
K	150	
L		150
M	1,000	1,647
TOTAL	**3,150**	**3,150**

Accordingly, the 1,000 short contracts declared for delivery at firm J are matched to the 1,000 contracts held long at firm J. The 150 contracts declared for delivery at firm K might be assigned to either firm H or firm L, each of which carries a total of 150 contracts eligible to take delivery. CME Clearing breaks the tie by directing the match to the clearing member firm carrying the long position with the oldest vintage date, in this case firm H.[16]

At completion of Stage 2, 2,000 contracts remain to be matched for delivery. Exhibit 11 summarizes the remaining unmatched short intentioners and Exhibit 12 displays the remaining unmatched pieces of the eligible long position pool.

16 Recall from Exhibit 7 that the relevant vintage dates are Date 1 for firm H and the later Date 2 for firm L.

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Exhibit 11: Unmatched short intentioners at completion of size matching

CLEARING FIRM AND ACCOUNT ORIGIN	NUMBER OF CONTRACTS DECLARED FOR DELIVERY
F – CUSTOMER	900
G – CUSTOMER	100
M – CUSTOMER	1,000
TOTAL	**2,000**

Exhibit 12: The eligible long position pool at completion of size matching

CLEARING FIRM, ACCOUNT ORIGIN, AND VINTAGE	ELIGIBLE PIECE (CONTRACTS)
L – CUSTOMER – DATE 2	150
G – HOUSE – DATE 3	203
M – CUSTOMER – DATE 3	611
M – HOUSE – DATE 3	1,036
TOTAL	**2,000**

Stage 3: Assignment of longs to shorts by random matching

CME Clearing matches remaining short intentioners to remaining pieces of the eligible long position pool by random selection. To begin, one of the short intentioners is drawn. Suppose this is firm G, which intends to deliver on 100 contracts held in customer accounts.

CME Clearing then randomly draws one piece from the eligible long position pool. Suppose this is the 1,036-contract house position at firm M. One hundred of the contracts in this piece are matched to take delivery on firm G's short position, and the remainder of the piece is returned to the eligible long position pool. Exhibit 13 summarizes the eligible long position pool at the end of the first round of random matching.

Exhibit 13: The eligible long position pool at the end of the first round of random matching

CLEARING FIRM, ACCOUNT ORIGIN, AND VINTAGE	ELIGIBLE PIECE (CONTRACTS)
L – CUSTOMER – DATE 2	150
G – HOUSE – DATE 3	203
M – CUSTOMER – DATE 3	611
M – HOUSE – DATE 3	936
TOTAL	**1,900**

CME Clearing then randomly selects a second short intentioner. Suppose it is firm F, which intends to deliver on 900 contracts held in its house account.

CME Clearing randomly draws a piece from the eligible long position pool. Suppose this is the 203-contract house position at firm G. To cover firm F's short position will require 697 more contracts, so CME Clearing makes another random draw from the eligible long position pool. Suppose this is the 936-contract house position at firm M. From this piece 697 contracts are assigned to take delivery from firm F, and the remaining 239 contracts are returned to the eligible long position pool. Exhibit 14 summarizes its status at completion of the second round of random matching.

Exhibit 14: The eligible long position pool at the end of the second round of random matching

CLEARING FIRM, ACCOUNT ORIGIN, AND VINTAGE	ELIGIBLE PIECE (CONTRACTS)
L – CUSTOMER – DATE 2	150
M – CUSTOMER – DATE 3	611
M – HOUSE – DATE 3	239
TOTAL	**1,000**

The remaining unmatched short intentioner is firm M, which has declared it will deliver on 1,000 contracts for customer accounts. By design, the three pieces remaining in the eligible long position pool total exactly 1,000 contracts. These are automatically matched to take delivery from firm M.

The process is now complete. Exhibit 15 summarizes the outcome from the vantage of the short intentioners making delivery. Exhibit 16 summarizes from the vantage of the long clearing members assigned to take delivery.

Exhibit 15: To which longs will each short deliver?

SHORT	POSITION	DELIVERS ON THIS MANY CONTRACTS...	TO...
F – HOUSE	900	203	G – House
		697	M – House
G – CUSTOMER	100	100	M – House
J – CUSTOMER	1,000	50	J – Customer
		950	J – House
K – CUSTOMER	150	150	H – Customer
M – CUSTOMER	1,000	150	L – Customer
		611	M – Customer
		239	M – House

Exhibit 16: From which shorts will each long take delivery?

LONG	POSITION	TAKES DELIVERY ON THIS MANY CONTRACTS...	FROM...
G – HOUSE – DATE 3	203	203	F – House
H – CUSTOMER – DATE 1	150	150	K – Customer
J – CUSTOMER – DATE 1	50	1000	J – Customer
J – HOUSE – DATE 1	950		
L – CUSTOMER – DATE 2	150	150	M – Customer
M – CUSTOMER – DATE 3	611	611	M – Customer
M – HOUSE – DATE 3	1,036	697	F – House
		100	G – Customer
		239	M – Customer

What happens to the long position stack?

Recall that, in order to construct the eligible long position pool, CME Clearing had to extract prorated portions (totaling 1,850 contracts) from long positions with Date 3 vintage (totaling 9,000 contracts). The remainders of each of those long positions (totaling 7,150 contracts) are returned to the top of the long position stack (the roster of long positions, ordered by vintage date, that clearing firms have reported to CME Clearing). See Exhibit 17.

If the ultimate owners of these positions – the house accounts at firm G and firm M, and the customer accounts at firm M – make no net changes to their contract holdings over the coming trading session, then the positions shown in Exhibit 17 will be what firm G and firm M report to CME Clearing at the end of the following business day as their long positions for Vintage Date 3.

Exhibit 17: The long position stack after the eligible long position pool has been drawn

VINTAGE DATE AND TOTAL POSITIONS (CONTRACTS)		CLEARING FIRM AND ACCOUNT ORIGIN	POSITION SIZE (CONTRACTS)
Date 3	7,150	G – House	797
		M – House	2,389
		M – Customer	3,964
Date 4		.....	.....
Date 5		.....	.....
Date 6		.....	.....

In at least two ways, these positions might naturally decrease over the course of the following business day. First, if it is on or before the expiring futures contract's last trading day, then the account owners might reduce their long positions by selling. Second, for a contract in which centralized competitive trading and block trading have terminated, an account owner can still reduce their long position by entering into an Exchange for Related Position ("EFRP") transaction in which they tender futures in exchange for suitable securities or over-the-counter derivative

contracts. For expiring UB, ZB, TN, or ZN futures, this route to position exit remains open until noon on the second business day following the last day of trading. For ZF, Z3N, or ZT futures, it is open until noon on the business day following the last day of trading.[17]

By definition, however, these long positions cannot increase. Any new purchase by a house account or customer account owner would be identified as a newly established long position with a brand new vintage date (namely the following business day).

What happens on Last Intention Day?

In matching long clearing firms to take delivery from short clearing firms, CME Clearing follows the procedure described above in all instances, including on Last Intention Day. The only difference is that all short contracts outstanding at close of business on Last Intention Day are required to go to delivery. Automatically, all become short intentioners. Moreover, since short open interest always equals long open interest, all remaining open long positions automatically enter the eligible long position pool.

How the clearing member firm finishes the job

As noted earlier,[18] the parties to deliveries on Treasury futures are clearing member firms, not the ultimate owners of futures positions. *The clearing firm – not CME Clearing – bears responsibility for allocating the Treasury securities tendered either by it or to it in a delivery. Any user of Treasury futures, and especially anyone who anticipates making or taking delivery on expiring contracts, should ensure that they understand the procedures by which their clearing firm determines such allocations among accounts holding long contract positions in delivery.*

To see why and how this matters, consider a clearing firm making delivery on one or more short positions. If these have been matched by CME Clearing to deliver to a single long position at another clearing firm, then no consequential allocation decision is required on the part of either clearing firm.

> *Example:* In Exhibit 15, firm K delivers on 150 contracts held short in one or more of its customer accounts. CME Clearing has assigned this delivery to a 150-contract long position held in the house account at firm H. Irrespective of what the individual customers among firm K's short intentioners tender for delivery – whether all tender the same Treasury issue, or they tender a variety of CUSIPs – all will be delivered to firm H for assignment to the 150-contract long position held in its house account. No allocation decision is required.

Now consider a clearing firm making delivery on a short position that's been matched to deliver to multiple long positions. If all owners of the accounts comprised in the short position happen to have tendered the same Treasury issue for delivery, then it makes no material difference how the short clearing firm allocates these among the long clearing firms to which it has been matched.

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17 *EFRP transactions both encompass, and are commonly referred to as, Exchange for Physical (EFP) trades. See Rule 538 for Exchange for Related Positions, Chapter 5, CBOT Rulebook, available at http://www.cmegroup.com/rulebook/CBOT/I/5/5.pdf or CME Group Market Regulation Advisory Notice Exchange for Related Positions, which is available at http://www.cmegroup.com/rulebook/files/cme-group-Rule-538.pdf.*

18 *See **The role of the clearing firm** on page 3.*

If instead the clearing firm's short account owners have tendered multiple Treasury issues for delivery to multiple long positions, then the clearing firm is responsible to allocate these various securities among the clearing firms assigned to take delivery on the short position. Unavoidably, the outcomes of this allocation – whether to other clearing firms, or to long positions held in other of the delivering clearing firm's accounts, or both – will reflect differences among the securities in their comparative cheapness to deliver. In Exhibit 15, for example:

- Firm J is delivering on 1,000 contracts held short in its customer accounts. 950 contracts are assigned to the long position in firm J's own house account, and the remaining 50 are assigned to a long position held in other of the customer accounts carried by firm J.
- The short house position at firm F is matched for delivery to long positions in house accounts at two other clearing firms, G and M.
- Firm M is delivering on 1,000 contracts held short in its customer accounts. CME Clearing has matched it to deliver to a variety of long positions held in its own house account, in other of its customer accounts, and in customer accounts carried by firm L.

Effectively the same responsibility is borne by any clearing member firm assigned by CME Clearing to take delivery on long positions. If the firm receives multiple Treasury issues in fulfillment of delivery to a long customer position that contains multiple account holders, then the firm must allocate the securities among these accounts. As above, the outcomes of the allocation will directly reflect differences among those securities. The futures delivery invoice amount payable by any individual long account holder may be financially more or less advantageous than the invoice amounts payable by others, depending on whether the security that the long clearing firm allocates to the account holder is CTD, or second CTD, or third CTD, and so on.

Potentially more dramatic is where the long clearing firm is matched by CME Clearing to take delivery on a prorated fraction of a long customer position containing multiple accounts. Depending on the circumstances and on the clearing firm's operational practices, this may result in all such long account holders taking delivery on some but not all – pro-rated shares, perhaps – of their contract holdings. Or it may result in some long account holders taking delivery on all of their delivery-eligible contracts, while other account holders receive nothing (and thus retain their entire open long positions in the futures contract).

> *Example:* In Exhibit 8, the long customer position held at firm M, totaling 5,000 contracts, is eligible for inclusion in the long position pool. Given the process by which CME Clearing builds the long position pool, delivery intentions for the day will be matched to only 1,036 of those contracts. Firm M is responsible to determine how these 1,036 deliveries will be allocated among the individual customer accounts within the 5,000-contract long position.

Clearing member firms might generally be expected to demonstrate fairness and equitability in discharging this responsibility.[19] To the extent that "just and equitable principles of trade" (in the words of the National Futures Association Rules) are open to reasonable interpretation, however, *the operational arrangements and procedures for allocating Treasury futures delivery assignments are apt to vary from one CME Clearing member firm to another. For any Treasury futures user, a wise investment of effort is to ensure they understand the procedures in place at their clearing firm.*

19 *For example, a firm who is a National Futures Association ("NFA") member might conduct its Treasury futures delivery allocation processes so as to comport with NFA Rule 2-4 ("Just and Equitable Principles of Trade"), which adjures NFA members and associates to "observe high standards of commercial honor and just and equitable principles of trade in the conduct of their commodity futures business and swaps business." See:* https://www.nfa.futures.org/rulebook/rules.aspx?Section=4.

Invoicing for Treasury futures deliveries

On Notice Day, CME Clearing informs the long clearing firm(s) assigned to take delivery of the details of the Treasury issues (CUSIP numbers, coupon rates, maturity dates) that the short intentioner(s) will deliver and the invoice amounts that the short clearing firm(s) must receive in payment. For each contract going to delivery, the invoice amount is the sum of two components:

invoice amount = converted futures price + accrued interest

Converted futures price

The converted futures price is the critical juncture at which the expiring futures contract price formally enters the delivery process. The converted futures price plays the same role in a Treasury futures delivery as the "clean" price plays in a cash market transaction in Treasury securities. For all Treasury futures contracts, the converted futures price is the product of three elements:[20]

converted futures price =

contract scale factor x futures settlement price x conversion factor

Contract scale factor

The contract scale factor accounts for differences in contract notional size among Treasury futures. For UB, ZB, TWE, TN, ZN, or ZF futures, it is $1,000 per contract price point (making notional size of $100,000 per contract). For Z3N or ZT futures, it is $2,000 per contract price point (making notional size of $200,000 per contract).

Futures settlement price

The futures settlement price is always expressed in price points and fractions of price points, with par equal to 100 points. If the owner of a short position in an expiring contract declares intent to deliver at any time prior to the contract's last trading day, then the invoice calculation is based on the contract's daily settlement price for the Intention Day on which they declare. If the short position holder declares intent to deliver *at any time on or after the contract's last trading day*, then the invoice calculation is based on the contract's final settlement price.[21]

Conversion factor

Regardless of when the short chooses to deliver, multiple Treasury issues will be available to them to fulfill contract. To make deliverable grade Treasury securities roughly comparable to one another, the futures settlement price that determines the invoice amount is adjusted to account for the characteristics of the Treasury issue tendered for delivery. This adjustment is accomplished through a system of delivery invoice conversion factors. The conversion factor for any given deliverable grade issue represents the price at which $1 face value, if transacted and settled during the futures contract delivery month, would yield 6% per annum.[22]

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20 Normal rounding conventions apply to the converted futures price: The amount on the left-hand side of the equation gets rounded to the nearest penny or rounded up to the nearest penny in the case of a computed amount ending in a half-cent ($0.005).

*21 Useful to recall in this connection is that the last day of trading for ZF, Z3N, and ZT futures differs from the last day of trading in other Treasury Note and Bond futures. (See **Similarities and differences among contract critical dates** on page 10).*

22 Conversion factors are determined and published by the Exchange and are available from most quote vendors. To obtain conversion factors, or to learn how they are computed, please visit http://www.cmegroup.com/trading/interest-rates/treasury-conversion-factors.html.

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Accrued interest

The short clearing firm making delivery also invoices the long clearing firm taking delivery for any coupon interest that has accrued but has not been paid as of the delivery date. Accrual of Treasury coupon interest is computed on the basis of the actual number of days in the semi-annual interval between the last coupon payment preceding delivery and the coupon payment next following delivery, as set forth in Exhibit 18.[23]

Exhibit 18: Day counts for Treasury Notes and Bonds

	BEGINNING AND ENDING DAYS ARE THE 1ST OR THE 15TH OF MONTHS LISTED UNDER INTEREST PERIOD (NUMBER OF DAYS).		BEGINNING AND ENDING DAYS ARE THE LAST DAYS OF MONTHS LISTED UNDER INTEREST PERIOD (NUMBER OF DAYS).	
INTEREST PERIOD	**REGULAR YEAR**	**LEAP YEAR**	**REGULAR YEAR**	**LEAP YEAR**
JANUARY TO JULY	181	182	181	182
FEBRUARY TO AUGUST	181	182	184	184
MARCH TO SEPTEMBER	184	184	183	183
APRIL TO OCTOBER	183	183	184	184
MAY TO NOVEMBER	184	184	183	183
JUNE TO DECEMBER	183	183	184	184
JULY TO JANUARY	184	184	184	184
AUGUST TO FEBRUARY	184	184	181	182
SEPTEMBER TO MARCH	181	182	182	183
OCTOBER TO APRIL	182	183	181	182
NOVEMBER TO MAY	181	182	182	183
DECEMBER TO JUNE	182	183	181	182
ONE YEAR (ANY TWO CONSECUTIVE HALF YEARS)	365	366	365	366

Source: 31 CFR Part 356, Department of the Treasury Circular, Public Debt Series No 1-93

23 *Conventions for calculation of daily accrual of coupon interest on Treasury bonds and notes are defined in the Code of Federal Regulations. See 31 CFR Part 306 – "General Regulations Governing U.S. Securities, Subpart E – Interest" and 31 CFR Part 356 – "Sale and Issue of Marketable Book-Entry Treasury Bills, Notes and Bonds, Appendix B." The latter of these is available as Department of the Treasury Circular, Public Debt Series No 1-93.*

For each futures contract lot going to delivery, the accrued interest amount is computed in four steps. The first is to determine the semiannual coupon amount per $1,000 of face value of the note or bond being delivered:

semiannual coupon amount = (coupon rate x $1,000) / 2

Using this result and Exhibit 18, find the daily rate of interest accrual:

daily interest per $1,000 face value =
semiannual coupon amount /
days in half-year from last coupon payment to next coupon payment

Then calculate the accrued interest amount per $1,000 face value. This result should be rounded to five decimal places, using standard rounding procedures:

accrued interest per $1,000 face value =
daily interest per $1,000 face value x
days between last coupon payment and delivery day

Finally, one scales up this result to the face value required for futures contract delivery. For 3-Year Note or 2-Year Note futures, this means multiplying by 200. For any other Treasury futures contract, it means multiplying by 100.

Example

Assume it is late September 2022. A hypothetical short position holder declares on September 28 (Last Intention Day) that on September 30 (Last Delivery Day) they will deliver on one expiring September 2022 "Ultra" 10-Year Treasury Note contract (TNU2).[24] The short plans to fulfill delivery with $100,000 face value of the 1-7/8% of Feb 15, 2032. What is the correct invoice amount?

Because trading in TNU2 futures terminated on Wednesday, September 21, delivery invoicing will be based on the contract final settlement price: 121 and 14/32nds, or 121.437500 points. The Exchange's conversion factor tables show 0.7104 as the conversion factor applicable to delivery of the 1-7/8% of Feb 15, 2032 note in fulfillment of TNU2. Given that the notional size of the TN contract is $1,000 per price point, the converted futures price is:

$86,269.20 = $1,000 contract size x 121.437500 price x 0.7104 conversion factor

To get the accrued interest amount for delivery on September 30, first determine the note's semiannual coupon payment. For $1,000 face value of the 1-7/8% of Feb 15, 2032, this will be:

$9.375 = (0.01875 x $1,000) / 2

The delivered note pays coupon interest every February 15 and August 15. Exhibit 18 confirms that the half-year from the last coupon payment before delivery (August 15, 2022) to the next coupon payment after delivery (February 15, 2023) spans 184 days. Thus, coupon interest accrues over this half-year interval at the following daily rate per $1,000 face value:

$0.050951087 per day = $9.375 / 184 days

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*24 Strictly speaking, the short position holder is not required to inform their clearing member firm of their intent to deliver. As explained above (**What happens on Last Intention Day?**, page 18), any short contract holding that remains open at close of business on the contract's Last Intention Day, as in this example, would automatically to go to delivery.*

The interval over which coupon interest accrues until the delivery date spans 46 days, from and including August 15, 2022, to and not including September 30, 2022. Thus, accrued interest per $1,000 face value is:

$2.34375 (rounded to five decimal places) = $0.050951087 per day x 46 days

Because one contract lot comprises 100 units of $1,000 face value each, this result is multiplied by 100 to get $234.375. Applying normal rounding procedures, the accrued interest amount is $234.38.

Summing these results produces the invoice amount:

$86,503.58 = $86,269.20 principal + $234.38 accrued interest

Physical delivery in historical overview

We remarked at the outset that physical delivery on Treasury futures is simultaneously pivotal and rare. Over the last three decades, the average share of delivery into expiring contracts is a mere 2.8% of mature open interest.[25] (See middle column of Exhibit 19.)

The incidence of delivery tends to be lower for futures for longer underlying term-to-maturity exposures. Thus, the average share of mature open interest taken to delivery is light, around 1.7%, in Long-Term Bond futures and conventional Bond futures. For 10-Year T-Note futures and 5-Year T-Note futures, it's approximately 3.3%. For 2-Year T-Note futures, it's 6.3%.

Exhibit 19: Treasury futures deliveries and delivery activity, Dec 1990 – Dec 2022

For Long-Term Bond (UB) futures, median values for delivery months are from Mar 2010 through Dec 2022, inclusive. For Ultra 10-Year futures, median values for delivery months are from Mar 2016 through Dec 2022, inclusive. For all other futures, median values for delivery months are from Dec 1990 through Dec 2022, inclusive.

FUTURES CONTRACT	PHYSICAL DELIVERIES AS PERCENT OF MATURE OPEN INTEREST	OPEN INTEREST ON FIRST POSITION DAY AS PERCENT OF MATURE OPEN INTEREST
ULTRA U.S. TREASURY BOND FUTURES (UB/UBE)	1.5	11.9
U.S. TREASURY BOND FUTURES (ZB/17)	1.9	34.3
20-YEAR U.S. TREASURY BOND (TWE/TWE)		
ULTRA 10-YEAR U.S. TREASURY NOTE (TN/TN)	1.4	9.1
10-YEAR T-NOTE FUTURES (ZN/21)	2.8	34.2
5-YEAR T-NOTE FUTURES (ZF/25)	3.4	33.9
3-YEAR T-NOTE FUTURES (Z3N/3YR)		
2-YEAR T-NOTE FUTURES (ZT/26)	6.3	36.5
TOTAL	**2.8**	**33.6**

Source: CME Group

25 *As we did in Exhibit 1, we define "mature open interest" in an expiring futures contract to be the median daily level of contract open interest during the 42 business days ending on, and including, the contract's First Position Day – essentially the prevailing level of open interest during the two months ending on First Position Day.*

A useful alternative measure is the open interest in an expiring contract that remains at the close of its First Position Day ("FPD"). The right-hand column of Exhibit 19 indicates that, over the long term, nearly 34% of a contract's mature open interest remains open on FPD.

This measure directly gauges the willingness of open interest holders to involve themselves in physical delivery, irrespective of whether their contract holdings go to delivery. To see why this is so, recall that FPD is the earliest point in an expiring contract's delivery cycle at which a short holder can declare intent to deliver, and at which a long holder might be assigned to take delivery. For a long holder not wanting to take delivery, the most prudent course would be to close out their position before the close of trading on FPD. They might nonetheless maintain the position beyond FPD and into the delivery month, for at least two reasons:

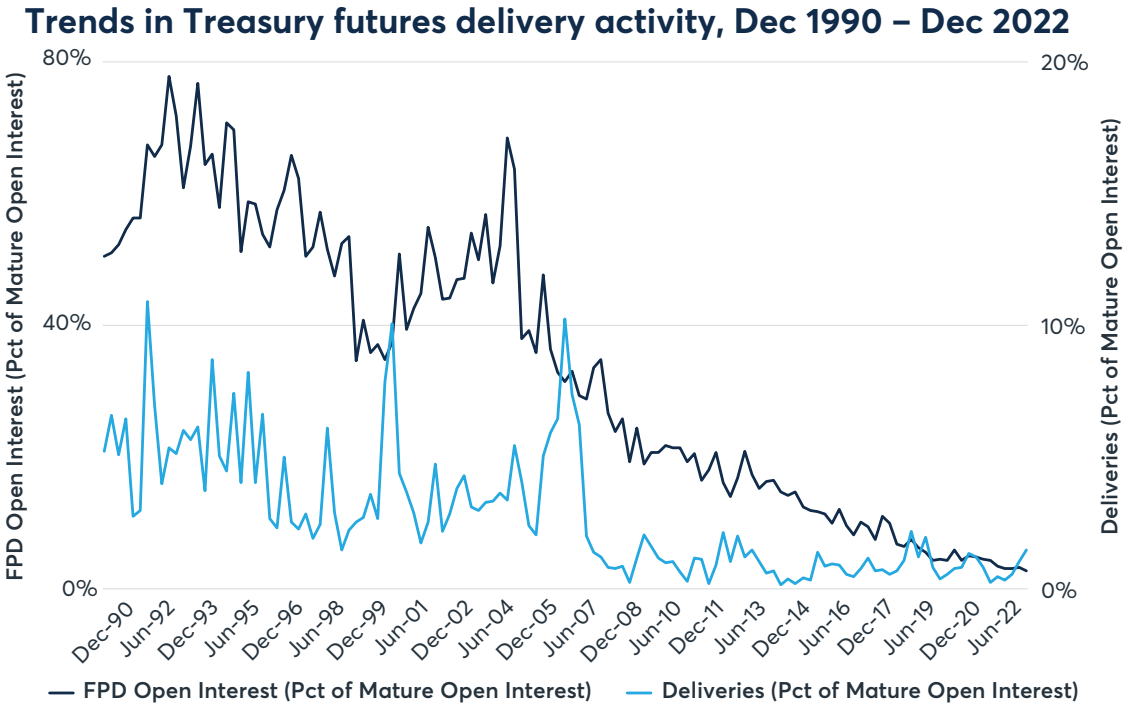
First, suppose the carry in contract grade notes or bonds is expected to be positive, i.e., the coupon interest that a deliverable grade security will pay is expected to exceed the cost of financing ownership of the security via repurchase agreements or other means of borrowing, during the interval between the expiring contract's FPD and its last delivery day. Under these conditions, a short futures holder who contemplates making delivery has at least one financial incentive to wait until the contract's last delivery day. This consideration might prompt the long position holder to maintain their position into the delivery month. In so doing, they play the odds either that no short position holder would elect to make delivery earlier than the end of the delivery month, or that if they do choose to act before month-end, their long position is less likely than others to be matched to take any such early delivery.

Second, suppose the long position owner has acquired their futures position very recently. Perhaps they are aware that, on any given day from FPD onward, CME Clearing will search out the open long positions with oldest vintages when it constructs its eligible pool of longs to accept deliveries from short intentioners. With this in mind, they might play the odds that there are outstanding long positions with older vintages than theirs, and that these longs, and not them, will be assigned to accept any early deliveries.

Exhibit 20: Trends in Treasury futures delivery activity, Dec 1990 – Dec 2022

Left scale: Aggregate open interest in expiring contracts on First Position Day as percent of aggregate contract mature open interest.

Right scale: Aggregate number of expiring contracts delivered as percent of aggregate contract mature open interest.



Source: CME Group

In both instances nothing is for certain. The long holder knows there is a chance, no matter how remote, that they might be tapped to take delivery. In its essence, the choice between holding the expiring contract position (and for how long) versus rolling out of it (and when) remains a gamble.

Because the secular proportions of delivery and FPD open interest shown in Exhibit 19 are 32-year median levels, they conceal that both measures have trended lower since the early 1990s (Exhibit 20). During 1991-5 the aggregate pace of physical delivery ran around 5.5% of aggregate futures mature open interest. Since 2010 it has fallen to 0.9%. Likewise, the share of mature open interest in expiring contracts that remains open on First Position Day has shrunk from roughly 65% in the early 1990s to around 11.2% lately.

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Appendix: Treasury futures contract specifications

All contracts

DELIVERY MONTHS	Mar, Jun, Sep, Dec
DELIVERY METHOD	Physical delivery of contract grade U.S. Treasury securities via the Federal Reserve book-entry wire-transfer system. Delivery invoice price equals the futures contract settlement price, times the size of the futures contract price point, times a conversion factor, plus accrued interest from the delivered security's last coupon payment date to the futures contract delivery date. The conversion factor, computed and published by the Exchange, represents the price of $1 face value of the delivered security to yield 6 percent per annum as of the first day of the futures contract delivery month.
TRADING HOURS	CME Globex: 5:00 p.m. - 4:00 p.m., CT, Sunday - Friday Trading in an expiring contract ceases at 12:01 p.m., CT, on the contract's last trading day.
DAILY PRICE LIMIT	None

Treasury Bond futures

	ULTRA U.S. TREASURY BOND FUTURES	**U.S. TREASURY BOND FUTURES**	**20-YEAR U.S. TREASURY BOND FUTURES**
CONTRACT SIZE	One Treasury bond having face value at maturity of $100,000.		
DELIVERABLE GRADE	U.S. Treasury bonds with remaining term to maturity of not less than 25 years from the first day of the futures contract delivery month.	U.S. Treasury Bonds that have remaining term to maturity of at least 15 years and less than 25 years from the first day of the futures delivery month.	U.S. Treasury Bonds with not less than 19 years 2 months and not more than 19 years 11 months of remaining term to maturity from first day of futures delivery month.
PRICE QUOTE	Par is on the basis of 100 points, with each point equal to $1,000. For example, 80-16 represents 80 and 16/32 points. Minimum price increment is one thirty-second of one point ($31.25 per contract) except for intermonth spreads, for which minimum price increment is one quarter of one thirty-second of one point ($7.8125 per contract).	Par shall be on the basis of 100 points, with each point equal to $1,000. For example, 80-16 represents 80 and 16/32 points. Minimum price increment shall be one thirty-second of one point ($31.25 per contract) except for intermonth spreads, where the minimum price increment shall be one quarter of one thirty-second of one point ($7.8125 per contract).	Par shall be on the basis of 100 points, with each point equal to $1,000. For example, 80-16 represents 80 and 16/32 points. Minimum price increment shall be one thirty-second of one point ($31.25 per contract) except for intermonth spreads, where the minimum price increment shall be one quarter of one thirty-second of one point ($7.8125 per contract).
LAST TRADING DAY	Seventh business day preceding the last business day of the delivery month		
LAST DELIVERY DAY	Last business day of the delivery month		
TICKER SYMBOLS	Globex: UB Clearing: UBE	Globex: ZB Clearing: 17	Globex: TWE Clearing: TWE

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Treasury Note futures

	ULTRA 10-YEAR U.S. TREASURY NOTE FUTURES	10-YEAR T-NOTE FUTURES	5-YEAR T-NOTE FUTURES	3-YEAR T-NOTE FUTURES	2-YEAR T-NOTE FUTURES
CONTRACT SIZE	One Treasury note having face value at maturity of $100,000			One Treasury note having face value at maturity of $200,000	
DELIVERABLE GRADE	Original issue 10-Year U.S. Treasury notes with not less than 9 years 5 months and not more than 10 years of remaining term to maturity from first day of futures delivery month.	U.S. Treasury notes with a remaining term to maturity of at least six and a half years, but less than 8 years, from the first day of the delivery month.	U.S. Treasury notes with an original term to maturity of not more than five years and three months and a remaining term to maturity of not less than four years and two months as of the first day of the delivery month.	U.S. Treasury notes that have an original maturity of not more than 7 years and a remaining maturity of not less than 2 years and 9 months from the first day of the delivery month but not more than 3 years from the last day of the delivery month.	U.S. Treasury notes with an original term to maturity of not more than five years and three months and a remaining term to maturity of not less than one year and nine months from the first day of the delivery month and a remaining term to maturity of not more than two years from the last day of the delivery month.
PRICE QUOTE	Par shall be on the basis of 100 points, with each point equal to $1,000. For example, 84-16 represents 84 and 16/32 points, and 84-165 represents 84 and 16.5/32 points. Minimum price increment shall be one half of one thirty-second of one point ($15.625 per contract) except for intermonth spreads, where the minimum price fluctuation shall be one quarter of one thirty-second of one point ($7.8125 per contract).	Par shall be on the basis of 100 points, with each point equal to $1,000. For example, 84-16 represents 84 and 16/32 points, and 84-165 represents 84 and 16.5/32 points. Minimum price increment shall be one half of one thirty-second of one point ($15.625 per contract) except for intermonth spreads, where the minimum price fluctuation shall be one quarter of one thirty-second of one point ($7.8125 per contract).	Par shall be on the basis of 100 points, with each point equal to $1,000. For example, 91-16 represents 91 and 16/32 points, 91-162 represents 91 and 16.25/32 points, 91-165 represents 91 and 16.5/32 points, and 91-167 represents 91 and 16.75/32 points. Minimum price increment shall be one quarter of one thirty-second of one point ($7.8125 per contract).	Par shall be on the basis of 100 points, with each point equal to $2,000. For example, 91-16 represents 91 and 16/32 points, 91-162 represents 91 and 16.25/32 points, 91-165 represents 91 and 16.5/32 points, and 91-167 represents 91 and 16.75/32 points. Minimum price increment shall be one eighth of one thirty-second of one point ($7.8125 per contract).	Par shall be on the basis of 100 points, with each point equal to $2,000. For example, 91-16 represents 91 and 16/32 points, 91-162 represents 91 and 16.25/32 points, 91-165 represents 91 and 16.5/32 points, and 91-167 represents 91 and 16.75/32 points. Minimum price increment shall be one eighth of one thirty-second of one point ($7.8125 per contract).
LAST TRADING DAY	Last business day of the delivery month				
LAST DELIVERY DAY	Last business day of the delivery month		Third business day following the Last Trading Day		
TICKER SYMBOLS	Globex: TN Clearing: TN	Globex: ZN Clearing: 21	Globex: ZF Clearing: 25	Globex: Z3N Clearing: 3YR	Globex: ZT Clearing: 26

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