

# **Yield-bearing Financial Assets (YBFAs)**

**The quiet market (for the moment)**



# October 22, 1969 (50 years ago) UNIX was born



Ken Thompson (standing) and Dennis Ritchie, inventors of UNIX and the C programming language, working at Bell Labs on a PDP-11 computer, around 1972. *Source: Wikipedia.*

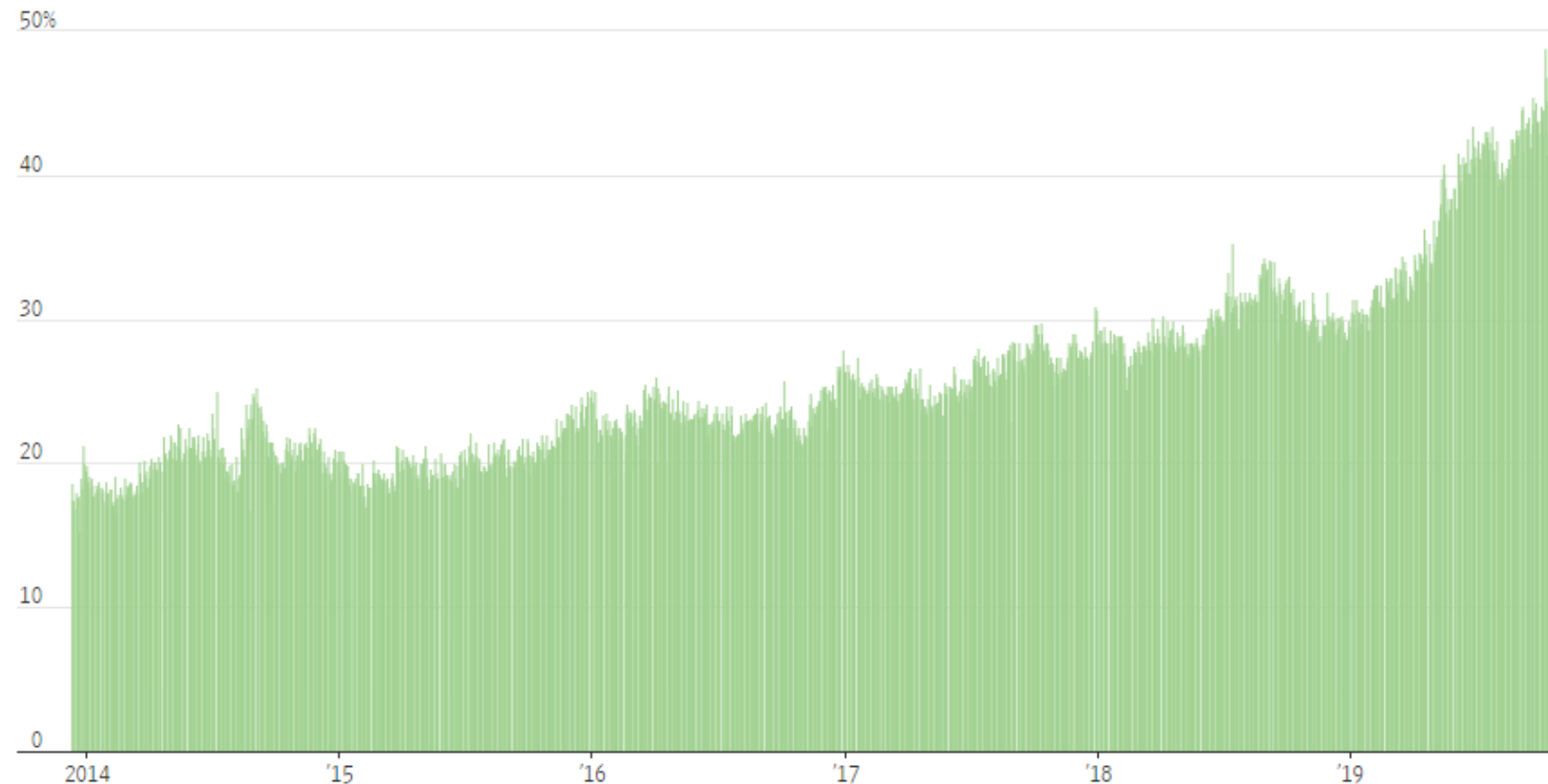
... from yesterday's Wall Street Journal

## Tiny 'Odd Lot' Trades Reach Record Share of U.S. Stock Market

Shift follows rise in algorithmic trading and expensive stocks; investors could miss out on best price

By Alexander Osipovich  
Oct. 22, 2019 8:00 am ET

Percentage of trades in odd-lot sizes



Source: NYSE TAQ data

## Terms used in this lecture ..

- basis point: One percent of a percent. If an interest rate rises from 4.65% to 4.66%, we say that it is up by one basis point.
- nominal yield: the actual market yield as quoted for any yield-bearing financial asset.
- real yield: the inflation-adjusted yield for any yield-bearing financial asset, crudely calculated as the nominal (market) yield less the inflation rate, as measured by an accepted index, like the Consumer Price Index.

## Primary YBFA markets

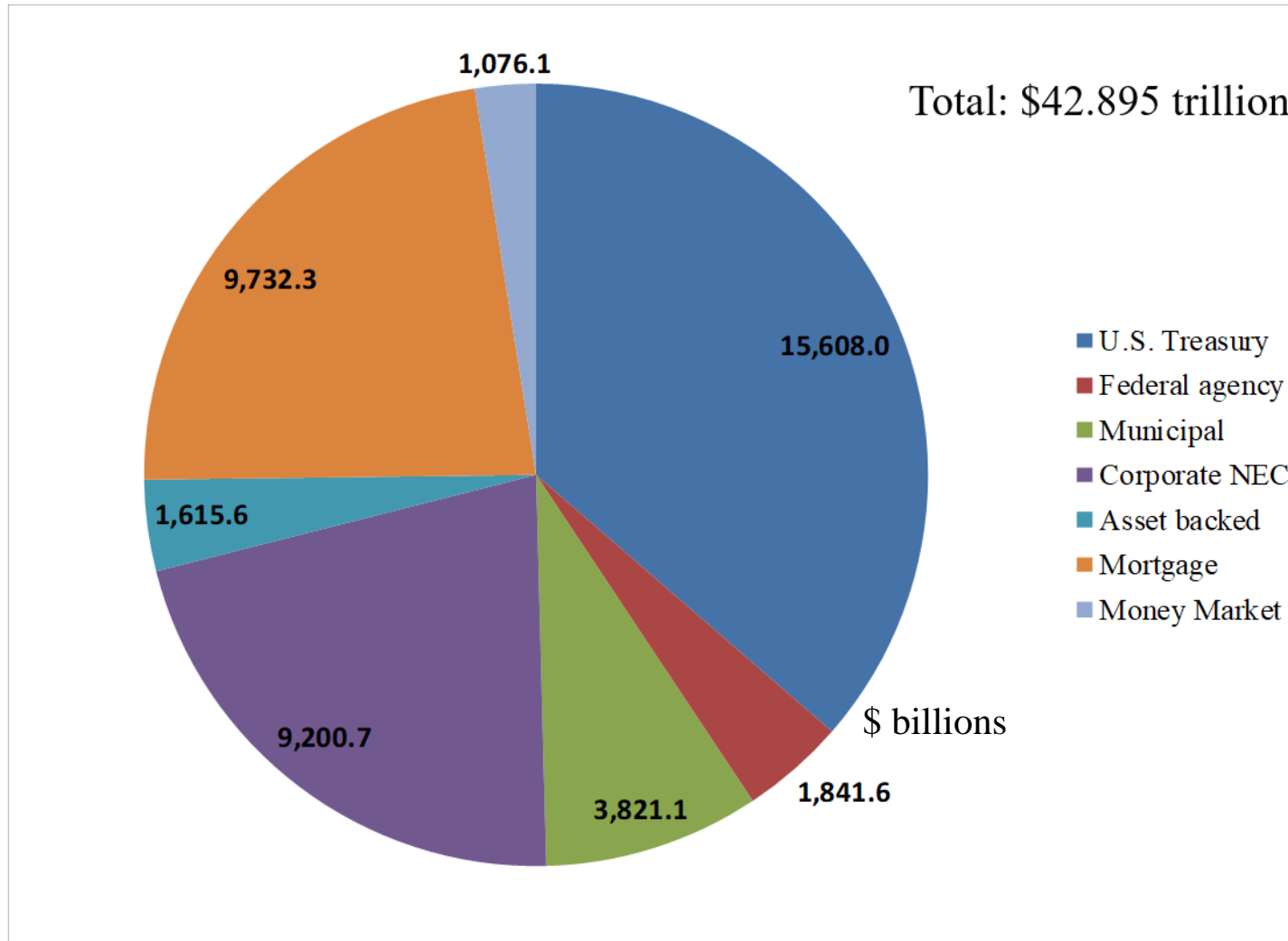
- Note and Bond
  - U.S. Treasury notes and bonds
  - Corporate notes and bonds
  - Municipal (tax free) notes and bonds
  - Asset-backed securities (ABS)
- Money Market (maturities less than 1 year)
  - U.S. Treasury bills
  - Corporate commercial paper
  - Bank certificates of deposit



## Figure 1 - Pennzoil United Bond Certificate, circa 1968



**Figure 2 - Outstanding U.S. Bond Market Debt by Category, 2018**



Source: **sifma**, 2019 Capital Markets Factbook, pp. 15.

## Some interesting facts about notes and bonds (hereafter bonds) ...

- Bonds are debt obligations of the party that issues them .. they are a debt contract that promises to pay period interest payments over so many years then the full principal at the end.
- Bonds are bought and sold on a huge secondary market.
- Bonds are first issued by the agency that issues them at or very near par (100), but thereafter trade above or below par.
- **Bond values on the secondary market move in opposite directions of interest rates! When interest rates rise, bond values fall!**



# U.S. Treasury Securities

Figure 3		
U.S Treasury Securities Offered to the Public		
Security	Maturity	Now Offered
<b>Bills:</b>	Less than one year	28,91,182,364 days
<b>Notes:</b>	More than one to ten years	2,3,5,7,9 and 10 <sup>*</sup>
<b>Bonds:</b>	20 to 30 years	30 years <sup>*</sup>
<b>Floating Rate Notes:</b>	2 years	2 years <sup>**</sup>
<b>Inflation Indexed:</b>	5, 10, and 20 years	All <sup>*</sup>

<sup>\*</sup>These are sometimes approximate: e.g. a 10 year notes might have a maturity of 9 years and 10 months a 30 year bond might have a maturity of 29 years and 11 months.

<sup>\*\*</sup>These were first introduced in January 2014 and pay variable interest rates.

The budget deficit is financed by the sale of interest-bearing U.S. Treasury securities to the public, including corporations, financial institutions, and foreign investors. The securities differ largely by the maturities. After a 5-year hiatus, the Treasury began selling 30 year bonds in February 2006. The Treasury in recent years has sold 20 year bonds also, but is not currently selling them. Inflation-indexed securities are called TIPS, and are described in the reading material for this section.

# What is the level of U.S government debt?

## Total U.S. Treasury Securities Outstanding Gross and Net Public Debt \$ billions June 2019

Instrument	Amount
<b>Marketable</b>	<b>15,906.3</b>
Bills	2,250.4
Notes	9,548.0
Bonds	2,266.0
Inflation-indexed	1,432.1
Floating rate notes	409.8
<b>Non-Marketable</b>	<b>6,141.1</b>
Government Account	5,859.0
Non-marketable privately held	282.1
<b>TOTAL PUBLIC DEBT:</b>	<b>22,045.3</b>
<b>NET PUBLIC DEBT:</b>	<b>16,186.3</b>

(Net is total less govt. account but not less FRS holdings)

Note: This has more information than Figure 4 in the text, which covers only the marketable debt.

Source: US Treasury Bulletin September 2019 Tables FD-1 FD-2

# Who owns the U.S. Treasury Debt?

## Ownership of Marketable U.S. Treasury Debt

	December 1995		March 2019	
	Billions \$	% total	Billions \$	% total
Deposit institutions	315.4	9.5%	769.4	5.5%
US Savings Bonds	155.0	4.7%	154.5	1.1%
Private pension funds	142.9	4.3%	440.2	3.1%
S&L govt pension funds	208.2	6.3%	395.3	2.8%
Insurance companies	241.5	7.3%	202.2	1.4%
Mutual funds	225.1	6.8%	2,012.4	14.3%
State & local governments	289.8	8.8%	647.8	4.6%
Foreign holdings	835.2	25.3%	6,473.4	46.1%
Other (mostly individuals)	864.6	26.1%	2,933.7	20.9%
Total privately held	3,307.7	100.0%	14,028.9	100.0%
Memo:				
Total Debt:			22,028.0	
Held by Federal Reserve System:			2,536.7	11.5%
Memo: Federal Reserve Ownership of Marketable Debt:				15.3%

Source: U.S. Treasury Bulletin, September 2019, Tables OFS-1, OFS-2

Figure 5  
Ownership of Marketable U.S. Treasury Debt

	December 1995		March 2016	
	Billions \$	% total	Billions \$	% total
Deposit institutions	315.4	9.5%	555.1	4.8%
US Savings Bonds	155.0	4.7%	170.3	1.5%
Private pension funds	142.9	4.3%	548.3	4.8%
S&L govt pension funds	208.2	6.3%	160.5	1.4%
Insurance companies	241.5	7.3%	301.3	2.6%
Mutual funds	225.1	6.8%	1,399.7	12.2%
State & local governments	289.8	8.8%	714.3	6.2%
Foreign holdings	835.2	25.3%	6,287.0	54.8%
Other (mostly individuals)	864.6	26.1%	1,327.0	11.6%
Total privately held	3,307.7	100.0%	11,463.6	100.0%
Memo:				
Total Debt:			19,264.9	
Held by Federal Reserve System:			2,819.0	14.6%
Held by U.S. Government Accounts:			5,444.3	28.3%
Memo: Federal Reserve Ownership of Marketable Debt:				19.7%

Source: U.S. Treasury Bulletin, September 2016, Tables OFS-1, OFS-2

Overseas ownership is falling ...

Major Foreign Holdings of Treasury Securities  
(billions of dollars)

Country	Aug 2019	% Tot
Japan	1,174.7	17.1%
China, Mainland	1,103.5	16.1%
United Kingdom	349.9	5.1%
Brazil	311.5	4.5%
Ireland	272.5	4.0%
Luxembourg	244.4	3.6%
Cayman Islands	236.3	3.4%
Switzerland	233.2	3.4%
Hong Kong	224.6	3.3%
Belgium	217.9	3.2%
Taiwan	186.0	2.7%
Saudi Arabia	183.8	2.7%
India	162.2	2.4%
Singapore	145.5	2.1%
France	133.9	2.0%
Canada	118.0	1.7%
Korea	117.8	1.7%
Norway	101.0	1.5%
Germany	86.5	1.3%
All Other	1,254.3	18.3%
Grand Total	6,857.5	100.0%

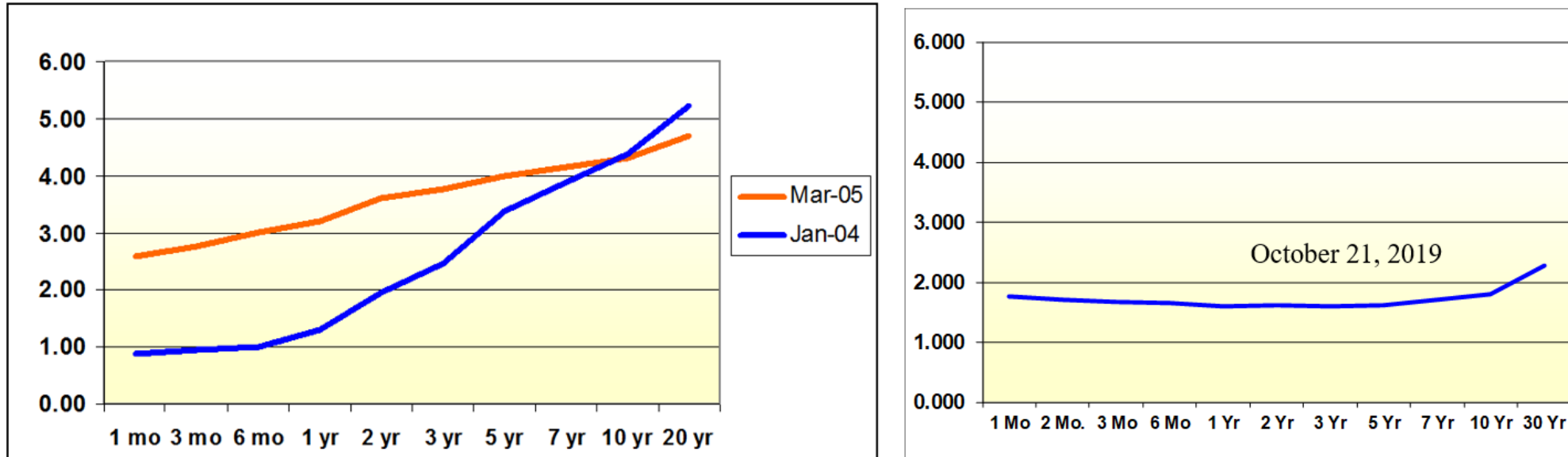
Foreign Official Holdings	4,196.7	61.2%
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Source: U.S. Department of Treasury Resource Center, Treasury International Capital Center, Major Foreign Holders of U.S. Treasury Securities, released October 16, 2019.

# Overseas ownership

# The Treasury Yield Curve

Figure 8 - Comparing U.S. Treasury Security Yield Spreads from the Past and Fall 2019



The Treasury Yield Curve plots the maturity of newly issued Treasury securities against their yield. Normally, but not always, this slopes upward, which means that longer maturities have higher yields. When this flattens or steepens, the reason is usually important and worth understanding.

# Auction Scheduling ... (see Treasury Direct)

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## Announcements, Data & Results

Treasury sells bills, notes, bonds, FRNs, and TIPS at regularly scheduled auctions. Refer to the [auction announcements & results press releases](#) for more information. Follow the links below to get the latest information on:

- [Tentative Auction Schedule of U.S. Treasury Securities \(PDF\)](#)  
The schedule of Treasury securities auctions is released at the Treasury's Quarterly Refunding press conference, usually held on the first Wednesday of February, May, August, and November.
- [Upcoming Auctions](#)
- [Useful Data for Research](#)
- Click to find [additional statistics](#) from May 5, 2003 through April 1, 2008, which includes information on bidding by primary dealers, direct bidders, and indirect bidders.

**Note:** The following table displays data for the 20 most recently auctioned securities that have not yet matured, for each security type. If you would like to see data for additional securities, please use our [Auction Query](#).

Bills	CMBs	Notes	Bonds	TIPS	FRNs	
Security Term	CUSIP	Reopening	Issue Date	Maturity Date	High Yield	Interest Rate
30-Year	<a href="#">912810SD1</a>	Yes	10/15/2018	08/15/2048	3.344%	3.000%
30-Year	<a href="#">912810SD1</a>	Yes	09/17/2018	08/15/2048	3.088%	3.000%
30-Year	<a href="#">912810SD1</a>	No	08/15/2018	08/15/2048	3.090%	3.000%
30-Year	<a href="#">912810SC3</a>	Yes	07/16/2018	05/15/2048	2.958%	3.125%
30-Year	<a href="#">912810SC3</a>	Yes	06/15/2018	05/15/2048	3.100%	3.125%
30-Year	<a href="#">912810SC3</a>	No	05/15/2018	05/15/2048	3.130%	3.125%
30-Year	<a href="#">912810SA7</a>	Yes	04/16/2018	02/15/2048	3.044%	3.000%
30-Year	<a href="#">912810SA7</a>	Yes	03/15/2018	02/15/2048	3.109%	3.000%
30-Year	<a href="#">912810SA7</a>	No	02/15/2018	02/15/2048	3.121%	3.000%
30-Year	<a href="#">912810RZ3</a>	Yes	01/16/2018	11/15/2047	2.867%	2.750%
30-Year	<a href="#">912810RZ3</a>	Yes	12/15/2017	11/15/2047	2.804%	2.750%
30-Year	<a href="#">912810RZ3</a>	No	11/15/2017	11/15/2047	2.801%	2.750%
30-Year	<a href="#">912810RY6</a>	Yes	10/16/2017	08/15/2047	2.870%	2.750%
30-Year	<a href="#">912810RY6</a>	Yes	09/15/2017	08/15/2047	2.790%	2.750%

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There are 2 or 3 auctions every week for bills ...

... and the longer-term maturities once per month or less.

See Appendices 1,2, and 3 of chapter 7.



# Appendix 1 - U.S. Treasury Auction Calendar

Tentative Auction Schedule of U.S. Treasury Securities				
Security Type		Announcement Date	Auction Date	Settlement Date
3-Year NOTE		Thursday, October 03, 2019	Tuesday, October 08, 2019	Tuesday, October 15, 2019
10-Year NOTE	R	Thursday, October 03, 2019	Wednesday, October 09, 2019	Tuesday, October 15, 2019
30-Year BOND	R	Thursday, October 03, 2019	Thursday, October 10, 2019	Tuesday, October 15, 2019
4-Week BILL		Tuesday, October 08, 2019	Thursday, October 10, 2019	Tuesday, October 15, 2019
8-Week BILL		Tuesday, October 08, 2019	Thursday, October 10, 2019	Tuesday, October 15, 2019
				
4-Week BILL		Tuesday, October 15, 2019	Thursday, October 17, 2019	Tuesday, October 22, 2019
8-Week BILL		Tuesday, October 15, 2019	Thursday, October 17, 2019	Tuesday, October 22, 2019
13-Week BILL		Thursday, October 17, 2019	Monday, October 21, 2019	Thursday, October 24, 2019
26-Week BILL		Thursday, October 17, 2019	Monday, October 21, 2019	Thursday, October 24, 2019
2-Year NOTE		Thursday, October 17, 2019	Tuesday, October 22, 2019	Thursday, October 31, 2019
2-Year FRN		Thursday, October 17, 2019	Wednesday, October 23, 2019	Thursday, October 31, 2019
5-Year NOTE		Thursday, October 17, 2019	Wednesday, October 23, 2019	Thursday, October 31, 2019

# Original Treasury Issue: Dutch Auctions

When U.S. Treasury securities first come to the market, they are sold at scheduled auctions throughout the year. The frequency of the auction varies by the type of security, ranging from once a week (every Thursday) for 13- and 26-week bills to twice a year for 30-year bonds. See

<http://www.treasurydirect.gov>

under institutions for the calendar of Treasury auctions.

Prior to the auction, the Treasury will set the size of the subscription for the type of security and announce it publicly (e.g. 5-year notes will be sold on October 31). A private investor can buy some of the subscription by submitting a **non-competitive tender** for an amount up to \$5 million through *Treasury Direct* (<http://www.treasurydirect.gov>).

Larger investors are required to submit a **competitive bids tender** to participate in a **dutch auction**. The competitive bidder will submit based upon the *lowest yield that she is willing to accept up to three decimal places*.

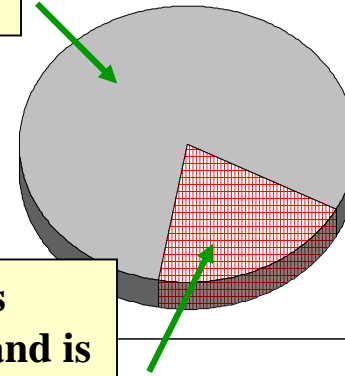
# How the Dutch Auction Works

In this example, the Treasury is selling \$10 billion worth of 2-year notes. Tenders are received for \$2 billion of non-competitive bids (gray area).

Tenders are also shown for the competitive bids (green and yellow) totaling \$15 billion. Each bidder bids the *minimum* yield that he will accept up to 3 decimal places. Starting with the lowest bid the auction works up until the competitive subscription is filled at \$8 billion. Winners (green) are awarded the *highest* yield accepted. Those who bid at the cutoff are pro-rated.

80% is competitive bid

The other \$2 billion is non-competitive bid and is awarded at high bid.



Amount	Bids	Result
2	4.389	Rejected
3	4.388	Rejected
4	4.387	Pro-rated 50% at 4.387
2	4.386	Accepted at 4.387
1	4.385	Accepted at 4.387
2	4.384	Accepted at 4.387
1	4.383	Accepted at 4.387
2	NC	Accepted at 4.387

# Why Treasury Notes are not issued exactly at par!

This is an announcement made on September 5, 2019 for an auction to take place on September 11, 2019.

Appendix 2 - Treasury Auction Announcement for 10-year Note:

# TREASURY NEWS

Department of the Treasury • Bureau of the Fiscal Service



Embargoed Until 11:00 A.M.  
September 05, 2019

CONTACT: Treasury Auctions  
202-504-3550

## TREASURY OFFERING ANNOUNCEMENT <sup>1</sup>

Term and Type of Security	9-Year 11-Month 1-5/8% Note (Reopening)
Offering Amount	\$24,000,000,000
Currently Outstanding	\$44,619,000,000
CUSIP Number	912828YB0
Auction Date	September 11, 2019
Original Issue Date	August 15, 2019
Issue Date	September 16, 2019
Maturity Date	August 15, 2029
Dated Date	August 15, 2019
Series	E-2029
Yield	Determined at Auction
Interest Rate	1-5/8%
Interest Payment Dates	February 15 and August 15
Accrued Interest from 08/15/2019 to 09/16/2019	\$1.41304 Per \$1,000
Premium or Discount	Determined at Auction

Determined at Auction?  
1-5/8%?  
Note:  $1-5/8\% = 1.625\%$

Yield?  
Interest Rate?

# Why Treasury Notes are not issued exactly at par!

Appendix 3 - Treasury Auction Results for same 10-year note.

## TREASURY NEWS

Department of the Treasury • Bureau of the Fiscal Service



For Immediate Release  
September 11, 2019

CONTACT: Treasury Auctions  
202-504-3550

### TREASURY AUCTION RESULTS

Term and Type of Security	9-Year 11-Month Note		
CUSIP Number	912828YB0		
Series	E-2029		
Interest Rate	1-5/8%		
High Yield <sup>1</sup>	1.739%		
Allotted at High	46.67%		
Price	98.965031		
Accrued Interest per \$1,000	\$1.41304		
Median Yield <sup>2</sup>	1.700%		
Low Yield <sup>3</sup>	0.880%		
Issue Date	September 16, 2019		
Maturity Date	August 15, 2029		
Original Issue Date	August 15, 2019		
Dated Date	August 15, 2019		
Competitive	Tendered	Accepted	
Noncompetitive	\$59,121,805,000	\$23,997,675,800	
	\$2,324,600	\$2,324,600	

1-5/8%

1.739%

46/67%

98.965031

Note: 1-5/8% = 1.625%

Also see what was  
tendered and accepted.

# Treasury Bond/Note Quotations

These notes have a **par** value of 100.

1. The **coupon rate** is the annual interest payment *based upon par*.
2. The **price** is the *ask* that you will pay (per \$100) if you buy this bond.
3. The **yield to maturity** is the yield that you will earn if you buy at this **price** and are paid this **coupon rate**. It includes the yield that is implicit in the price appreciation of this bond (i.e. if you buy it for 95.11 and it matures at 100).
4. The **current yield** is the **price** divided by the **coupon rate**, which does not take into account any price appreciation or depreciation.

These notes are trading at **premium** because their price is above par. When they trade below par they are trading at a **discount**.

*The Wall Street  
Journal*, October  
22, 2019

MATURITY	COUPON	BID	ASKED	CHG	ASKED YIELD
2/15/2048	3.000	115.1860	115.2060	0.9160	2.250
5/15/2048	3.125	118.1160	118.1360	0.9200	2.247
8/15/2048	3.000	115.2500	115.2700	0.2300	2.250
11/15/2048	3.375	124.0340	124.0540	0.9220	2.239
2/15/2049	3.000	116.0220	116.0420	0.9100	2.246
5/15/2049	2.875	113.1420	113.1620	0.9120	2.247
8/15/2049	2.250	99.2860	99.3060	0.2120	2.252



# Comparing quotations from last year to this year ...

Maturity	Coupon	Bid	Asked	Chg	Asked yield
2/15/2047	3.000	93.3750	93.4063	0.2422	3.363
5/15/2047	3.000	93.3281	93.3594	0.2578	3.364
8/15/2047	2.750	88.6250	88.6563	0.2266	3.368
11/15/2047	2.750	88.5938	88.6250	0.2578	3.367
2/15/2048	3.000	93.1563	93.1875	0.2500	3.367
5/15/2048	3.125	95.4922	95.5234	0.2656	3.364
8/15/2048	3.000	93.1875	93.2188	0.3203	3.362

MATURITY	COUPON	BID	ASKED	CHG	ASKEDYIELD
2/15/2048	3.000	115.1860	115.2060	0.9160	2.250
5/15/2048	3.125	118.1160	118.1360	0.9200	2.247
8/15/2048	3.000	115.2500	115.2700	0.2300	2.250
11/15/2048	3.375	124.0340	124.0540	0.9220	2.239
2/15/2049	3.000	116.0220	116.0420	0.9100	2.246
5/15/2049	2.875	113.1420	113.1620	0.9120	2.247
8/15/2049	2.250	99.2860	99.3060	0.2120	2.252

Why is this 30-year bond, issued in 2018 and maturing in February 15, 2048, not trading at par?

Why has this 30-year bond, issued when the 30-year bond rate was 3.00% (how can we tell that?) risen from asked value of 93.1875 to the current ask of 115.206? This is an increase in value of more than 20% in one year! Aren't these bonds supposed to be stable and risk-free?

What was the 30-year bond rate in May, 2018?