



Navigating the Municipal Landscape in a Higher Rate Environment

October 2023

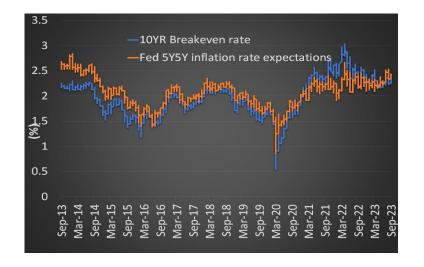
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FOMC Maintains Hawkish Pause

- The FOMC held its target range for the federal funds rate at 5.25% to 5.5%, while updated quarterly projections showed 12 of 19 officials favored another rate hike in 2023, underscoring a desire to ensure inflation continues to decelerate. The median YE 2023 projection is now 5.61%.
- They also expect less easing next year and the median projection for YE 2024 is now 5.1% (up from 4.6% in June 2023). They see the rate falling to 3.9% by YE 2025 and 2.9% by YE 2026.
- The upward revision reflects market signals, fiscal concerns, or more optimism on economy, labor and risk appetite.
- However, several near-term headwinds could drive the soft-landing optimism to fade somewhat going forward. These include a government shutdown, the recent rise in oil prices which add to nearterm inflationary risks and the United Auto Workers (UAW) strike which puts downward pressure on growth.

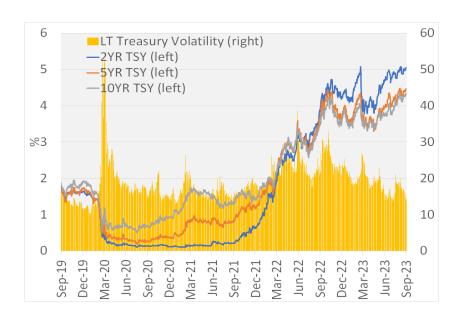
SEP - June vs. September 2023 (%)

		2023	2024	2025	2026	Longer Run
Fed Funds Rate	Sept 2023	5.6	5.1	3.9	2.9	2.5
red rulius Rate	June 2023	5.6	4.6	3.4		2.5
Real GDP	Sept 2023	2.1	1.5	1.8	1.8	1.8
	June 2023	1.0	1.1	1.8		1.8
Unampleyment Date	Sept 2023	3.8	4.1	4.1	4.0	4.0
Unemployment Rate	June 2023	4.1	4.5	4.5		4.0
Core PCE	Sept 2023	3.7	2.3	2.3	2.0	
	June 2023	3.9	2.2	2.2		



Elevated Rates Have Come With Lower Volatility

- Treasury yields have moved higher over the last few weeks though volatility has been declining as of late. 1-month volatility in long Treasuries has steadily declined over the last month and has fallen toward the lowest levels since the Fed dropped the discussion of "transitory" inflation and started to turn more hawkish in the fall of 2021.
- The same is true for municipal yields and have cheapened commensurately.



Treasury Yields

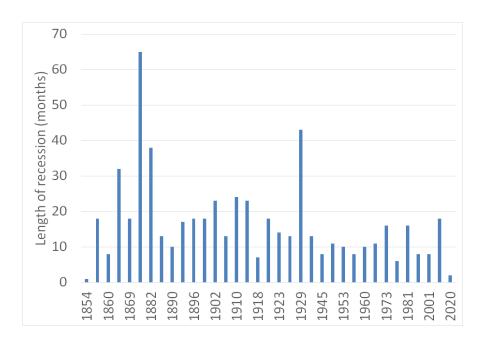
Maturity	2-Year	3-Year	5-Year	7-Year	10-Year	20-Year	30-Year
Current Yield (%)	5.05	4.81	4.64	4.65	4.62	4.97	4.76
1-Week Change (bp)	(3)	(8)	(12)	(16)	(19)	(20)	(21)
Trailing 1-Year Avg. (%)	4.52	4.25	3.98	3.92	3.84	4.13	3.95
Min Yield (%)	3.77	3.51	3.30	3.32	3.31	3.66	3.43
Max Yield (%)	5.18	4.95	4.80	4.83	4.80	5.17	4.97
Z-Score	1.45	1.56	1.86	2.08	2.31	2.48	2.53

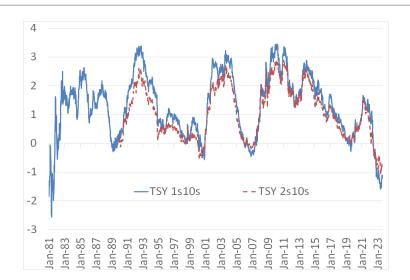
AAA Municipal Yields

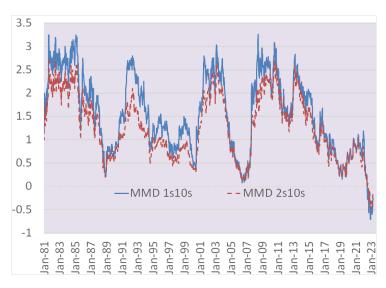
Maturity	2-Year	3-Year	5-Year	7-Year	10-Year	20-Year	30-Year
Current Yield (%)	3.56	3.43	3.31	3.31	3.39	4.09	4.31
1-Week Change (bp)	(14)	(13)	(11)	(11)	(11)	(11)	(12)
Trailing 1-Year Avg. (%)	2.81	2.71	2.61	2.59	2.64	3.35	3.60
Min Yield (%)	2.12	2.07	2.01	2.00	2.06	2.86	3.15
Max Yield (%)	3.74	3.60	3.47	3.47	3.55	4.25	4.48
Z-Score	2.06	2.02	2.02	2.06	2.08	2.36	2.42

We expect the Yield Curve Inversion to be Long Lived

- The Treasury curve inverted again around July 2022 in response to an active Fed, which had expressed the intent to rein in inflation via sharply higher policy rates. The AAA Municipal curve inverted (for the first time) about a month after that.
- At present both the Treasury and the AAA municipal curves remain inverted and sharply kinked. However, the outlook for the advent of a recession is unclear.

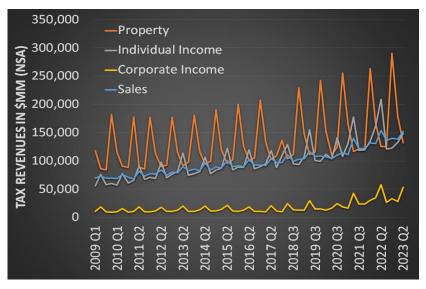


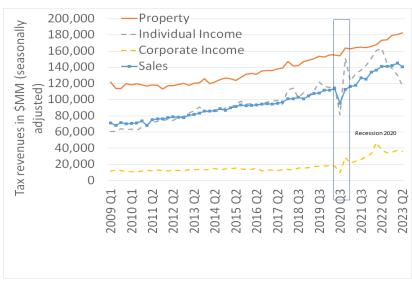




Revenue uncertainty looms with the possibility of a recession

- State and local government revenue collections have been strong over the last two years, fueled by the economy healing from the pandemic and supported by major federal relief efforts that both strengthened the recovery and directly bolstered state revenues.
- But revenue growth slowed significantly over the latter half of 2022 due to factors including high gas prices, supply chain shocks caused by geopolitical disruption, and a weak stock market.
- Property tax collections are notoriously seasonal though they are likely the most resilient of all tax revenues and offer local policy makers some certainty in an uncertain economic environment.





Butterfly Strategies are Prohibitive for Premium Municipals

• Butterfly strategies are DV01 neutral where one either sells the belly and buys the wings (called selling the FLY) or vice-versa (called buying the FLY). While such strategies are designed to benefit from a change in the curvature of the curve, if the position is positive carry, the strategy can be profitable even if the curve shape is unchanged over the duration of the holding period. In the current environment, the high interest rates towards the front end of the curve can make a butterfly trade prohibitive if the funding costs are high.

1-7-15 DV01 Neutral FLY - Sell the Belly, Buy the Wings

Position	Yield (%)	Coupon(%)	DV01 per \$1MM	Position DV01	Income (Outlay) in \$MM		Income (Outlay) in \$MM After 1-Yr (Rolldown)	Net Gain in \$MM
1-Yr 5% MMD	2.99%	5.00%	\$98.97	\$50,000	-\$505.19	\$15.11	\$495.48	\$5.39
7-Yr 5% MMD	2.25%	5.00%	\$708.08	-\$100,000	\$141.23	-\$3.18	-\$138.18	-\$0.13
15-Yr 5% MMD (10-Yr Call)	2.90%	5.00%	\$951.81	\$50,000	-\$52.53	\$1.52	\$52.17	\$1.17
Total				\$0	-\$416.49			\$6.43

1-7-15 DV01 Notional FLY - Sell the Belly, Buy the Wings

Position	Yield (%)	Coupon(%)	DV01 per \$1MM	Position DV01	Income (Outlay) in \$MM		Income (Outlay) in \$MM After 1-Yr (Rolldown)	Net Gain in \$MM
1-Yr 5% MMD	2.99%	5.00%	\$98.97	\$9,897	-\$100.00	\$1.99	\$98.08	\$1.07
7-Yr 5% MMD	2.25%	5.00%	\$708.08	-\$141,616	\$200.00	-\$4.62	-\$196.98	-\$1.60
15-Yr 5% MMD (10-Yr Call)	2.90%	5.00%	\$951.81	\$95,181	-\$100.00	\$3.36	\$99.03	\$2.39
Total				-\$36,537	\$0.00			\$1.86

Source: Thomson Reuters/MMD, Wells Fargo, October 12, 2023

Municipal Returns, Year-to-Date, Have Been Unexceptional...

Ticker (Equities)	ETF Name	%1D	%MTD	%YTD	%1YR	Lifetime Low	Lifetime High	Market Cap
DIA US	SPDR DJIA TRUST	0.5	0.9	2.0	15.7	64.8	369.5	28,037,978,515.6
SPY US	SPDR S&P 500 ETF TRUST	0.7	1.8	13.8	20.9	42.7	480.0	399,991,812,500.0
QQQUS	INVESCO QQQ TRUST SERIES 1	0.7	3.0	38.6	38.5	19.8	408.7	204,841,203,125.0
SPXL US	DIREXION DLY S&P 500 BULL 3X	2.1	5.2	32.4	51.1	1.2	148.0	3,211,081,787.1
TQQQ US	PROSHARES ULTRAPRO QQQ	2.1	8.6	123.6	104.8	0.4	91.7	17,707,705,078.1

Ticker (Fixed Income)	NAME (of Index)	%1D	%MTD	%YTD	%1YR	TYW	Coupon	WAM (Years)
Treasuries								
LUATTRUU	U.S. Treasury	-0.4	-1.0	-2.6	-1.4	5.0	2.4	7.5
LTR1TRUU	1-5 Yr	-0.1	-0.1	1.0	2.1	5.0	2.2	2.9
LUTLTRUU	Long	-1.2	-3.8	-12.0	-11.5	5.1	2.7	22.7
Corporates								
LUACTRUU	Corporate	-0.4	-1.4	-1.4	2.0	6.2	4.0	10.6
LF98TRUU	U.S. Corporate High Yield	0.0	-1.2	4.6	7.4	9.2	6.0	5.0
Municipals								
LMBITR	Municipal Bond Index	0.0	-0.6	-2.0	1.2	4.4	4.5	13.0
LMHYTR	Muni High Yield	0.0	-1.0	-1.0	1.4	6.4	4.6	19.7
BTMNTR	Taxable Municipal Index	0.0	-1.6	-0.8	1.1	5.8	4.3	14.3

...And Returns Have Fallen into Negative Territory Across Sectors

Index Name/Description	YTW (%)	WAM (Years)	YTD Return (%)	Duration (Years)	Average Rating	Current Spread to AAA (Matched Maturity)	12M Spread Z-Score (Matched Maturity)	3M Spread Z-Score (Matched Maturity)	Current Spread to AAA (vs. 10YR AAA)	12M Spread Z-Score (vs. 10YR AAA)	3M Spread Z-Score (vs. 10YR AAA)
Municipal Broad Bond Index	4.43	13.04	-2.01	6.91	Aa2/Aa3	55.68	-1.43	-2.26	88.14	-0.80	-2.34
Municipal HY Bond Index	6.36	19.66	-1.03	11.33	Ba2/Ba3	210.99	-2.82	-1.80	280.75	-2.07	-1.96
Municipal Taxable Bond Index*	5.77	14.26	-0.77	8.72	Aa2/Aa3	96.05	-1.62	-1.24	96.65	-2.41	-2.13
Municipal State GO Index	4.04	9.56	-1.72	5.10	Aa1/Aa2	49.02	-0.02	-1.87	49.02	-0.02	-1.87
Municipal Local GO Index	4.33	12.88	-3.23	7.35	Aa1/Aa2	8.04	-0.66	-2.09	77.81	-0.37	-2.81
Municipal Sector Index - IG Electric	4.36	13.59	-1.69	6.06	Aa3/A1	37.37	-0.40	-0.82	81.04	-0.34	-1.72
Municipal Sector Index - IG Hopsital	4.92	16.50	-2.66	9.40	A1/A2	79.43	-1.79	-1.03	137.68	-1.78	-1.59
Municipal Sector Index - IG Housing	4.85	19.83	-2.91	11.43	Aa1/Aa2	60.83	-3.25	-2.20	130.60	-1.71	-2.33
Municipal Sector Index - IG IDR/PCR	5.04	8.36	-0.62	5.92	A2/A3	155.21	-1.47	-1.76	148.78	-1.35	-1.80
Municipal Sector Index - IG Transportation	4.61	14.74	-1.11	7.27	Aa3/A1	56.32	-1.56	-2.19	106.49	-2.02	-2.41
Municipal Sector Index - IG Education	4.37	14.61	-2.40	7.07	Aa2/Aa3	32.37	-1.59	-2.91	82.54	-1.16	-3.03
Municipal Sector Index - IG Water & Sewer	4.28	14.03	-2.36	6.55	Aa1/Aa2	3.39	-0.36	0.09	73.17	-0.30	-2.03
Municipal Sector Index - IG Resource Recovery	3.96	13.09	-0.06	6.29	Aa2/Aa3	8.35	-1.71	-0.71	40.81	-1.86	-0.82
Municipal Sector Index - IG Leasing	4.40	12.43	-1.62	7.08	Aa3/A1	66.35	-1.82	-2.18	85.49	-1.59	-2.18
Municipal Sector Index - IG Special Tax	4.35	13.65	-2.05	6.73	Aa1/Aa2	36.55	-0.80	-1.56	80.22	-0.64	-2.32
Municipal Sector Index - IG Tobacco Index	4.58	11.77	0.11	6.87	A1/A2	84.44	-1.73	-1.78	103.58	-1.62	-1.79
to II TOV											

^{*}Spread to TSY

Z-Score - Red Indicates Rich, Green Indicates Cheap

We expect Supply in 2023 to Underwhelm Even Lowered Expectations

- We expect total gross issuance this year to be in the range \$380 390 billion. A convergence of inhibitors kept supply much lower than expected in 2023. The most severe inhibitor was that volatility of municipal interest rates severely hindered refinancing volume.
- We should expect some recovery in 2024 thanks to:
- Recession fears, which have finance officers advising their states to conserve cash piles rather than spend them down.
- Pension underperformance, which will be a strain on general funds for states that are continuing to try to catch up with contributions.
- Inflation-driven cost increases, both operating (wages) and fixed (pensions with COLA adjustments).

Ex	Expectation for total gross issuance for full year 2023 \$378 Billion									
	ance (incl. AMT) Billion	Taxable issuance (incl. Corporate CUS \$36 Billion								
New Money	Refundings	New Money	Refundings							
\$282 Billion	\$60 Billion	\$32 Billion	\$4 Billion							

Estimated Net Issuance Breakdown (\$Billions)										
	Tax-Exempt	Taxable	Total							
Total Gross Issuance	342	36	378							
Total Maturing Bonds	191	31	222							
Total Calls Due to Refundings	93	6	99							
Calls due to prior advance refundings	22	4	26							
Calls due to current refundings	71	2	73							
Grand Total for Redemptions	284	37	321							
Net Issuance	58	-1	57							

We expect the Municipal Market to Expand Marginally in CY 2023

- In 2023, we expect the municipal market will expand by about \$57 billion in notional terms, though the expansion would be around \$74 billion in market value terms.
- The trends in the municipal holdings varied vs. prior years owing to the mutual fund outflow cycle of 2022, though ETFs continue to increase their footprint.
- Bank demand was weak as per expectations and insurance companies continue to shrink their municipal holdings.

Expected progression of municipal holdings over 2023 (in market value)

	2	021	2	022			2023		
Investor Class	YE 2021 holdings (\$Billions)	YE 2021 holdings (as % of total)	YE 2022 holdings (\$Billions)	YE 2022 holdings (as % of total)	Q2 2023 holdings (\$Billions)	Q2 2023 holdings (as % of total)	Expected Change over CY 2023 (\$Billions)		Expected Q4 2023 Holdings as \$ of Total
Households and Nonprofits (Direct)	1,016	19%	891	23%	979	25%	97	988	25%
SMAs	789	18%	727	19%	716	18%	5	732	19%
Mutual Funds	991	22%	746	19%	763	19%	34	780	20%
US Banks	631	14%	580	15%	548	14%	-63	517	13%
Property and Casualty Companies (P&Cs)	289	7%	2,416	6%	234	6%	-25	221	6%
Life Insurance Companies (LICs)	235	5%	192	5%	191	5%	-2	190	5%
Money Market Funds (MMFs)	111	2%	118	3%	121	3%	6	124	3%
Foreign Investors	119	3%	108	3%	108	3%	0	108	3%
Exchange-Traded Funds (ETFs)	83	2%	104	3%	107	3%	6	110	3%
Closed-End Funds (CEFs)	98	2%	82	2%	82	2%	0	82	2%
State and Local Governments	22	0%	26	1%	30	1%	9	35	1%
Nonfinancial Corporate Business	27	1%	24	1%	24	1%	1	25	1%
Security Brokers and Dealers	13	0%	12	0%	16	0%	7	19	0%
Others**	24	1%	21	1%	21	1%	1	22	1%
Total Outstanding (or Change in Outstanding) in MARKET Value Total Outstanding (or Change in Outstanding) in Par Value	4,448.2 4,076.9	100%	3,878.3 4,023.8	100%	3,941.3 4,043.1	100%	74.3 57.0	3,953.0 4,080.8	100%

Source: Fed Reserve, Wells Fargo, October 12, 2023

Municipal Trading Volumes Are Up Year-to-Date

Daily Trading Volume (\$Billions)	UST	Agency MBS	Non-Agency	Corporates	Municipals	Agency Debt	ABS	Total
2012	519.5	279.8	4.6	22.6	11.3	10.7	1.5	850.0
2013	546.5	221.8	4.0	24.7	11.2	7.3	1.3	816.8
2014	505.0	177.4	3.7	26.7	9.9	6.0	1.5	730.2
2015	490.0	192.3	3.1	27.9	8.6	5.2	1.4	728.6
2016	519.1	209.5	2.8	30.0	11.1	5.4	1.3	779.2
2017	505.2	208.7	2.3	30.9	10.8	4.2	1.4	763.5
2018	547.8	219.0	1.6	31.5	11.6	3.5	1.4	816.4
2019	593.6	249.0	1.4	34.3	11.5	4.2	1.5	895.4
2020	603.2	291.1	1.9	38.9	12.0	5.3	1.9	954.3
2021	624.1	279.3	1.4	37.0	8.8	3.2	1.4	955.2
2022	614.3	240.6	1.4	38.3	14.1	2.8	1.6	913.2
YTD 2023	750.8	247.9	1.3	40.6	14.5	3.7	1.7	1060.5
10Yr Change		-11%	-71%	79%	29%	-65%	11%	

Snapshot of the Municipal High Yield Universe

Unrated Bonds Form 82% of all High Yield Tax-Exempt Debt

Sector	Tax-Exempt Speculative Grade Long- Term Debt Outstanding* (\$MM)	Tax-Exempt Unrated Long-Term Debt Outstanding* (\$MM)	Tax-Exempt Total *(\$mm)
Education	12,919	23,801	36,720
Housing	2,224	29,851	32,075
Special Tax District	68	25,130	25,197
Development	11,213	11,686	22,900
CCRC	4,186	18,189	22,375
Hospital	7,717	14,004	21,721
Tobacco	3,964	13,441	17,405
GO	573	15,907	16,480
Sales Tax Securitization	83	16,337	16,421
Other Tax Securitization	2,783	8,667	11,450
Water & Sewer	1,636	9,041	10,677
Highway	65	3,677	5,742
Airport	7	4,016	4,023
Appropriated Debt	635	2,780	3,415
Power	51	2,371	2,422
Governmental Guaranteed	20	634	653
Lease-Backed	0	0	0
Other	1,497	31,943	33,440
Total	49,641	233,475	283,116

Unrated Bonds Form 91% of all High Yield Taxable Debt

Sector	Taxable Speculative Grade Long- Term Debt Outstanding* (\$MM)	Taxable Unrated Long-Term Debt Outstanding* (\$MM)	Taxable Total* (\$mm)
GO	67	4,665	4,731
Education	1,668	2,644	4,312
Development	53	3,638	3,691
Other Tax Securitization	106	2,927	3,033
Appropriated Debt	17	3,005	3,022
Housing	31	2,089	2,120
Sales Tax Securitization	0	2,102	2,102
Hospital	343	1,381	1,724
Water & Sewer	0	985	985
Power	12	812	824
Airport	0	592	592
CCRC	59	525	584
Tobacco	145	146	291
Special Tax District	0	186	186
Pension Obligation	0	141	141
Highway	0	88	88
Government Guaranteed	8	41	49
Lease-Backed	0	0	0
Other	370	4,296	4,664
Total	2,878	30,261	33,139

Municipal Distress Remains Limited to a Handful of Sectors

Municipal Defaults Since YE 2021

Default Detail	Amount Impacted (\$MM)
Debt Service Payment Default	2,374.99
Reserve Fund Withdrawal	2,162.77
Default Distribution	1,121.97
Technical Default	610.81
Forbearance Plan	607.49
Chapter 11	412.39
Status Update	397.59
Plan of Reorganization	202.91
Non-Compliance	197.36
Appointment of Receiver	160.59
Foreclosure/Sale of Project	125.62
Loan/Lease Payment Default	68.79
Chapter 9	16.77
Chapter 7	6.59
Foreclosure Cancelled	2.10
Dutch Auction	2.10
Moficiation of Indenture	2.10
Grand Total	8,472.94

Municipal Defaults Since YE 2021

Sector	Amount Impacted
36001	(\$MM)
Nursing Homes	1,951.09
General	1,702.05
Development	1,458.99
Medical	1,016.40
Build America Bonds	625.48
Power	486.82
Housing	310.88
Facilities	212.57
Multifamily Housing	173.79
Water	139.70
Mello-Roos	114.53
Education	100.28
Pollution	70.02
Airport	35.98
Transportation	32.44
Utilities	18.86
Higher Education	12.57
General Obligation	10.48
Grant Total	8,472,92

CCRC, HY Hospital & Dirt bond sectors face varying levels of duress

Municipal Defaults Since YE 2021

Bloomberg Sector	Amount Impacted (\$MM)
CCRC	1,326.18
DEV	1,266.95
HOSP	982.87
PUBPWR	967.73
ASST	711.76
PILOT	649.19
HOTELTAX	326.30
TIF	269.16
STDHSG	229.27
NFPCULT	217.67
PKFAC	200.00
MEL	145.42
WTRSWR	133.95
APPROP	132.21
LMFH	131.87
SPLASMT	103.63
SALESTAX	89.19
ILF	87.89
CHRT	82.03
SOLWST	70.02

Municipal Defaults Since YE 2021

Bloomberg Sector	Amount Impacted (\$MM)
CDD	41.91
HGR	39.82
APRT	38.07
SMFH	35.63
MDD	33.53
PKGTD	31.44
MISCTAX	31.16
NUR	26.41
PUBTRAN	11.48
NFPMO	8.38
NFPHSP	8.38
GO	6.29
TELCOM	6.29
MISC	6.29
PENSN	6.29
PVTS	5.68
NFPFNDN	4.19
GODIST	4.19
JAIL	4.19
Grand Total	8,472.92

Corporate & Investment Banking



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