Municipal Markets Brief

Taxable advance refundings primer

US Fixed Income Strategy

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- Through 10/23/2019, YTD issuance of taxable advance refunding bonds (including muni and corporate cusip) has grown to $21bn or 42% of total taxable municipal and corporate cusip YTD issuance ($50bn), with $32bn issued since the beginning of August
- Taxable advance refunding issuance has been heaviest in 10yr, 30yr, and 20yr maturities, at $1.9bn, $1.8bn, and $1.6bn, respectively. Issuance has been concentrated in education, toll roads/airport, and healthcare sectors
- 70% of issuance has been AA or better, and only 4.6% of bonds have BBB or lower ratings. This demonstrates that lower rated taxable muni yields generally do not provide enough savings to justify a refinancing
- Note that, taxable advance refunings are viable for both new money and refunded tax-exempt bonds. Additionally, once the refunded tax-exempt bond reaches the call date, there is potential to tax-exempt advance refund the taxable refunding bonds
- However, if the refunding bonds are corporate cusip, or municipal cusip without a call option, the bonds can not be tax-exempt advance refunded in the future
- There are two primary considerations in determining the viability of taxable advance refunding of tax-exempt debt: first and foremost, cash flow savings are a function of the interest cost (par value * stated coupon) on the current tax-exempt bonds less the interest cost (new par value * new stated coupon) on the taxable advance refunding bonds
- The second key consideration is the amount of bond proceeds needed to fund the escrow. This cost is a function of the number of years until the call date on the refunded tax-exempt bond, the interest rate on the UST bonds in escrow, as well as the coupon on the refunded bonds. Of these factors, years until the call date is the dominate feature in determining the amount of additional bond proceeds needed
- The average coupons on AA taxable refunding bonds are extremely low relative to the stated coupon on tax-exempts. The coupon on par taxable muni refunding bonds in 15yrs, 20yrs, and 25yrs is just 3.02%, 3.36%, and 3.48%, respectively
- At current taxable municipal yields, we estimate double digit PV savings on 10yr 5% coupon bond with 2yrs or less to call, 15yr bonds with a 3yr or earlier call date, and 20-25yr bonds with 4yrs or less to the call date
- Savings are far more difficult to come by when refunding 4% coupon bonds versus 5% bonds. Broadly speaking, at current levels, only a narrow band of 4% 10-15-20yr bonds with 1-2yrs to call, achieve a PV savings in the 5-9% range
- Based on our estimation, taxable municipal yields could increase a fair amount before the level of savings on 5% tax-exempt bonds becomes unappealing
- Even at a 50bps increase in taxable rates, the ~$32bn in 5% coupon bonds in 10yrs and longer with 2yrs or shorter to the call date, would still provide PV savings of greater than 9%

See page 11 for analyst certification and important disclosures.

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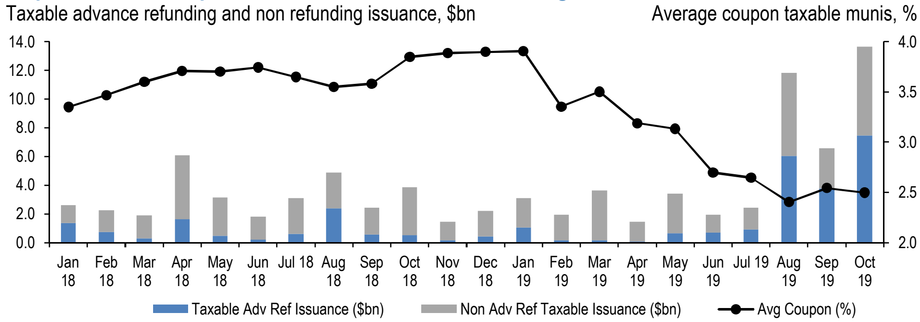
Everything you need to know about taxable advance refunding

In our 09/13/2019 publication, we discussed the burgeoning trend of advance refunding tax-exempt debt with taxable municipal bonds. At the most basic level, the widespread adoption of this type of advance refunding was instigated by the **repeal of tax-exempt advance refunding of existing tax-exempt debt,** dictated in the Tax Cut and Jobs Act (implemented in 2018) and **the current low rate environment across fixed-income markets.**

As illustrated in Exhibit 1, taxable advance refundings did not take off until taxable municipal rates dropped leading into August ($6bn) of this year. Through 10/23/2019, **YTD issuance of taxable advance refunding bonds (including muni and corporate cusip) has grown to $21bn or 42% of total taxable municipal and corporate cusip YTD issuance ($50bn) (Exhibit 1), with $32bn issued since the beginning of August.** Additionally, there are another $7.4bn in taxable muni refunding deals spread over 17 issuers, on the public calendar that have yet to be brought to market.

In this report, we compile and update past materials on taxable advance refundings, as well as **profile taxable advance refundings to date, approximate the potential opportunity set of future refundings, take a deep dive into how taxable refundings achieve cash flow savings, and analyze the sensitivity of taxable advance refunding volume to changes in key market rates.**

Exhibit 1: YTD issuance of taxable advance refundings (Muni + Corp cusip) has been ~$21bn, with almost all of the issuance are after Aug 2019. Lower taxable muni yields are chiefly responsible for the spike in taxable muni advance refunding



Source: Bloomberg, JP Morgan Note: As of 10/23/2019. Taxable municipal advance refunding and corp cusip refinancing included.

Exhibit 2 displays the maturity and sector allocation of taxable advance refundings thus far in 2019. Issuance has been the largest in 10yr, 30yr, and 20yr maturities, at $1.9bn, $1.8bn, and $1.6bn, respectively. In 5-9yr, volume ranges from $830mn to $1.5bn across maturities.

The largest sector is higher education/school district, with $4.9bn sold this year. The next largest sectors are Toll Roads/Airport ($3.9bn) and healthcare ($2.6bn, majorities are sold in Corp CUSIP).

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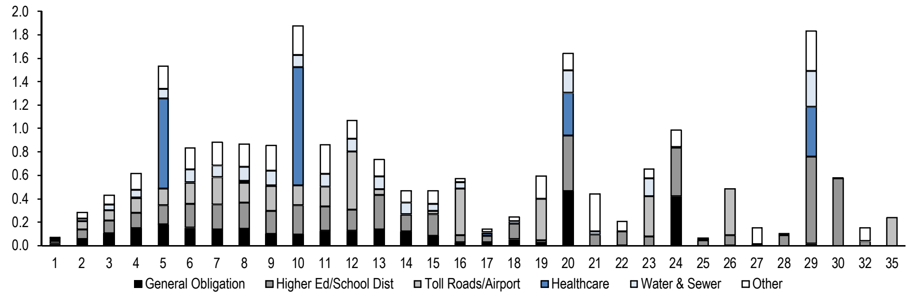
Exhibit 2: Taxable advance refunding issuance have been heaviest in 10yr, 30yr, and 20yr maturities, at $1.9bn, $1.8bn, and $1.6bn, respectively. Issuance has been concentrated in education, toll roads/airport, and healthcare sectors

YTD issuance by maturity and sector, $bn



Source: Bloomberg, JP Morgan. Note: As of 10/23/2019. 2019 YTD issuance only. $700mn of 30yr maturity CommonSpirit Health included. Taxable municipal advance refunding and corp cusip refinancing included.

Currently, based on the number of cusips, the vast majority of taxable advance refunding bonds are relatively small, with amount outstanding of less than $5mn. However, when viewed by amount outstanding, the majority of bonds are in the $10mn-$50mn and $300-$500mn buckets (Exhibit 3).

Looking at the YTD supply by credit quality, not surprisingly, most are highly rated as **70% of issuance has been AA or better, and only 4.6% of bonds have BBB or lower ratings.** This demonstrates that lower rated taxable muni yields generally do not provide enough savings to justify a refinancing. Within the A rated bucket, we note that the A- proportion is infinitesimal.

Exhibit 3: Currently, based on the number of cusips, the vast majority of taxable advance refunding bonds are relatively small, with amount outstanding of less than $5mn. However, when viewed by amount outstanding, the majority of bonds are in the $10mn-$50mn and $300-$500mn buckets. 70% of the issuance is AA or better, and only 4.6% of the bonds are BBB rated or lower

CUSIP Size	Total Amount Outstanding ($mn)	# of CUSIP	% Amt Outstanding
0-5mn	2,907	1,879	14.1%
5mn-10mn	1,772	258	8.6%
10mn-50mn	5,229	251	25.4%
50mn-100mn	1,988	30	9.7%
100mn-300mn	1,758	13	8.5%
300mn-500mn	5,514	16	26.8%
500mn+	1,420	2	6.9%
Total	20,588	2,449	100.0%

Rating Bucket	Total Amount Outstanding ($mn)	# of CUSIP	% Amt Outstanding
AAA	2,050	367	10.0%
AA	12,403	1,729	60.2%
A	5,178	299	25.2%
BBB	944	28	4.6%
NR	12	26	0.1%
Total	20,588	2,449	100.0%

Source: Bloomberg, JP Morgan Note: 2019 YTD issuance only, as of 10/23/2019. Taxable municipal advance refunding and corp cusip refinancing included.

Opportunity Set

In attempting to forecast the amount of taxable advance refundings to come, in this section we discuss **the approximate amount of tax-exempt debt outstanding that would generate 5% or greater PV savings, given the execution of a taxable advance refunding.** This estimate is based on the profile of the refundings done year-to-date and not a detailed analysis of the cash flows on the individual bonds. Bear in mind that **the continued viability of these refunding transactions is dependent on rates in the taxable municipal market and 1-5yr UST yields.** Further, issuers have differing savings thresholds, as a 5% PV cash flow

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savings might motivate some issuers to advance refund debt, while others await larger savings.

Based on taxable advance refunding debt issued YTD, and range bound taxable municipal/UST 1-5yr rates, **we estimate that there is about $150bn of tax-exempt bonds outstanding that are candidates for advance refunding.** This set of eligible tax-exempt bonds meets the following criteria: **5% or higher coupon, A or better rated bonds, callable in 5yrs or less, with term maturities from 10-30yrs.** We also view **4% coupons, A or better rated bonds, callable in 2yrs or less, with term bonds maturing from 10-20yrs** as currently viable refunding opportunities.

Note that, taxable advance refunings are viable for **both new money and refunded tax-exempt bonds.** Additionally, once the refunded tax-exempt bond reaches the call date, **there is potential to tax-exempt advance refund the taxable refunding bonds.** However, if the refunding bonds are corporate cusip, or municipal cusip without a call option, the bonds can not be tax-exempt advance refunded in the future.

Primary considerations in determining cash flow savings

Following is a detailed discussion of the savings produced in taxable advance refundings and the sensitivity of those savings to changes in taxable municipal yields. The diagram below illustrates the revenue that back the cash flows from the issuance of the tax-exempt refunded bond to the maturity on the taxable refunding bonds (Exhibit 4). There are two primary considerations in determining the viability of taxable advance refunding of tax-exempt debt: **first and foremost, cash flow savings are a function of the interest cost (par value * stated coupon) on the current tax-exempt bonds less the interest cost (new par value * new stated coupon) on the taxable advance refunding bonds.**

The second key consideration is the cost associated with financing the coupon payments on the refunded tax-exempt bonds, between the refunding date and the call date on the bonds. The higher the stated coupon and longer the period from refunding date to call date, the larger the amount of additional proceeds required to finance the payments (escrow).

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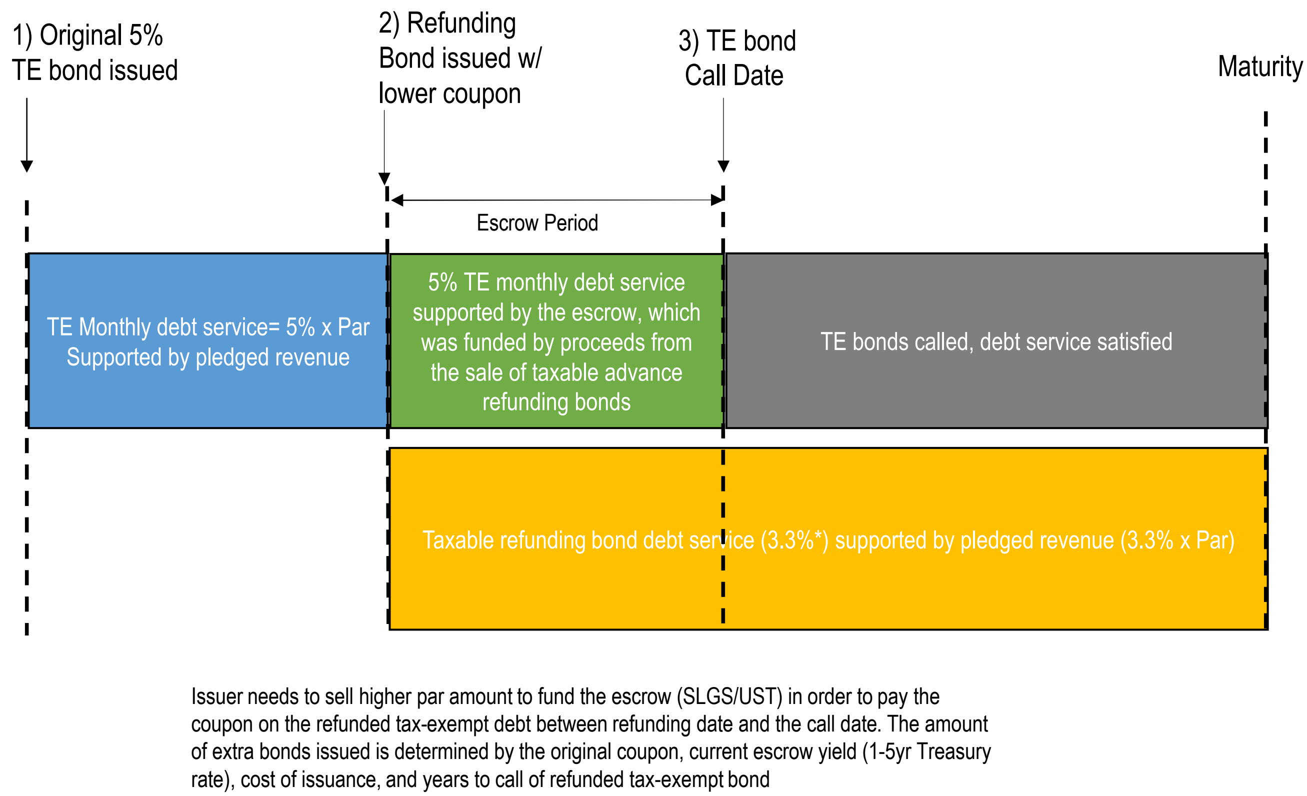
Exhibit 4: Diagram of debt service in a taxable advance refunding transaction



Source: JP Morgan. Note: *20yr AA taxable muni rate of 3.3% used for illustration

As stated earlier, the most essential factor in determining of the viability of taxable advance refundings, is the stated coupon on par issued AA taxable municipal bonds. This is effectively the refinancing rate, before funding the escrow and paying any fees. In Exhibit 5, we provide the recent average coupon on AA rated taxable municipal advance refunding bonds. It is worth noting, that current taxable rates are ~20bps higher than the prior lows, hit in August of this year. **Perhaps, this is a factor in the rapid acceleration of taxable advance refundings, as issuers seek to achieve cash flow savings before rates rise further.**

As illustrated in Exhibit 5 below, **the average coupons on AA taxable refunding bonds are extremely low relative to the stated coupon on tax-exempts. The coupon on par taxable muni refunding bonds in 15yrs, 20yrs, and 25yrs is just 3.02%, 3.36%, and 3.48%, respectively.** Obviously, this refinancing rate compares highly favorably to the preponderance of tax-exempt callable 4-5% coupon bonds outstanding in the market.

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Exhibit 5: The average coupon on par taxable muni refunding bonds in 15yrs, 20yrs, and 25yrs was just 3.02%, 3.36%, and 3.48%, respectively

Average coupon on taxable refunding bonds issued at par, %

Maturity	Average	School District	Higher Education	Water & Sewer	Appropriations	Loan Pool	Others
2020	1.86	1.84	1.76			1.99	
2021	1.99	1.97	1.83	2.10	1.93	1.99	2.03
2022	2.05	2.03	1.93	2.17	1.96	2.16	2.08
2023	2.11	2.09	2.02	2.22	2.01	2.26	2.11
2024	2.19	2.19	2.07	2.32	2.06	2.36	2.19
2025	2.36	2.33	2.32	2.44	2.25	2.50	2.36
2026	2.45	2.40	2.42	2.54	2.35	2.60	2.46
2027	2.57	2.53	2.53	2.68	2.49	2.69	2.58
2028	2.64	2.55	2.61	2.73	2.54	2.74	2.65
2029	2.68	2.54	2.64	2.95	2.59	2.79	2.72
2030	2.74	2.63	2.69		2.69	2.89	2.78
2031	2.86	2.73	2.79		2.79	2.99	2.93
2032	2.90	2.82	2.90		2.89	3.09	2.91
2033	2.94	2.89	2.95		2.99	3.19	2.93
2034	3.02	2.94	3.00	3.18	3.04	3.24	2.99
2035	3.07	2.99	3.08		3.09	3.29	3.05
2036	3.09	2.95			3.12		3.15
2037	3.18	3.00	3.38		3.17		
2038	3.23				3.20		3.25
2039	3.36	3.38	3.30	3.55			3.16
2040	3.26		3.45	3.34			3.00
2042	3.40		3.40				
2043	3.27		3.27				
2044	3.48	3.48					
2046	3.23						3.23
2049	3.80			3.80			

Source: Bloomberg, JP Morgan. Note: Taxable advance refunding bonds issued from 10/14/2019 to 10/22/2019, 10yr UST ranged 1.74%-1.79% during this period

The cost of funding the escrow is critical in assessing the savings derived by advance refunding tax-exempt debt. Exhibit 6 shows the additional percentage of par required to fund the purchase of bonds to be placed in escrow. **The amount of bond proceeds needed is a function of the number of years until the call date on the refunded tax-exempt bond, the interest rate on the UST bonds in escrow, as well as the coupon on the refunded bonds. Of these factors, years until the call date is the dominate feature in determining the amount of additional bond proceeds needed.** Exhibit 6 illustrates the percentage of par needed to fund the escrow for 4% and 5% coupon bonds, with escrow periods (call dates) ranging from 1-6 years.

As a rule of thumb, using current market levels, funding the escrow on 5% bonds requires an additional 3.2% of the original par amount for each year until the call date. 4% coupon bonds would require 2.3% of par per year, over the life of the escrow. **4% bonds however generally provide far lower overall savings,** even though **4's require less additional par to fund the escrow, as the monthly cash flow payments/savings are lower than those on similar 5% coupon bonds.**

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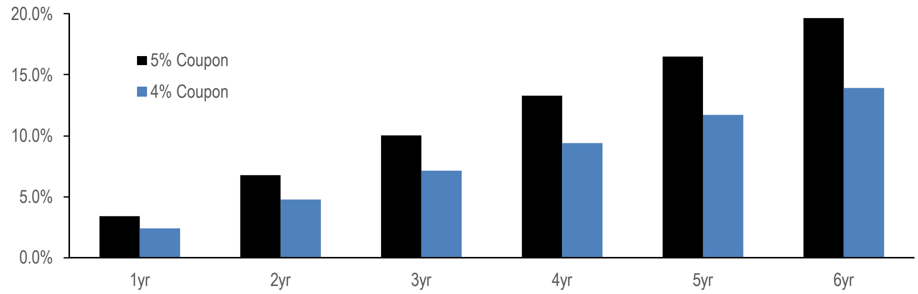
Exhibit 6: Using current market levels, funding the escrow on 5% bonds requires an additional 3.2% of the original par amount, for each year until the call date. 4% generally provide far lower savings, even though 4's require far less additional par, as the monthly cash flow payments/savings are lower than for similar 5% coupon bonds

Additional par need to fund escrow, %



Source: JP Morgan Note: assume 1% cost of issuance and escrow yield equals to 1.56%

Exhibit 7, shows the total PV cash flow savings achieved by refunding 5% coupon bonds based current AA taxable municipal rates, 1-5yr escrow periods, and fees of 1% of par. **The matrix shows PV savings for the refundings at lower and higher taxable rates, to give a sense for the impact of changing taxable municipal yields on PV savings.** The analysis also includes a series of final maturities and time to call, to provide context for which tax-exempt bonds are most likely to be advance refunded.

Generally speaking, at current taxable municipal bond rates, 10yr and longer, 5% tax-exempt bonds with 5yrs or less remaining to call, achieve PV savings 5-20%. Savings increase as the maturity lengthens and the time to call shortens. **At current taxable municipal yields, we estimate double digit savings on 10yr 5% coupon bond with 2yrs or less to call, 15yr bonds with a 3yr or earlier call date, and 20-25yr bonds with 4yrs or less to the call date.**

Conversely, PV savings decrease as rates on the taxable municipal refunding bonds rise and maturity shortens. Savings also decline as the years to call on the tax-exempt refunded bonds increase and the coupon on the refunded bond falls.

For example, refunding a 20yr 5% tax-exempt bond with 3-years until the call date, ***would currently generate ~13.6% savings,*** when refunded with a AA ***taxable municipal bond yielding around the market rate of 3.30%.*** This assumes a market like SLGS rate of 1.56% and fees of 1.0%.

Using the above example, we see that advance refunding the same 20yr 5% tax-exempt bonds with 3yrs to call, ***if taxable municipal rates rose 70bps (to 4.0%), would only result in only 4.7% PV savings.*** Further, ***extending the time to call to 5-years,*** using a 4% taxable municipal rate, completely ***eliminates the savings (-0.3%).***

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Exhibit 7: PV cash flow savings achieved by refunding 5% coupon bonds based current AA taxable municipal rates and the indicated length of escrow. At current taxable municipal yields, we estimate double digit savings on 10yr 5% coupon bond with 2yrs or less to call, 15yr bonds with 3yrs or earlier call date, and 20-25 bonds with 4yrs or less to the call date

PV Saving		Taxable rate														
Refunded Coupon	5%							Current								
Years to Maturity	Years to Call	1.60%	1.70%	1.80%	1.90%	2.00%	2.10%	2.20%	2.30%	2.40%	2.50%	2.60%	2.70%	2.80%	2.90%	3.00%
5	3	3.2%	3.0%	2.8%	2.6%	2.4%	2.2%	2.0%	1.8%	1.6%	1.5%	1.3%	1.1%	0.9%	0.7%	0.5%
	2	7.2%	6.9%	6.6%	6.3%	6.0%	5.7%	5.4%	5.1%	4.8%	4.5%	4.2%	3.9%	3.6%	3.3%	3.0%
	1	11.2%	10.8%	10.4%	10.0%	9.6%	9.1%	8.7%	8.3%	7.9%	7.5%	7.1%	6.8%	6.4%	6.0%	5.6%
		Taxable rate														
								Current								
		2.10%	2.20%	2.30%	2.40%	2.50%	2.60%	2.70%	2.80%	2.90%	3.00%	3.10%	3.20%	3.30%	3.40%	3.50%
10	5	5.1%	4.7%	4.2%	3.7%	3.3%	2.8%	2.4%	1.9%	1.5%	1.1%	0.7%	0.2%	-0.2%	-0.6%	-1.0%
	4	9.0%	8.5%	7.9%	7.3%	6.7%	6.2%	5.6%	5.1%	4.5%	4.0%	3.5%	2.9%	2.4%	1.9%	1.4%
	3	13.0%	12.3%	11.6%	10.9%	10.2%	9.5%	8.9%	8.2%	7.6%	6.9%	6.3%	5.7%	5.1%	4.5%	3.9%
	2	17.0%	16.1%	15.3%	14.5%	13.8%	13.0%	12.2%	11.5%	10.7%	10.0%	9.2%	8.5%	7.8%	7.1%	6.4%
	1	21.0%	20.1%	19.1%	18.2%	17.3%	16.5%	15.6%	14.7%	13.9%	13.0%	12.2%	11.4%	10.5%	9.7%	8.9%
		Taxable rate														
								Current								
		2.40%	2.50%	2.60%	2.70%	2.80%	2.90%	3.00%	3.10%	3.20%	3.30%	3.40%	3.50%	3.60%	3.70%	3.80%
15	5	11.7%	10.8%	9.9%	9.0%	8.1%	7.2%	6.4%	5.5%	4.7%	3.9%	3.1%	2.3%	1.6%	0.8%	0.1%
	4	15.6%	14.6%	13.5%	12.5%	11.5%	10.5%	9.6%	8.6%	7.7%	6.8%	5.9%	5.0%	4.2%	3.3%	2.5%
	3	19.5%	18.4%	17.2%	16.1%	15.0%	13.9%	12.9%	11.8%	10.8%	9.8%	8.8%	7.8%	6.8%	5.9%	4.9%
	2	23.5%	22.2%	21.0%	19.8%	18.6%	17.4%	16.2%	15.0%	13.9%	12.8%	11.7%	10.6%	9.5%	8.5%	7.4%
	1	27.5%	26.2%	24.8%	23.5%	22.1%	20.8%	19.6%	18.3%	17.1%	15.8%	14.6%	13.5%	12.3%	11.1%	10.0%
		Taxable rate														
								Current								
		2.70%	2.80%	2.90%	3.00%	3.10%	3.20%	3.30%	3.40%	3.50%	3.60%	3.70%	3.80%	3.90%	4.00%	4.10%
20	5	14.5%	13.2%	11.9%	10.7%	9.4%	8.2%	7.1%	5.9%	4.8%	3.8%	2.7%	1.7%	0.6%	-0.3%	-1.3%
	4	18.4%	17.0%	15.6%	14.2%	12.9%	11.6%	10.3%	9.1%	7.8%	6.7%	5.5%	4.3%	3.2%	2.1%	1.1%
	3	22.3%	20.8%	19.3%	17.8%	16.4%	15.0%	13.6%	12.2%	10.9%	9.6%	8.3%	7.1%	5.9%	4.7%	3.5%
	2	26.3%	24.7%	23.0%	21.5%	19.9%	18.4%	16.9%	15.5%	14.0%	12.6%	11.3%	9.9%	8.6%	7.3%	6.0%
	1	30.3%	28.6%	26.8%	25.2%	23.5%	21.9%	20.3%	18.7%	17.2%	15.7%	14.2%	12.8%	11.3%	9.9%	8.6%
		Taxable rate														
								Current								
		2.90%	3.00%	3.10%	3.20%	3.30%	3.40%	3.50%	3.60%	3.70%	3.80%	3.90%	4.00%	4.10%	4.20%	4.30%
25	5	16.3%	14.7%	13.1%	11.6%	10.1%	8.6%	7.2%	5.8%	4.5%	3.2%	1.9%	0.7%	-0.5%	-1.7%	-2.9%
	4	20.2%	18.4%	16.8%	15.1%	13.5%	11.9%	10.4%	8.9%	7.5%	6.1%	4.7%	3.4%	2.0%	0.8%	-0.5%
	3	24.1%	22.3%	20.5%	18.7%	17.0%	15.3%	13.7%	12.1%	10.6%	9.0%	7.6%	6.1%	4.7%	3.3%	2.0%
	2	28.1%	26.1%	24.2%	22.4%	20.5%	18.8%	17.0%	15.3%	13.7%	12.0%	10.5%	8.9%	7.4%	5.9%	4.5%
	1	32.1%	30.0%	28.0%	26.1%	24.1%	22.3%	20.4%	18.6%	16.8%	15.1%	13.4%	11.8%	10.2%	8.6%	7.0%

Source: JP Morgan. Note: Assume spread between long date taxable yields to SLGS rates (1.56% at current level) unchanged in the analysis and 1% of cost of issuance

In Exhibit 8, **we display the PV savings on tax-exempt 4% coupon refunded bonds based on the same taxable municipal rates and maturities, displayed in the prior exhibit for 5% coupon bonds.** From the exhibit it is clear that savings are far more difficult to come by when refunding 4% coupon bonds versus 5% bonds. Broadly speaking, at current levels, only a narrow band of 4% 10-15-20yr bonds with 1-2yrs to call, achieve a PV savings in the 5-9% range.

Using the example highlighted above, 4% coupons with 20yr to maturity, and 3yrs to call, would only achieve 2% PV savings and likely not be good candidates for refunding. This same example would achieve ~13.6% savings when refunding a 5% coupon tax-exempt bond.

Note that our calculation assume that the spread curve, the difference between taxable rate and SLGS rates, is unchanged. The SLGS yield will likely increase as

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the taxable yield increase. **If curve steepened, we would see less savings than the table illustrated.**

Exhibit 8: Savings are far more difficult to come by when refunding 4% coupon bonds versus 5% bonds. Broadly speaking, at current levels, only a narrow band of 4% 10-15-20yr bonds with 1-2yrs to call, achieve a PV savings in the 5-9% range

PV Saving		Taxable rate														
Refunded Coupon	4%							Current								
Years to Maturity	Years to Call	1.60%	1.70%	1.80%	1.90%	2.00%	2.10%	2.20%	2.30%	2.40%	2.50%	2.60%	2.70%	2.80%	2.90%	3.00%
5	3	1.4%	1.2%	1.0%	0.8%	0.6%	0.5%	0.3%	0.1%	-0.1%	-0.3%	-0.5%	-0.6%	-0.8%	-1.0%	-1.2%
	2	4.4%	4.1%	3.8%	3.5%	3.2%	2.9%	2.6%	2.3%	2.1%	1.8%	1.5%	1.2%	0.9%	0.7%	0.4%
	1	7.4%	7.0%	6.6%	6.2%	5.8%	5.4%	5.0%	4.6%	4.3%	3.9%	3.5%	3.1%	2.7%	2.3%	2.0%
		Taxable rate														
								Current								
		2.10%	2.20%	2.30%	2.40%	2.50%	2.60%	2.70%	2.80%	2.90%	3.00%	3.10%	3.20%	3.30%	3.40%	3.50%
10	5	1.1%	0.6%	0.2%	-0.2%	-0.7%	-1.1%	-1.5%	-1.9%	-2.3%	-2.7%	-3.1%	-3.5%	-3.9%	-4.2%	-4.6%
	4	4.0%	3.5%	2.9%	2.4%	1.8%	1.3%	0.8%	0.3%	-0.2%	-0.7%	-1.2%	-1.7%	-2.2%	-2.6%	-3.1%
	3	7.0%	6.3%	5.7%	5.0%	4.4%	3.7%	3.1%	2.5%	1.9%	1.3%	0.7%	0.1%	-0.5%	-1.0%	-1.6%
	2	10.0%	9.2%	8.4%	7.7%	6.9%	6.2%	5.5%	4.8%	4.1%	3.3%	2.7%	2.0%	1.3%	0.6%	0.0%
	1	13.0%	12.1%	11.3%	10.4%	9.5%	8.7%	7.9%	7.1%	6.2%	5.4%	4.6%	3.9%	3.1%	2.3%	1.6%
		Taxable rate														
								Current								
		2.40%	2.50%	2.60%	2.70%	2.80%	2.90%	3.00%	3.10%	3.20%	3.30%	3.40%	3.50%	3.60%	3.70%	3.80%
15	5	4.1%	3.2%	2.4%	1.6%	0.8%	0.0%	-0.8%	-1.6%	-2.3%	-3.1%	-3.8%	-4.5%	-5.2%	-5.8%	-6.5%
	4	7.0%	6.1%	5.1%	4.2%	3.3%	2.4%	1.5%	0.6%	-0.2%	-1.1%	-1.9%	-2.7%	-3.5%	-4.3%	-5.0%
	3	10.0%	8.9%	7.9%	6.8%	5.8%	4.8%	3.8%	2.8%	1.9%	0.9%	0.0%	-0.9%	-1.8%	-2.7%	-3.5%
	2	13.0%	11.8%	10.6%	9.5%	8.4%	7.3%	6.2%	5.1%	4.0%	3.0%	2.0%	1.0%	0.0%	-1.0%	-2.0%
	1	16.0%	14.7%	13.4%	12.2%	11.0%	9.8%	8.6%	7.4%	6.2%	5.1%	4.0%	2.9%	1.8%	0.7%	-0.4%
		Taxable rate														
								Current								
		2.70%	2.80%	2.90%	3.00%	3.10%	3.20%	3.30%	3.40%	3.50%	3.60%	3.70%	3.80%	3.90%	4.00%	4.10%
20	5	4.0%	2.8%	1.7%	0.6%	-0.5%	-1.6%	-2.6%	-3.7%	-4.6%	-5.6%	-6.6%	-7.5%	-8.4%	-9.3%	-10.1%
	4	7.0%	5.7%	4.4%	3.2%	2.0%	0.8%	-0.3%	-1.5%	-2.6%	-3.6%	-4.7%	-5.7%	-6.7%	-7.7%	-8.7%
	3	9.9%	8.5%	7.2%	5.8%	4.5%	3.2%	2.0%	0.8%	-0.4%	-1.6%	-2.8%	-3.9%	-5.0%	-6.1%	-7.1%
	2	12.9%	11.4%	9.9%	8.5%	7.1%	5.7%	4.3%	3.0%	1.7%	0.4%	-0.8%	-2.0%	-3.2%	-4.4%	-5.6%
	1	15.9%	14.3%	12.8%	11.2%	9.7%	8.2%	6.7%	5.3%	3.9%	2.5%	1.2%	-0.2%	-1.5%	-2.7%	-4.0%
		Taxable rate														
								Current								
		2.90%	3.00%	3.10%	3.20%	3.30%	3.40%	3.50%	3.60%	3.70%	3.80%	3.90%	4.00%	4.10%	4.20%	4.30%
25	5	3.5%	2.1%	0.7%	-0.7%	-2.0%	-3.3%	-4.5%	-5.7%	-6.9%	-8.1%	-9.2%	-10.3%	-11.3%	-12.4%	-13.3%
	4	6.4%	4.9%	3.4%	1.9%	0.5%	-0.9%	-2.2%	-3.6%	-4.8%	-6.1%	-7.3%	-8.5%	-9.7%	-10.8%	-11.9%
	3	9.4%	7.7%	6.1%	4.6%	3.0%	1.5%	0.1%	-1.3%	-2.7%	-4.1%	-5.4%	-6.7%	-7.9%	-9.2%	-10.3%
	2	12.4%	10.6%	8.9%	7.2%	5.6%	4.0%	2.4%	0.9%	-0.6%	-2.0%	-3.4%	-4.8%	-6.2%	-7.5%	-8.8%
	1	15.4%	13.5%	11.7%	9.9%	8.2%	6.5%	4.8%	3.2%	1.6%	0.1%	-1.5%	-2.9%	-4.4%	-5.8%	-7.2%

Source: JP Morgan. Note: Assume spread between long date taxable yields to SLGS rates (1.56% at current level) unchanged in the analysis and 1% of cost of issuance

When will taxable advance refundings fall out of favor

While it is impossible to define a uniform level of savings that would end the recent spate of taxable advance refundings, the prior two exhibits provide insight into the impact of changing taxable municipal yields on PV savings. **Based on the savings shown in the exhibits above, taxable municipal yields could increase a fair amount before the level of savings on 5% tax-exempt bonds becomes unappealing.** For example, a 30bps increase in taxable municipal yields would still provide 9-10% PV savings on 15yr and longer 5% bonds, with 3yrs or shorter to call. An increase of 50bps however would limit viable candidates to those with 2yrs or less remaining until the call date.

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Finally, we stated above that at current taxable municipal yields, the pool of viable tax-exempt bonds that are candidates for taxable advance refunding was ~$150bn. A 10bps increase in taxable municipal bond yields would decrease this opportunity set by ~$35bn-$40bn, as bonds with 5yrs to call would be less compelling refunding candidates. Another 30bps (40bps total), would wipe out another ~$40bn (~$80bn total) in the opportunity set, as bonds with 4yrs to call would be less compelling refunding candidates. **Even at a 50bps increase in taxable rates, the ~$32bn in 5% coupon bonds in 10yrs and longer with 2yrs or shorter to the call date, would still provide PV savings of greater than 9%.**

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