State Debt Management Network

an affiliate of the

NATIONAL ASSOCIATION OF STATE TREASURERS

Post Tax Reform: Now What?

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Elimination of Advance Refundings

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- Advance refundings on a tax-exempt basis were prohibited as of January 1, 2018 by the Tax Cuts and Jobs Act of 2017.
- Advance refundings were a valuable tool for states and local issuers to lock in savings prior to the call date of outstanding bonds.
- The structure allowed the savings to accrue prior to the call date.
- Advance refundings made up a significant portion of overall municipal market issuance.

Alternatives to Advance Refundings

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- There are many alternatives to advance refundings:
  - Current Refundings
  - Taxable Advance Refundings
  - Forward Starting Refundings
  - Forward Starting Swaps
  - Swaptions
  - Hedging with Fixing a Portion of a Variable Rate Portfolio
  - Cash Defeasance and Issue New Money Bonds
- Creative market participants will come up with more alternatives.

Alternatives to Advance Refundings

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- States should evaluate alternative products by understanding their mechanics, their risks and benefits.

Product	Description	Risks/Disadvantages	Benefits
Current Refunding	Wait and issue refunding bonds within 90 days of call date.	• Interest rate risk. • Savings are not available until after the call date.	• Simple to execute. • No hedging costs. • Has been the best performing option in recent years.
Taxable Advance Refunding	Issue taxable bonds to advance refund tax-exempt bonds.	• Significantly higher costs than a theoretical tax-exempt advance refunding. • High break-even versus tax-exempt current refunding. Universal cap considerations.	• Simple to execute. • Locks in savings. • Can achieve savings prior to the call date.
Forward Refunding	Price bonds for delivery in the future (within 90 days of call date).	• Forward premium and illiquidity premium. • Potential closing conditions such as no changes in law that impact the validity, tax-status or registration of the securities, no false or misleading information disclosed at time of initial closing and no banking moratorium. • Failure of underwriter to purchase bonds. • Savings not available prior to call date. • Higher costs of issuance with two closings and required supplemental official statement at time of delivery. • May have to use internal funds for costs of issuance payable after pricing and before closing.	• Locks in savings. • Relatively simple. • Interest rate risk is eliminated at pricing. • Transaction risk eliminated at delivery. • Investor assumes ratings and financial conditions risks.

Alternatives to Advance Refundings

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Product	Description	Risks/Disadvantages	Benefits
Forward Starting Swap	Price a swap today that will begin accruing at a specified time within 90 days of the call date ("Effective Date"). Issuer pays a fixed rate and receives a floating rate, probably SIFMA. Issuer issues variable rate refunding bonds at the time the swap becomes effective. The swap creates a synthetic fixed rate. Issuer may also terminate the swap at the Effective Date and issue fixed rate debt to refund the outstanding bonds and to pay any mark-to-market on the swap.	• Relatively complex. • Need to comply with Dodd-Frank protocols. • Many additional documents required to be negotiated. • Incur swap related risks including basis, counterparty, downgrade and termination risk. • May not be able to pay entire termination payment out of bond proceeds. • Must monitor swap position and counterparty credit on an on-going basis. • May have to post collateral.	• Locks in relative economics, but subject to basis risk and other swap related risks. • Efficient pricing of forward premium. • May achieve greater projected savings than available in bond market.
Swaption	Receive an upfront payment today to sell an option to a counterparty to enter into an "off-market" swap in the future where the issuer pays a fixed rate and receives a floating rate. Fixed rate is usually based on coupon of refunded bonds minus assumed support costs. When option is exercised, the issuer must issue variable rate bonds to refund outstanding fixed rate debt or terminate swap.	• Same risks and disadvantages as forward starting swap.	• Receive upfront payment. • Volatility assumptions built into the swaptions may increase payment versus forward starting swap.

Alternatives to Advance Refundings*

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Product	Description	Risks/Disadvantages	Benefits
Fixing Variable Rate Bonds	Fix outstanding variable rate bonds and then issue variable rate bonds as a current refunding at the call date to effectuate refunding.	• Only works for issuers with variable rate portfolios that have similar amounts and duration as potential refunding candidates. • Lose any benefit of variable rate between fixed out date and actual issuance of variable rate bonds. • Fairly complex. • Savings scoring would have to analyzed.	• Issuer generated hedge without an explicit forward premium.
Cash Defeasance and Issue New Money Bonds	Use excess or paygo capital cash to defease high coupon bonds. Issue new money bonds to fund eligible capital projects.	• Requires discussion with bond counsel and tax analysis and cannot be considered “replacement proceeds”. • Separation of defeasance and new money issuance is required.	• Issuer generated hedge without an explicit forward premium.

*Other less common structures include Cinderella Bonds, Bond Tenders, Sale of Optional Redemption Right.

Evaluation of Alternatives

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- We believe that states and other strong credits will generally pursue current refundings.
- The supply of current refunding candidates will eventually grow to produce a steady stream after several years:
  - Advance refundings have taken away many potential current refunding candidates over the next one to three years.
  - Build America Bonds issued in 2009 and 2010 generally were not issued with par calls and therefore the amount of bonds refundable for savings in the 2019 to 2020 timeframe is reduced.
  - Majority of candidates remaining are non-advance refundable under the prior law and bonds that have not been advance refunded for other reasons.
- After this general decline in supply available (in 2019 and 2020), there should be a reliable supply of current refunding candidates.
- At this point, we do not see a significant resurgence of swaps after the financial crisis, which highlighted their risks.
- To evaluate the economics of different options, we created a hypothetical refunding opportunity.

Assumptions

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- Refunded Bond Series Candidate:
  - $500 million issued in 2009
  - Series assumed to be issued with level debt service and a call date on 2/1/2019
  - Includes $309.8 million of callable bonds
  - Mature from 2/1/2010 to 2/1/2029
  - All 5% coupons
- Refunding Bond Series assumptions:
  - Issuance/Commitment date 2/1/2018
  - Forward scenarios assume a 11/5/2018 Delivery Date
  - MMD, Treasuries and Swap Curve as of COB 2/15/2018
  - Costs of Issuance of $250,000 and Underwriter's Discount of $4.00 per bond
  - Tax-Exempt credit spreads at 15 bps over MMD
  - Taxable credit spreads range from 20-80 bps over the respective Treasury spot rate
  - Tax-Exempt Forward premium of 7 bps per month (9 months Forward = 63 bps)
  - Swap scenarios include 45 bps for liquidity and 5 bps for remarketing on variable rate bonds.
  - Savings statistics are present valued at 3% to the Issuance/Commitment Date (2/1/18)

Results Illustration

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RESULTS COMPARISON ($ in 000s)

Scenario	Issuance Date	True Interest Cost (TIC)	Gross Savings	Net PV Savings	Net PV Savings as a % of Refunded	Breakeven to Current
Current Refunding	11/1/2018	2.461%	$46,945	$39,058	12.607%	-
Tax-Exempt Advance Refunding (Under Prior Law)	2/1/2018	2.510%	44,756	37,332	12.050%	0.110%
Taxable Advance Refunding	2/1/2018	3.440%	23,389	19,875	6.415%	1.200%
Forward Starting Refunding	11/1/2018	3.160%	33,353	27,751	8.957%	0.710%
Forward Starting Swap[1]	11/1/2018	2.988%	36,492	30,563	9.865%	0.530%
Swaption[2]	11/1/2018	2.957%	31,812	31,829	10.274%	0.450%

(1) Refunding debt service includes ancillary fees associated with the issuance of variable rate bonds.
(2) Refunding debt service includes ancillary fees associated with the issuance of variable rate bonds. Net PV Savings include the premium received at execution of the Swaption.

Alternative Call Features Going Forward

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- To provide more flexibility going forward, issuers are considering short calls and make-whole calls.
- For many years, the preferred structure in the municipal market has been 10-year par calls.
  - Investors received call protection for 10 years and issuers had an option whose value could be locked in prior to the call date with a tax-exempt advance refunding option.
  - With tax-exempt advance refundings no longer available, the option is worth slightly less.
- Question – if issuers were comfortable with 10-year par calls in prior years, why change now?
- Short calls produce more optionality, but at a cost of a higher yield to maturity and less proceeds upfront.

Comparison of Short Calls Versus 10-year Par Call

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- The table compares 3, 5, 7, and 10-year par calls for a 15 year maturity with a 5% coupon.

REDEMPTION PROVISION COMPARISON

Scenario	Maturity	Call Date	Coupon	MMD 2/21/2018	Spread	Stated Yield (to Call)	Bond Price	Bond YTM	Option Adjusted Yield	Savings vs. 10-Yr Par Call
10 Year Call	3/1/2033	3/1/2028	5.000%	2.770%	0.100%	2.870%	118.348%	3.423%	3.036%	
3 Year Call	3/1/2033	3/1/2021	5.000%	2.770%	-0.400%	2.370%	107.490%	4.315%	3.064%	-0.029%
5 Year Call	3/1/2033	3/1/2023	5.000%	2.770%	-0.300%	2.470%	111.756%	3.952%	3.004%	0.031%
7 Year Call	3/1/2033	3/1/2025	5.000%	2.770%	-0.100%	2.670%	114.721%	3.709%	3.009%	0.026%

- In general, issuers considering short calls should evaluate the pricing at the time of issuance and take into consideration the cost of gaining optionality.
- In addition, consider benefits of diversifying call features for:
  - Better overall market reception for a particular pricing, and
  - Having various call features in a debt portfolio to provide potential refunding opportunities in specific years and consistent cost averaging.

Comparison of Short Calls Versus 10-year Par Call (Continued)

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- The table below summarizes the call option analysis for the State of Wisconsin General Obligation Bonds of 2018, Series A, which have a 5-year par call.

STATE OF WISCONSIN GENERAL OBLIGATION BONDS OF 2018, SERIES A REDEMPTION PROVISION COMPARISON

Scenario	Maturity	Call Date	Coupon	MMD 2/21/2018	Spread	Stated Yield (to Call)	Bond Price	Bond YTM	Option Adjusted Yield	Savings vs. 10-Yr Par Call
10 Year Call	5/1/2024	5/1/2028	5.000%	2.100%	0.040%	2.140%	116.340%	2.140%	2.140%	
5 Year Call	5/1/2024	5/1/2023	5.000%	2.100%	-0.050%	2.050%	114.287%	2.473%	2.233%	-0.093%
10 Year Call	5/1/2025	5/1/2028	5.000%	2.220%	0.050%	2.270%	117.870%	2.270%	2.270%	
5 Year Call	5/1/2025	5/1/2023	5.000%	2.220%	-0.100%	2.120%	113.921%	2.829%	2.383%	-0.113%
10 Year Call	5/1/2026	5/1/2028	5.000%	2.340%	0.060%	2.400%	119.092%	2.400%	2.400%	
5 Year Call	5/1/2026	5/1/2023	5.000%	2.340%	-0.150%	2.190%	113.556%	3.100%	2.516%	-0.116%
10 Year Call	5/1/2027	5/1/2028	5.000%	2.430%	0.070%	2.500%	120.287%	2.500%	2.500%	
5 Year Call	5/1/2027	5/1/2023	5.000%	2.430%	-0.180%	2.250%	113.245%	3.307%	2.612%	-0.112%
10 Year Call	5/1/2028	5/1/2028	5.000%	2.500%	0.080%	2.580%	121.444%	2.580%	2.580%	
5 Year Call	5/1/2028	5/1/2023	5.000%	2.500%	-0.200%	2.300%	112.986%	3.468%	2.684%	-0.104%
10 Year Call	5/1/2029	5/1/2028	5.000%	2.570%	0.090%	2.660%	120.652%	2.824%	2.736%	
5 Year Call	5/1/2029	5/1/2023	5.000%	2.570%	-0.220%	2.350%	112.728%	3.601%	2.778%	-0.042%
10 Year Call	5/1/2030	5/1/2028	5.000%	2.630%	0.100%	2.730%	119.964%	3.021%	2.846%	
5 Year Call	5/1/2030	5/1/2023	5.000%	2.630%	-0.250%	2.380%	112.574%	3.703%	2.862%	-0.015%
10 Year Call	5/1/2031	5/1/2028	5.000%	2.680%	0.100%	2.780%	119.475%	3.174%	2.922%	
5 Year Call	5/1/2031	5/1/2023	5.000%	2.680%	-0.250%	2.430%	112.317%	3.799%	2.936%	-0.014%
10 Year Call	5/1/2032	5/1/2028	5.000%	2.720%	0.100%	2.820%	119.086%	3.299%	2.977%	
5 Year Call	5/1/2032	5/1/2023	5.000%	2.720%	-0.250%	2.470%	112.112%	3.878%	2.988%	-0.012%

Comparison of Short Calls Versus 10-year Par Call (Continued)

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- The table below summarizes the call option analysis for the State of Wisconsin General Obligation Bonds of 2018, Series A, which have an 8-year par call.

STATE OF WISCONSIN GENERAL OBLIGATION BONDS OF 2018, SERIES A REDEMPTION PROVISION COMPARISON

Scenario	Maturity	Call Date	Coupon	MMD 2/21/2018	Spread	Stated Yield (to Call)	Bond Price	Bond YTM	Option Adjusted Yield	Savings vs. 10-Yr Par Call
10 Year Call	5/1/2033	5/1/2028	4.000%	2.770%	0.430%	3.200%	106.870%	3.414%	3.181%	
8 Year Call	5/1/2033	5/1/2026	4.000%	2.770%	0.380%	3.150%	106.050%	3.482%	3.135%	0.045%
10 Year Call	5/1/2034	5/1/2028	4.000%	2.820%	0.430%	3.250%	106.425%	3.476%	3.217%	
8 Year Call	5/1/2034	5/1/2026	4.000%	2.820%	0.380%	3.200%	105.682%	3.534%	3.172%	0.045%
10 Year Call	5/1/2035	5/1/2028	4.000%	2.860%	0.430%	3.290%	106.070%	3.525%	3.245%	
8 Year Call	5/1/2035	5/1/2026	4.000%	2.860%	0.380%	3.240%	105.389%	3.576%	3.202%	0.044%
10 Year Call	5/1/2036	5/1/2028	4.000%	2.890%	0.430%	3.320%	105.805%	3.562%	3.265%	
8 Year Call	5/1/2036	5/1/2026	4.000%	2.890%	0.380%	3.270%	105.170%	3.609%	3.224%	0.041%

- The 5-year call option generally produces higher option adjusted yields than a hypothetical 10-year call.
  - The longer bonds are close to breakeven.
- The 8-year call option produces lower option adjusted yields than a hypothetical 10-year call.

Make-Whole Calls

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- Make-whole calls have been traditionally used in the taxable market.
- There have been some make-whole calls on tax-exempt transactions, but none so far in 2018 and many on more specialized bond issues such as utilities and health care.
- With a make-whole call, typically an issuer can redeem bonds at the greater of
  - at least 100% of amortized value or
  - the present value of the remaining principal and interest payments on the bonds at a specified rate tied to MMD.
- It is more advantageous to the issuer that the cash flows be present-valued to the par call date.
- In that way, an issuer can retain the benefits of any advance refunding by exercising the make-whole call and performing a current refunding.
- The major difference to issuers is that instead of determining escrow costs based on the yield on the permitted defeasance securities (Treasuries and in some cases, Agencies), the make-whole cost is based on discounting the cash flows through the par call date at tax-exempt rates tied to MMD.
- Also the minimum redemption price could be a factor.

Make-Whole Calls (Continued)

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- From an investor perspective, the make-whole call could generate a capital gain which would not have been generated if the bonds were escrowed to the call date and held by the investor.
- Some investors are also concerned with giving more optionality to issuers.
- It is not clear what the market will accept because of limited experience with tax-exempt make-whole calls.
- The make whole call calculation amount on the limited examples of recent tax-exempt transactions has been the greater of
  - 102% of amortized value or
  - the present value of the cash flows at either flat MMD or a specified level through MMD.
- And even with provisions that are not particularly issuer friendly, investors may demand higher yields initially.

Make-Whole Calls – Cost Analysis

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MAKE WHOLE CALL ANALYSIS

Delivery Date	2/26/2018
Par Call	3/1/2028
Refunding Date	3/1/2025

Maturity Date	Coupon	MMD	Spread	Yield	Price
3/1/2033	5.00%	2.74%	0.40%	3.14%	115.875%
3/1/2038	5.00%	2.91%	0.40%	3.31%	114.304%
3/1/2043	5.00%	2.98%	0.40%	3.38%	113.664%
3/1/2048	5.00%	3.03%	0.40%	3.43%	113.210%

	Make Whole Call Price Calculation					Prior Regime Adv. Ref.		
	Amortized Cost		Present Value Cost		Make-Whole	Escrow Cost	Make-Whole	Make-Whole
Maturity	Amortized Cost	Amt. Cost X 102%	PV Rate 3 Yr MMD	PV Cost	Call Price	Esc. Yield: 2.36%	Additional Escrow Cost	Additional Annualized Cost
3/1/2033	105.285%	107.391%	1.67%	109.704%	109.704%	107.603%	2.1%	0.30%
3/1/2038	104.788%	106.884%	1.67%	109.704%	109.704%	107.603%	2.1%	0.20%
3/1/2043	104.585%	106.677%	1.67%	109.704%	109.704%	107.603%	2.1%	0.16%
3/1/2048	104.439%	106.528%	1.67%	109.704%	109.704%	107.603%	2.1%	0.13%

Additional make whole cost driven by difference between treasury yield in adv. ref. escrow and tax exempt borrowing rate in PV calc.

Advance Refunding Build America Bonds (BABs)

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- Bond Attorneys, with input from Treasury and the IRS, are in the process of reaching a consensus that BABs are advance refundable in certain circumstances.
- The thought is that refunding BABs would not result in two sets of tax-exempt bonds being outstanding.
- The simplest circumstance is when there is legal defeasance.
- A legal defeasance of BABs, unlike tax-exempt bonds, is considered a reissuance for tax purposes.
- With the reissuance, the BABs subsidy payment is eliminated.
- At that point, there is the ability to issue tax-exempt bonds for the original eligible projects and to advance refund the taxable BABs.
- If legal defeasance is not possible, for example for GOs of certain states, the view of tax attorneys is less clear.
  - Under discussion is the possibility of issuers either disclaiming future subsidies or not filing the required form to receive subsidies in order to advance refund BABs.

Advance Refunding BABs (continued)

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- The elimination of the subsidy adds to the cost of advance refunding BABs.
- Below is an example that illustrates cost:

ASSUMPTIONS:

Refunded Bond Series Candidate:

- $390 million BABs issued in December 2009
- Series assumed call date of 2/1/2020
- Includes $265.8 million of callable bonds
- Assumes 32.7% subsidy (reflects current sequester of 6.6%)

Refunding Bond Series assumptions:

- Issuance/Commitment date 2/1/2018
- Current scenarios assume a 2/1/2020 Delivery Date
- MMD as of COB 2/15/2018
- BABs subsidy is forgone in advance refunding escrow
- Costs of Issuance of $250,000 and Underwriter's Discount of $4.00 per bond
- Tax-Exempt credit spreads at 15 bps over MMD
- Savings statistics are discounted at 3% to the Issuance/Commitment Date (2/1/18)

RESULTS COMPARISON ($ in 000s)

	Current Refunding of Build America Bonds	Advance Refunding of Build America Bonds[1]
Issuance Date	2/1/2020	2/1/2018
Par Amount Refunded	265,755,000	265,755,000
Refunded Bond Debt Service[2]	322,437,423	341,491,688
Par Amount Issued	233,980,000	241,980,000
Refunding Bond Debt Service	302,895,250	337,447,250
Escrow Cost[3]	265,755,000	281,946,639
True Interest Cost (TIC)	2.450%	2.625%
Gross Savings	19,542,173	4,044,438
Net PV Savings	15,617,718	2,331,724
Net PV Savings as a % of Refunded	5.877%	0.877%
Breakeven to Current	-	0.890%

(1) Assumes subsidy is lost after issuance date and escrow cost reflects full taxable interest expenses.

(2) Refunded Bond debt service is net of Federal Subsidy (35% adjusted for the current sequestration of 6.6% = Net subsidy of 32.69%).

(3) Escrow cost reflects foregone BABs subsidy (approximately $10.2 million between 2018 - 2020).

Bank Loans

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- Interest rates on bank loans may increase as banks adjust their municipal tax-exempt exposure due to the tax exemption not being worth as much at the lower corporate tax rates following Tax Reform.
- Gross-up provisions in direct purchase documents may mean that certain issuers will see interest rates rise on their existing tax-exempt debt.
  - In the event of a change in the bank's corporate tax rate which causes a reduction in the tax-equivalent yield on the bonds, the interest payable on the bonds may be increased by the bank to compensate for such change.
  - May be discretionary or mandatory.
  - Rates would rise according to the formula outlined in the loan documents.
    - Example: (1 - new tax rate) divided by (1 – old tax rate), or a multiplier of 1.215
    - a 2% interest rate becomes 2.43%
- Given the change in the corporate tax rates new bank loans are likely to be more expensive and banks may be less willing to offer bank loans.

Questions?

Appendix: Dodd-Frank Swap Regulation

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- Dodd-Frank and Commodity Futures Trading Commission (CFTC) rulemaking have established Business Conduct Rules for dealers.
  - To provide safe harbors which include Issuer representations and the need for a governmental entity to have a Qualified Independent Representative (QIR) that is independent from the swap dealer.
- Before a swap dealer will engage in discussions or executions with a municipal counterparty (Special Entity), dealers require Issuers to adhere to the August 2012 and March 2013 Protocols, which effectively amend any existing ISDA Agreements to allow them to fulfill their regulatory obligations.
- Issuers also can enter into bilateral agreements instead of adhering to protocols.
- Regulations require issuers to select a QIR, i.e., a swap advisor to advise on the appropriateness and pricing of the swap.
  - Maintain internal written policies and procedures, including swap policies regarding the selection and monitoring of a QIR.
  - The Issuer and the QIR make certain representations to the swap dealer.
  - The swap dealer is required to make certain determinations in order to do business with the Issuer as a swap counterparty.

Appendix: Dodd-Frank Swap Regulation

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- Regulations also mandate Special Entities to:
  - Obtain or certify a “Legal Entity Identifier: from DTCC-SWIFT (one legal identifier per legal entity)
  - Participate in the Protocols
    - Sign-up on a web site
    - Pay a Fee
    - Sign an adherence letter (agreement to participate in the Protocol)
  - Maintain and keep all records related to Swaps for a least five years from swap date to be able to produce records if required by any regulatory authority.
- Issuers should also amend their swap policy to provide for the recordkeeping requirements and hiring and supervising a QIR.

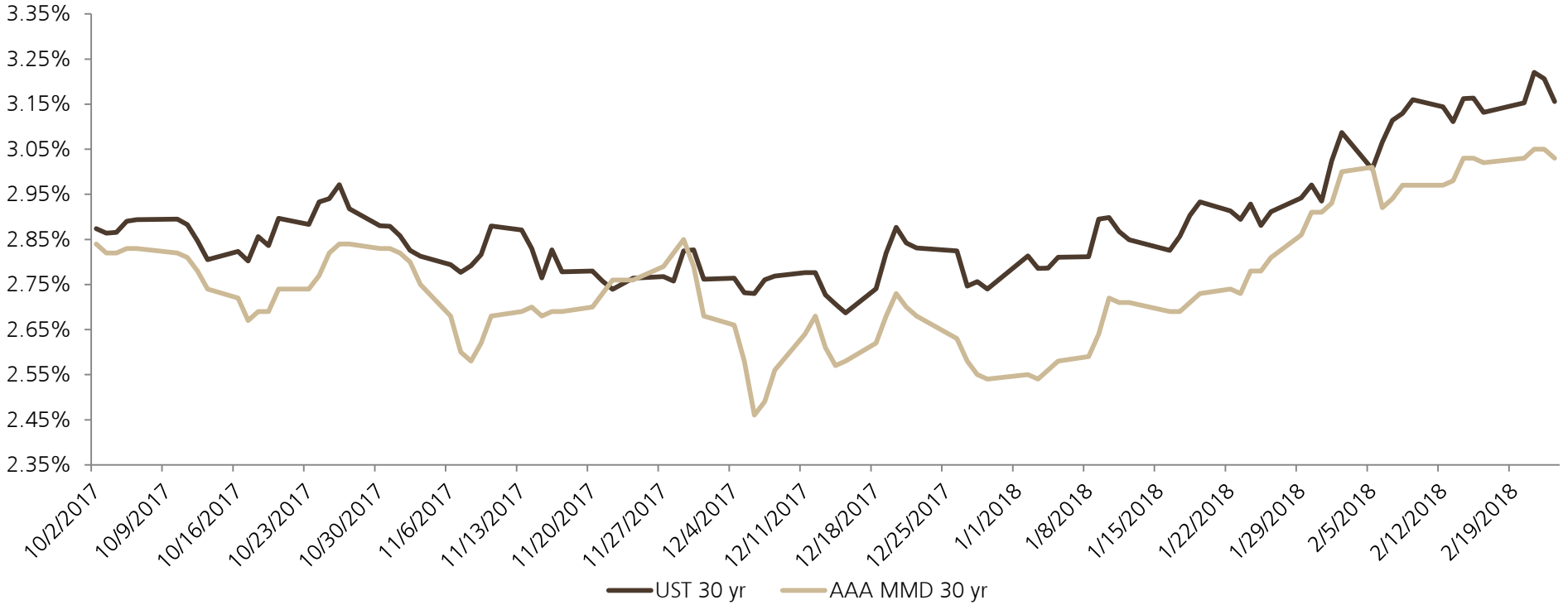
Post Tax Reform: Now What?

Angelia Schmidt, Head of Municipal Underwriting

AAA MMD & UST Yields

Due to a variety of market factors, rates have been volatile and upward trending since December

AAA MMD & UST Yields



Yield	Low	High	Difference
10 Yr. MMD	1.88	2.47	+59 bps
10 Yr. UST	2.27	2.94	+67 bps
30 Yr. MMD	2.46	3.05	+59 bps
30 Yr. UST	2.69	3.22	+53 bps

Source: Thomson Reuters – The Municipal Market Monitor (TM3) as of 02/23/2018

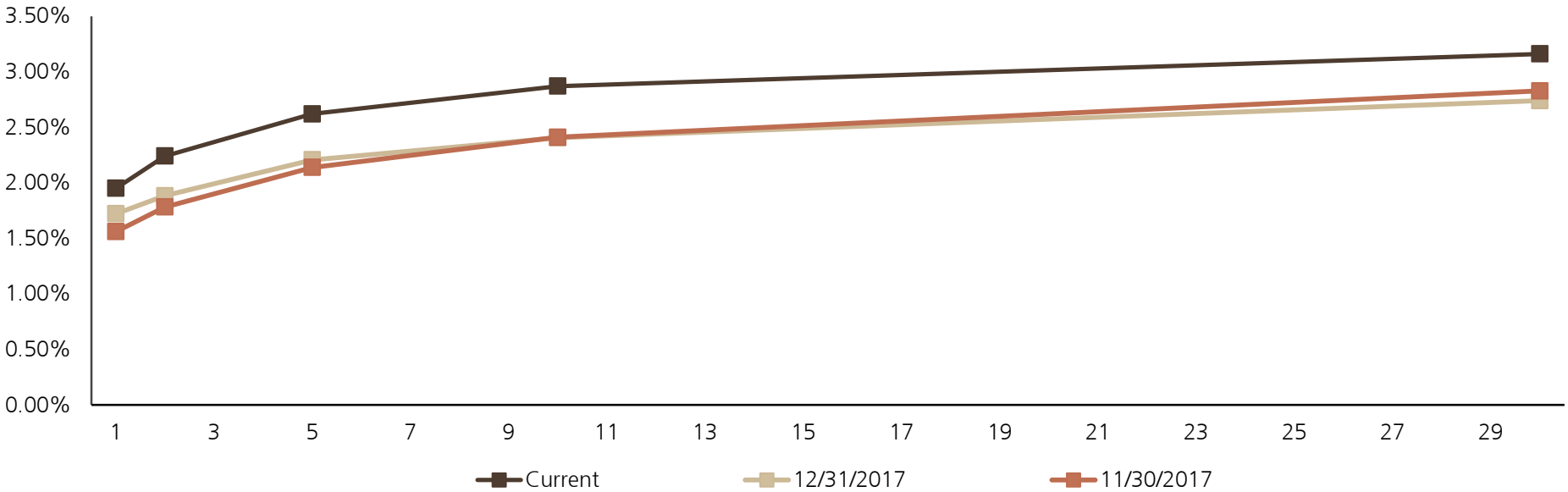
UST Yield Curve Since November 2017

The UST curve has shifted upwards and is expected to flatten further in 2018, driven by:

- Potential for at least three rate hikes this year
- Strong economy and rising inflation expectations
- Concerns surrounding increased Treasury issuance

UST Yield Curves

Yield (y), Years to Maturity (x)



Maturity Year	Current UST	12/31/2017	11/30/2017
2 Yr.	2.24%	+36 bps	+47 bps
5 Yr.	2.62%	+41 bps	+48 bps
10 Yr.	2.87%	+46 bps	+46 bps
30 Yr.	3.16%	+42 bps	+33 bps

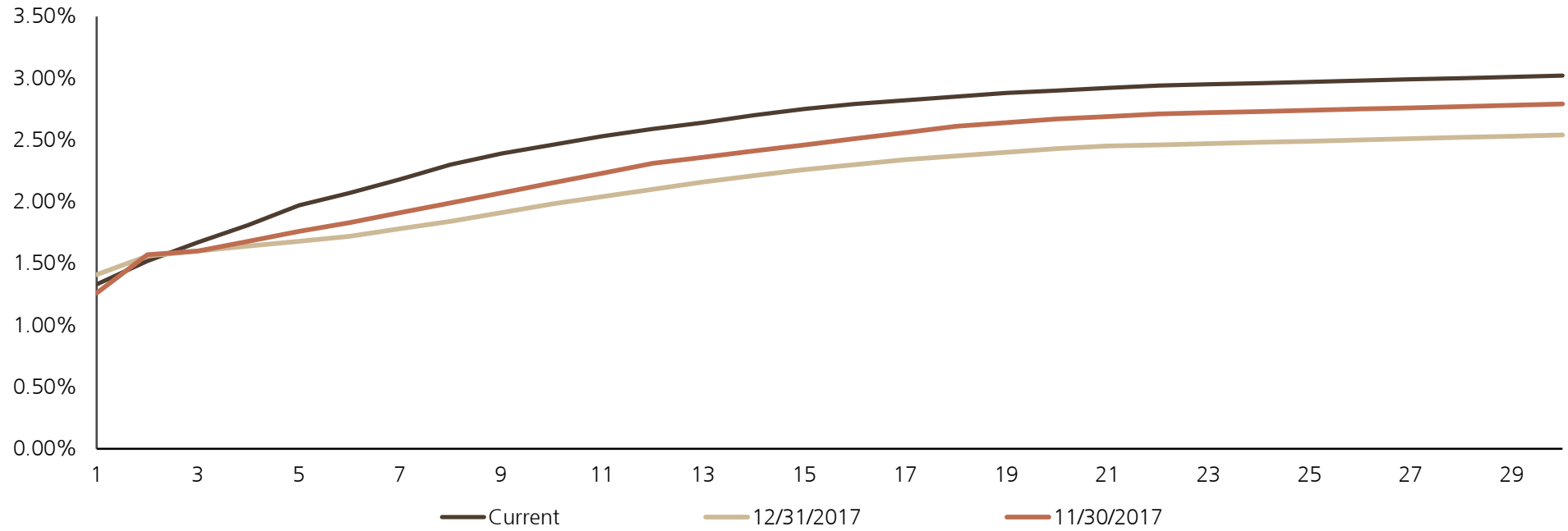
Source: Thomson Reuters – The Municipal Market Monitor (TM3) as of 02/23/2018

AAA MMD Yield Curve Since November 2017

The municipal curve has also shifted upwards, though has generally outperformed USTs and has actually steepened year-to-date

AAA MMD Yield Curves

Yield (y), Years to Maturity (x)



Maturity Year	Current AAA MMD	12/31/2017	11/30/2017
2 Yr.	1.52%	-4 bps	-5 bps
5 Yr.	1.96%	+28 bps	+20 bps
10 Yr.	2.45%	+47 bps	+30 bps
30 Yr.	3.03%	+49 bps	+24 bps

Source: Thomson Reuters – The Municipal Market Monitor (TM3) as of 02/23/2018

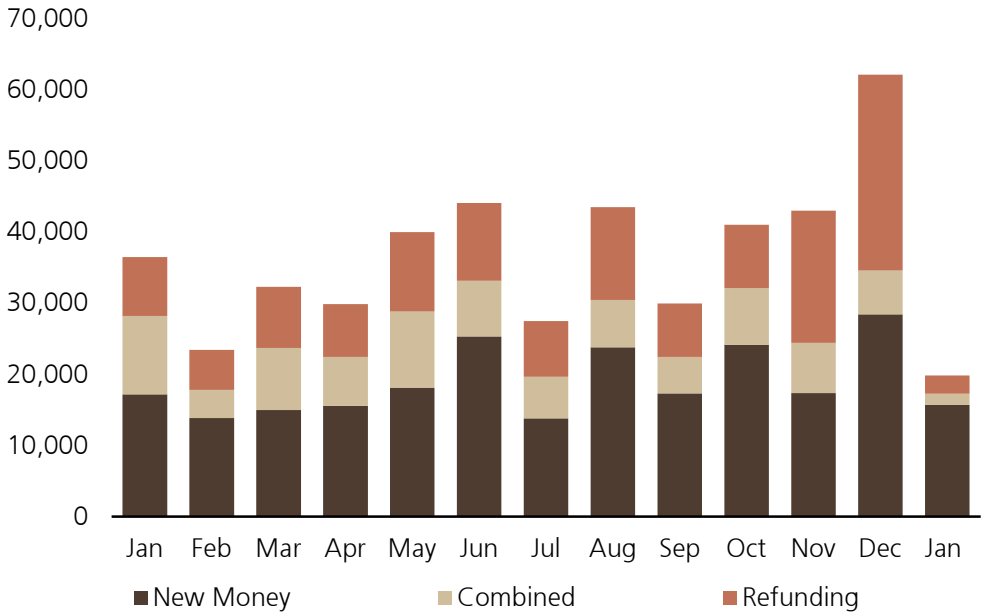
Municipal Market Volume Trends

Tax reform had a significant impact on municipal volume, creating a spike in new issuance during the last two months of 2017

- December had record volume of $62 billion, which was well absorbed by the market as many market participants accelerated municipal purchases in anticipation of reduced supply in 2018
- January had the lowest monthly supply since 2011, plummeting ~54% YoY, but the market faced a significant uptick in secondary offerings and a relative lack of liquidity

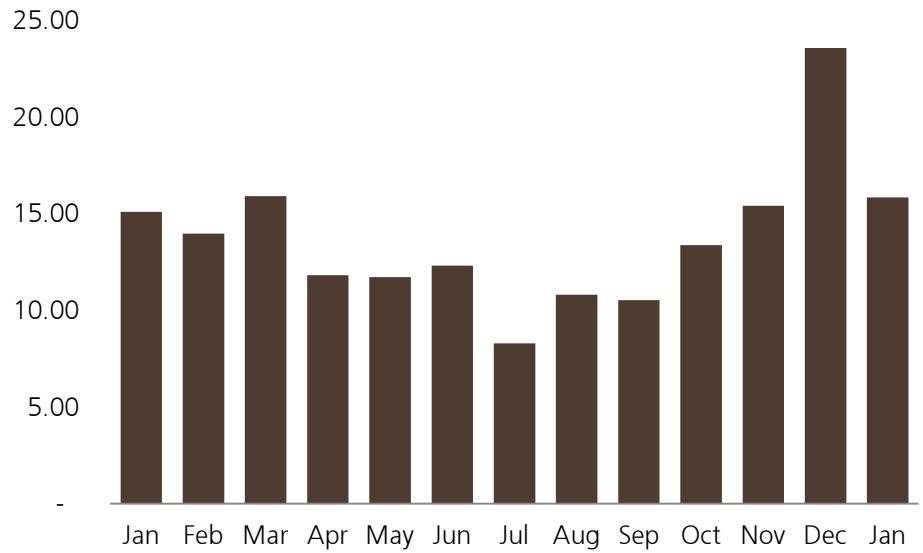
Monthly Volume by Use of Proceeds

Par Value ($ in mns)



Bids Wanted in Competition

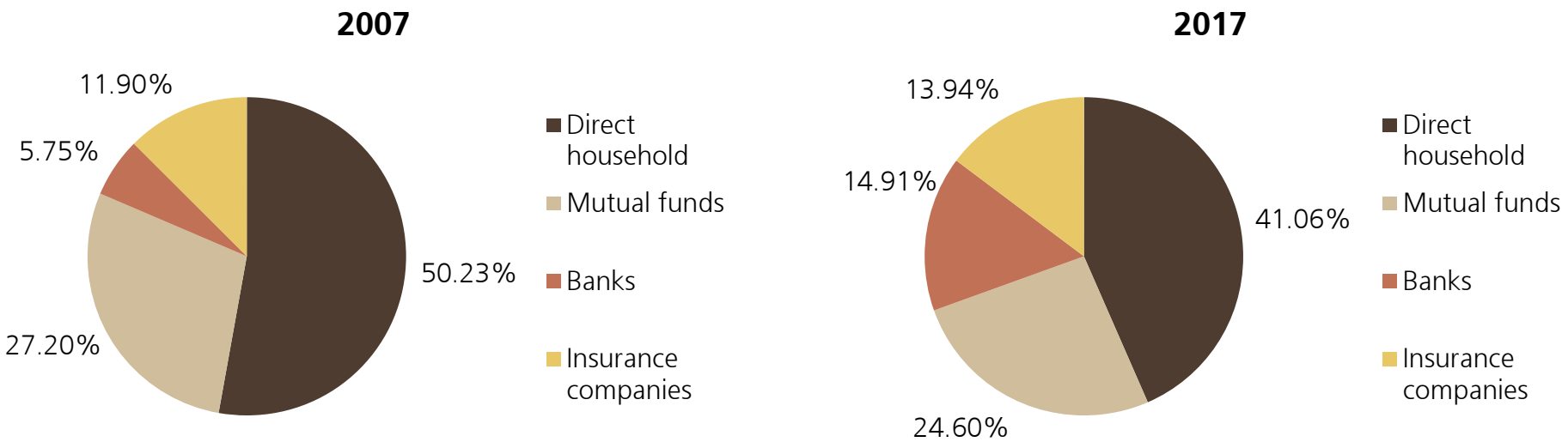
Par Value ($ in bns)



Source: Bloomberg; as of 02/01/2018, Thomson Reuters – The Municipal Market Monitor (TM3), Thomson Reuters SDC; as of 1/2/2018. Note: Excludes Private Placements.
UBS CIO, *Municipal Market Guide: 2018: On the horizon,* 17 November, 2017; https://www.ubs.com/content/dam/WealthManagementAmericas/documents/muni-market-guide-17-11-2017.pdf?

Changing Ownership Trends

- Ownership trends have changed over the past decade, with the household buyer losing share to banks and insurance companies. However, this stands to shift again
- Federal Reserve data shows that direct retail holdings by households has declined over the past decade, from $1.8 trillion in 2007 to $1.6 trillion by 2017
- Meanwhile, the greatest increase in holdings has been by banks, from $204 billion in 2007 to $567 billion by 2017



Source: UBS CIO Wealth Management Research

Institutional Investor Demand

The corporate tax rate cut from 35% to 21% may prompt institutional investors to curtail their future purchases of municipals in favor of taxable securities

- Banks
  - Lower tax rates decrease the attractiveness of tax exempt bonds
  - Gross-up provisions on outstanding direct purchases has been enforced
  - The legislative designation as "High Quality Liquid Assets" may increase the attractiveness of municipals
  - FASB changes to Premium Bond Amortization may make shift coupon preferences

- Insurance Companies
  - Accounting rule changes have implications for municipal demand, specifically changes to proration rules, which impact life insurers and property and casualty insurers differently
    - Proration impacts the benefit of tax exemption on interest from municipal bonds insurers receive[1]
  - Property and casualty insurance companies may have less demand
    - Tax-exempt yield will need to rise a notable amount for these companies to receive the same tax-equivalent yield
  - Municipals have become more attractive to life insurance companies based on more clearly defined proration rules
    - Life insurance companies are currently the smallest institutional buyer base, holding $188 billion

1. UBS CIO, *Municipal Market Guide February 16, 2018*

Retail Investor Demand

- Tax reform has not yet shown an impact on demand from retail investors, but investor awareness is expected to increase during the upcoming tax season

- The top tax rate cut to 37.0% from 39.6% is expected to have a marginal impact on demand

- State of Local Tax (SALT) deduction may create greater demand in high tax states as in-state investors seek tax advantaged investments
  - High income tax states (e.g., California, Connecticut, New Jersey and New York)
  - High property tax states (e.g., Texas, Minnesota and Oregon)

- Individual appetite for AMT paper should increase as fewer individuals are now subject to AMT because of the increase in income level exemptions

- Historically retail investor appetite typically increases as interest rates increase, but will be increasingly state-specific

Post-Tax Reform Refunding & Structuring Alternatives

Issuers have several alternatives to continue to capture the economic savings offered by their callable bonds in a low rate environment, including Forward Delivery Bonds and Taxable Refundings

Forward Delivery Bonds	+ Standard-documentation, fixed-rate bond sale with an extended delivery period, eliminating interest rate risk and determining pricing well before the 90 day window of a current refunding + Current flat yield curve results in forward premiums of only 5 to 10 basis points per month (12 month maximum) – Cannot be unwound and thin market limits size and requires illiquidity premium
Taxable Refunding	+ Can be executed anytime, eliminating interest rate risk as well as yield restriction and arbitrage rebate rules accompanying tax-exempt bonds – Higher interest rates and change in tax law risk if depending on future tax-exempt refunding – Market for taxable bonds with short par calls is very limited

Issuers may want to evaluate structuring alternatives to the standard fixed rate ten-year par call and consider other call provisions

Short and Make Whole Calls	+ Increased optionality and refinancing flexibility + Make whole calls can typically be added without a penalty and could be priced to the par call date – More costly – short calls increase the "kicker yield" associated with premium coupon structures and make whole call prices move inversely to rates to compensate investors – both could reduce the investor base

Forward Delivery Bonds

- On January 31st Kansas City, MO Sanitary Sewer System priced side-by-side both current & 8-month forward-delivery Bonds
- The transaction was well-received in both series, but saw greater demand in the forward delivery portion
  - Preliminary pricing levels incorporated a 55 bps differential but a strong and varied book across both series resulted in the decrease in the forward premium

Current Delivery: 2/4/2018 Settle					Forward Delivery: 10/4/2018 Settle					
Maturity	Amount ($M)	Coupon (%)	Yield (%)	Spread (bps)	Maturity	Amount ($M)	Coupon (%)	Yield (%)	Spread (bps)	Spread Differential
1/1/2019	4,715	4.000	1.486	9.1						
1/1/2020	4,045	4.000	1.620	9.5	1/1/2020	2,035	5.000	2.120	59.5	50
1/1/2021	4,205	4.000	1.730	11.4	1/1/2021	2,145	5.000	2.230	61.4	50
1/1/2022	4,370	5.000	1.840	14.8	1/1/2022	2,255	5.000	2.340	64.8	50
1/1/2023	4,590	5.000	1.950	15.6	1/1/2023	2,370	5.000	2.450	65.6	50
1/1/2024	4,820	5.000	2.090	21.1	1/1/2024	2,475	5.000	2.590	71.1	50
1/1/2025	5,060	5.000	2.240	26.5	1/1/2025	2,585	5.000	2.740	76.5	50
1/1/2026	5,315	5.000	2.380	27.8	1/1/2026	2,700	5.000	2.880	77.8	50
1/1/2027	5,580	5.000	2.500	28	1/1/2027	2,825	5.000	3.000	78	50
1/1/2028	5,860	5.000	2.590	27.4	1/1/2028	2,965	5.000	3.040	72.4	45
1/1/2029	6,150	5.000	2.660	26.8	1/1/2029	3,115	5.000	3.110	71.8	45
1/1/2030	6,460	5.000	2.720	25.3	1/1/2030	3,040	5.000	3.170	70.3	45
1/1/2031	6,780	5.000	2.790	25.2	1/1/2031	3,195	5.000	3.240	70.2	45
1/1/2032	7,120	5.000	2.850	25.4	1/1/2032	3,355	5.000	3.300	70.4	45
1/1/2033	7,480	5.000	2.900	24.6	1/1/2033	3,525	5.000	3.350	69.6	45
1/1/2034	7,850	3.125	3.400	69.7	1/1/2034	3,700	5.000	3.390	68.7	--
1/1/2035	8,095	4.000	3.330	58.3						
1/1/2036	8,420	4.000	3.370	60.2						
1/1/2037	8,755	4.000	3.400	60.7						
1/1/2038	9,110	4.000	3.430	61.1						
1/1/2042	40,220	4.000	3.490	64.6						

Taxable Refunding

- For some issuers, taxable advanced refunding may be a simple approach to achieving the benefits of an advanced refunding and can achieve a few objectives:
  - Eliminating disadvantageous covenants
  - Achieving interest rate savings and taxable rates are less than the rates on the refunded bonds
  - Restructuring existing debt
- Issuance of taxable debt is expected to increase, especially if relative market movements make this option more attractive for issuers
- Investor demand for taxable municipal paper is expected to be strong due to incremental yield, diversification and potential for longer duration

City of County of Honolulu Wastewater System Revenue Bonds
Junior Series 2018A (Taxable Refunding)
Refunded portions of Series 2009A, 2010A, and 2015B 2018 A
Dated: 2/13/2018
Aa3/ AA-

Maturity	Par ($M)	Coupon (%)	Yield (%)	Price	Spread to Maturity
7/1/2018	185	2.20	2.20	100.00	37
7/1/2019	40	2.35	2.35	100.00	47
7/1/2020	40	2.54	2.54	100.00	49
7/1/2021	15,360	2.78	2.78	100.00	51
7/1/2023	6,760	3.00	3.00	100.00	44
7/1/2026	19,520	3.20	3.20	100.00	56

Short Calls in the Market

- Maturities with shorter call dates have historically priced at spreads that were significantly tighter than comparable 10 year call maturities
- Investor appetite was largely driven by the higher YTM offered in the shorter call bonds

Energy Northwest, WA Project 1 & 3 & Columbia Generating Station Electric Revenue Refunding Bonds, Series 2017A
Aa2 / AAA / AAA

Maturity	Call	Amount ($M)	Coupon (%)	Yield (%)	Price	Yield to Call	Spread to Call	YTM	Spread to Maturity
7/1/2018		7,725	5.000	0.900	104.724			0.900	2
7/1/2018		12,655	5.000	0.900	104.724			0.900	2
7/1/2021		3,940	4.000	1.430	110.345			1.430	10
7/1/2022		5,405	5.000	1.610	116.722			1.610	12
7/1/2023		5,680	5.000	1.790	118.644			1.790	14
7/1/2024		5,965	5.000	1.980	120.068			1.980	18
7/1/2025		41,780	5.000	2.160	121.142			2.160	22
7/1/2026		40,570	5.000	2.280	122.370			2.280	22
7/1/2026	7/1/2022	39,615	5.000	1.810	115.648	1.81	-25	3.030	97
7/1/2027		52,500	5.000	2.410	123.216			2.410	26
7/1/2028	7/1/2027	55,000	5.000	2.490	122.408	2.49	25	2.665	43
7/1/2028	7/1/2022	50,000	5.000	1.890	115.222	1.89	-35	3.353	111
7/1/2028	7/1/2027	100,000	5.000	2.490	122.408	2.49	25	2.665	43
7/1/2029	7/1/2027	53,015	5.000	2.580	121.506	2.58	24	2.890	55
7/1/2033	7/1/2027	33,750	5.000	2.890	118.460	2.89	24	3.495	84
7/1/2034	7/1/2027	35,440	5.000	2.950	117.881	2.95	24	3.594	88
7/1/2035	7/1/2027	37,210	5.000	3.000	117.401	3.00	24	3.678	92

Short Calls in the Market

- In light of tax reform, there has been an increase in issuance of short term call features which has negatively impacted relative credit spreads
- Investors have become increasingly sensitive to managing the duration of short call bonds, particularly for long dated maturities and in a rising rate environment

Tallahassee, FL
Consolidated Utility Systems Refunding Bonds, Series 2017
Aa3 / AA / NR

Maturity	Call	Par ($M)	Coupon (%)	Yield (%)	Price	Yield to Call	Spread to Call	YTM	Spread to Maturity
10/1/2018		4,680	5.000	1.160	103.194			1.160	2
10/1/2019		3,615	5.000	1.260	106.775			1.260	2
10/1/2020		3,795	5.000	1.370	110.071			1.370	5
10/1/2021		3,985	5.000	1.480	113.087			1.480	7
10/1/2022		4,185	5.000	1.580	115.869			1.580	6
10/1/2023		4,395	5.000	1.700	118.266			1.700	8
10/1/2024		4,615	5.000	1.810	120.430			1.810	10
10/1/2025	10/1/2024	4,845	5.000	1.850	120.145	1.85	5	2.190	39
10/1/2026	10/1/2024	5,085	5.000	1.850	120.145	1.85	-4	2.450	56
10/1/2027	10/1/2024	5,340	5.000	1.880	119.932	1.88	-11	2.680	69
10/1/2028	10/1/2024	5,610	5.000	1.940	119.507	1.94	-16	2.890	79
10/1/2029	10/1/2024	5,885	5.000	2.010	119.013	2.01	-16	3.070	90
10/1/2030	10/1/2024	6,180	5.000	2.080	118.521	2.08	-16	3.230	99
10/1/2031	10/1/2024	6,495	5.000	2.140	118.102	2.14	-15	3.350	106
10/1/2032	10/1/2024	6,815	5.000	2.190	117.754	2.19	-15	3.460	112
10/1/2033	10/1/2024	7,155	5.000	2.240	117.407	2.24	-16	3.550	115
10/1/2034	10/1/2024	7,515	5.000	2.300	116.992	2.30	-15	3.640	119
10/1/2035	10/1/2024	7,890	5.000	2.350	116.648	2.35	-15	3.720	122
10/1/2036	10/1/2024	8,280	5.000	2.390	116.373	2.39	-15	3.780	124
10/1/2037	10/1/2024	8,695	5.000	2.420	116.168	2.42	-15	3.830	126

Expectations Going Forward

- Supply is expected to be notably lower in 2018 compared to 2017.
    - $330 – 340 billion as a result of issuers accelerating their bond issuances into 2017 in anticipation of tax reform as well as tax reform's repeal of tax-exempt advance refunding bonds, among other impacts
- Economists believes that central bankers are unlikely to raise rates faster then once a quarter
    - Do not expect Fed rate hikes to have a profound negative impact on municipal bond performance over longer time horizons
    - Headlines surrounding changes in monetary policy are often a source of temporary higher volatility for the municipal market
- Issuers will continue to explore alternative options, but should carefully consider trade-offs and risks associated with different financing alternatives
- Investor buying patterns will evolve based on the market, both in terms of availability of bonds, rates and relative value versus other fixed income asset classes

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