CDIAC

California Debt and Investment Advisory Commission
Municipal Debt Essentials

February 13, 2019

Day 2, Session 4: Debt Structuring and Refunding

Eric Goldstein, Debt Management Specialist

The Metropolitan Water District of Southern California

Scott Nagelson, Managing Director

usbancorp

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Presenters

Eric Goldstein
Debt Management Specialist
Metropolitan Water District of Southern California
700 N. Alameda Street
Los Angeles, CA 90012

Tel: (213) 217-5746
egoldstein@mwdh2o.com

Scott Nagelson
Managing Director, Head of Government Infrastructure Group
US Bancorp
1 California Street, Suite 350
San Francisco, CA 94111

Tel: (415) 677-3685
scott.nagelson@usbank.com

Topics

- Types of Debt Obligations
- Sizing the Bond Issue
- Debt Service Structure
- Refunding Considerations
- Purpose of Refunding Bonds
- Variable Rate Bonds
- Managing Interest Rate Swaps

Types of Debt Obligations

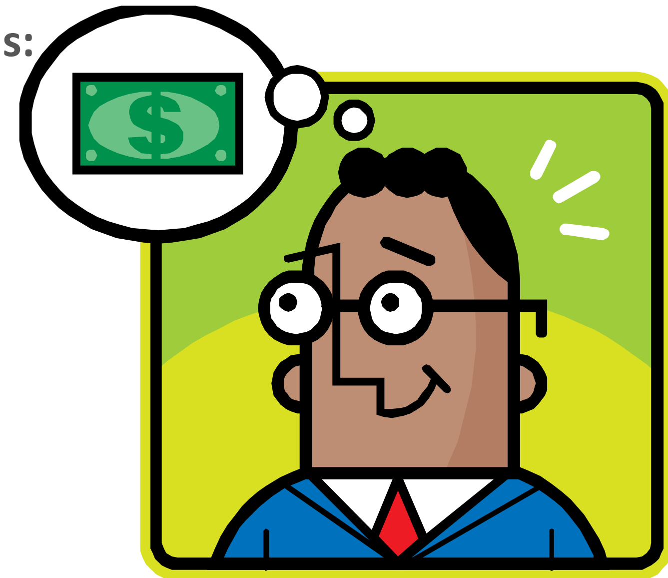
There are many types of debt that California governments issue:

- General Obligation Bonds
- TRANs
- Lease Revenue Bonds
- Certificates of Participation
- Revenue Bonds
- Sales Tax Bonds
- Pension Bonds
- Special Tax Bonds
- Tax Allocation Bonds
- Assessment Bonds

There are also a number of ways to access financing:

- Publicly Offered Bonds
  - **Fixed rate**
    - **Negotiated**
    - **Competitive**
  - **Variable rate**
    - **VRDB**
    - **FRN**
- Direct Purchase
  - **Fixed rate**
  - **Variable rate**

At this point, the Issuer has made several decisions:



- Identified a need to borrow money.
- Identified debt structure
- Identified a revenue stream to pay debt service.
- Assembled a finance team:
  - Bond counsel/Disclosure counsel
  - Municipal advisor
  - Investment banker

It's now time to STRUCTURE THE FINANCING!

Sizing the Bond Issue

Depending on the type of debt and the nature of the plan of finance, proceeds of the bonds may be used for a number of purposes.

- Project or Construction Fund
- Capitalized Interest Fund
- Refunding Escrow Fund
- Debt Service Reserve Fund
- Costs of Issuance
- Underwriters Discount
- Bond Insurance

The Project or Construction Fund

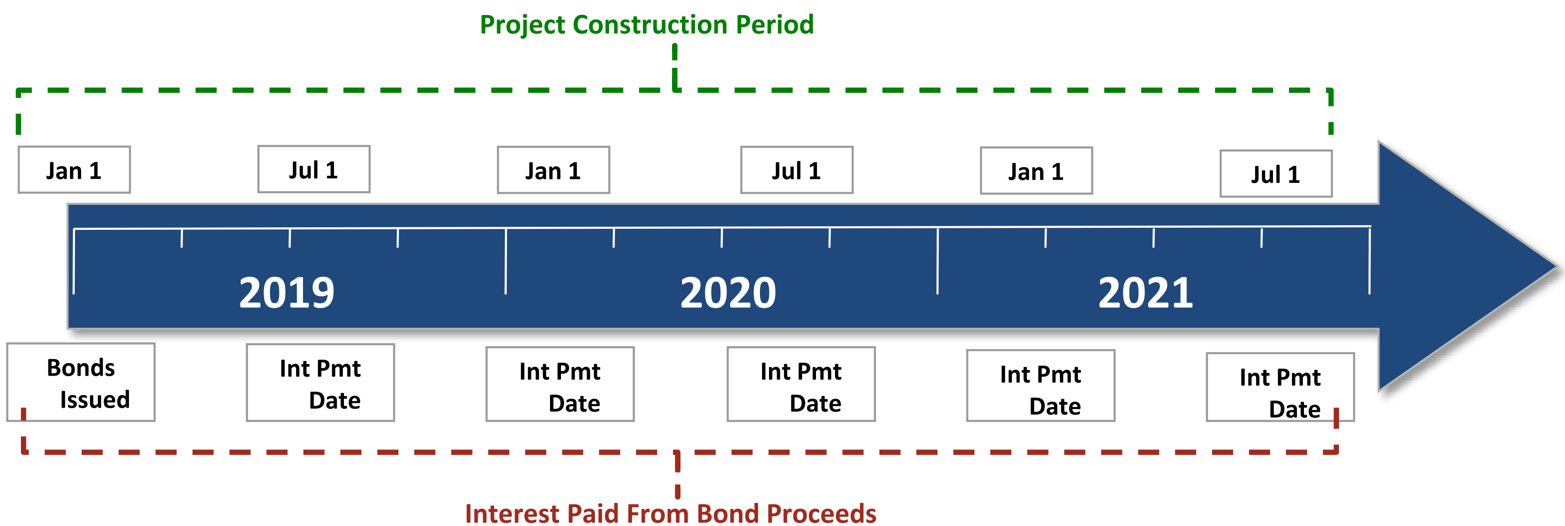
Fund acquisition of the asset or construction of the project

- Based on actual costs or reliable estimates.
- Net Funded or Gross Funded?
  - Gross Funded – Deposit exact amount required to pay for asset or project.
  - Net Funded – Amount deposited plus interest earnings during the drawdown period sufficient to fund project.

The Capitalized Interest Fund

Bonds proceeds used to pay interest for a finite period of time

- Interest is capitalized for a number of reasons:
  - Until a project/asset can produce revenue.
  - Until the issuer has beneficial use (COPs, Lease Revenue Bonds).
  - Until revenue is projected to be sufficient to pay debt service.



Refunding Escrow

Refinance outstanding bonds

- Current refunding – escrow can be funded up to 90 days prior to the call date.
- Advance refunding – escrow is funded more than 90 days prior to the call date. Advance refunding bonds are no longer permitted on a tax exempt basis.
- An amount of proceeds sufficient to pay principal and interest on the prior bonds is deposited into an escrow account.
- Escrowed funds are used to pay off the prior bonds at the call date or maturity.

The Debt Service Reserve Fund

Provides additional security for investors

- Historically found in most credits with the exception of GO Bonds and Pension Obligation Bonds.

- Many issuers of highly rated revenue bonds have eliminated DSRF requirement.

- Tax Code limits the size of the Reserve Fund to the lesser of:

  - Maximum Annual Debt Service

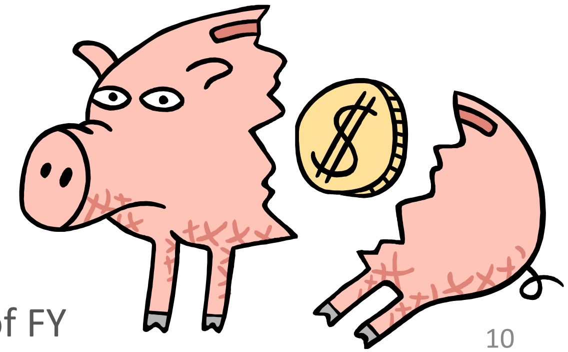
  - 125% of Average Annual Debt Service

  - 10% of Par Amount

- Fund is invested with earnings usually going as an offset to debt service.

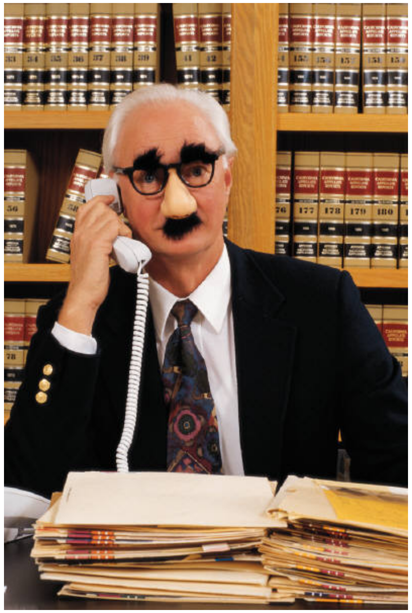
- Debt Service Reserve Fund Surety Policy

- Recently, Moody's and S&P have revised their criteria for COPs/LRBs such that a DSRF may not be necessary.
  - Issuer has strong liquidity
  - Essential asset
  - Debt service payments not due within 90 days of beginning of FY



Costs of Issuance

Bond proceeds may be used to pay certain eligible costs



Professional Services

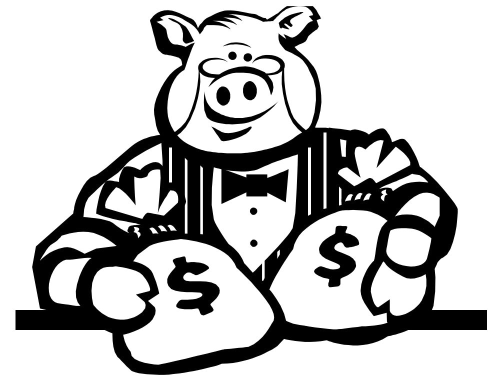
- Bond Counsel and/or Disclosure Counsel
- Municipal Advisor
- Trustee/Paying Agent
- Rating Agencies
- Appraisal, Feasibility Study, Engineer's Report
- Special Tax Consultant
- Title Insurance

Credit Enhancement

- Bond Insurance and/or Surety Bond Premium
- Letter of Credit fees

Underwriter's Discount

Underwriter's compensation and expenses



Components

- Average Takedown
- Management Fee
- Expenses

Funding Method

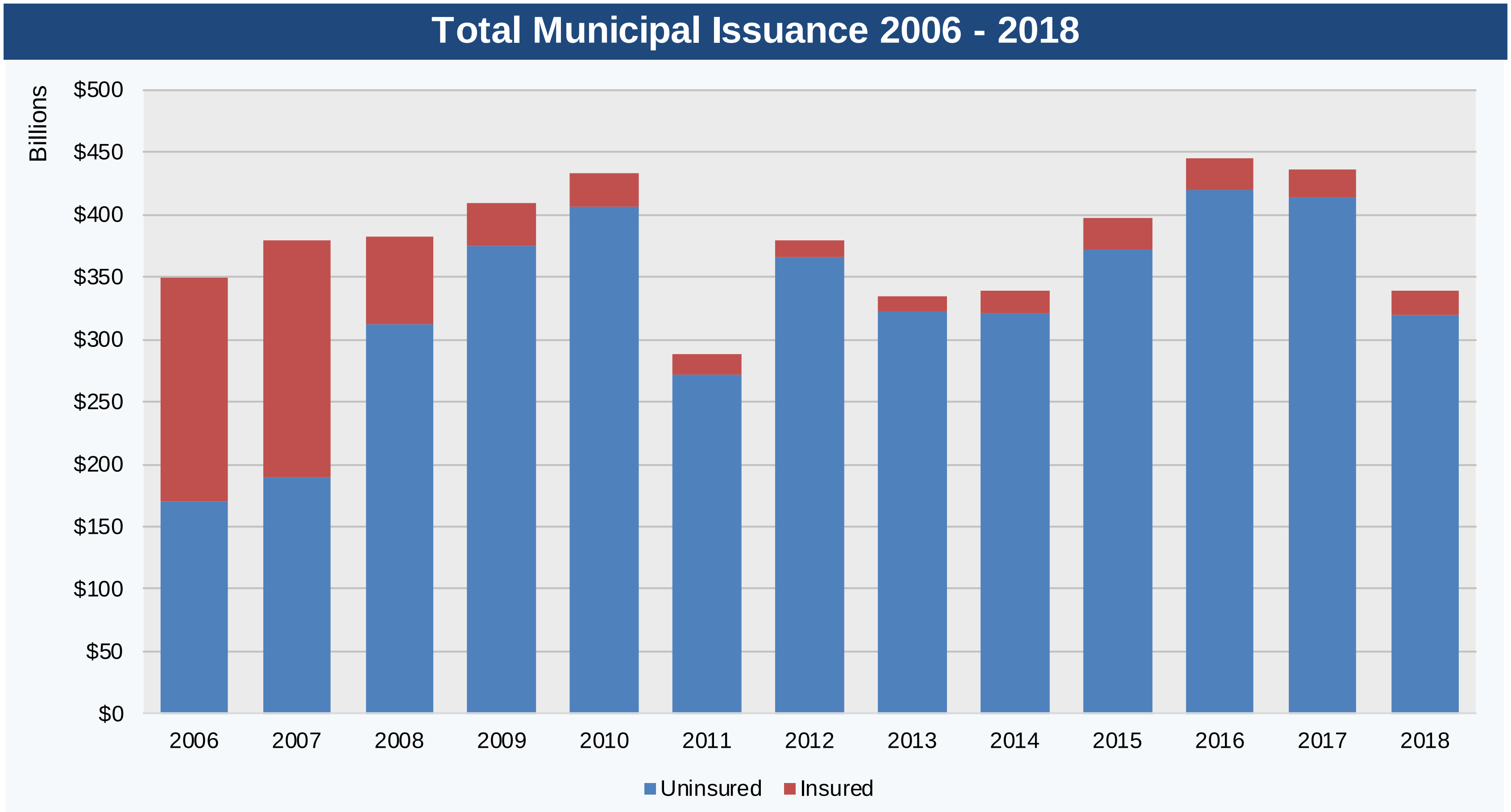
- At closing, Underwriter pays for bonds an amount less the Underwriter's Discount

$100,000,000	Par
(650,000)	Less discount of 6.50/$1,000
$ 99,350,000	Purchase Price

- Expressed as dollars per thousand dollars of bonds (e.g., $6.50/$1,000)

Bond Insurance

Bond insurance has declined dramatically since 2008



Source: The Bond Buyer

Bond Insurance - A More Limited Role

- In 2008, most of the insurers lost their "AAA" ratings due to losses associated with sub-prime mortgage bond insurance
- Today, only AGM and BAM are active with "AA" category ratings

2007 Top Bond Insurers

Rank	Bond Insurer	Par Amt ($mil)	Number of Issues
1	FSA	48,988.5	1,702
2	AMBAC	48,859.1	1,081
3	MBIA Insurance Corporation	46,398.2	1,037
4	FGIC	30,712.4	375
5	XL Capital Assurance Inc.	13,654.5	587
6	CIFG NA	4,927.1	351
7	Assured Guaranty	3,729.6	144
8	Radian Asset Assurance Inc	2,375.4	207
9	ACA Financial Guaranty Corp	648.7	31

2018 (1/1 to 9/30) Top Bond Insurers

Rank	Bond Insurer	Par Amt ($mil)	Number of Issues
1	AGM formerly FSA Inc	7,132.5	355
2	Build America Mutual (BAM)	5,798.7	486
3	Municipal Assurance Corp (MAC)	354.4	87
4	National Public Fin Guarantee	0.0	0

Source: The Bond Buyer

New Money Sizing Example

Ammonia Springs
Clean Water Authority

- Net Funded Construction Fund
- Capitalized Interest Fund
- Debt Service Reserve Fund
- Bond Insurance
- Costs of Issuance
- Underwriter’s Discount

Sizing Assumptions – Ammonia Springs Clean Water Authority

Project Cost and Draw Schedule

4/1/2019	$ 10,000,000	
10/1/2019	$ 10,000,000	
4/1/2020	$ 10,000,000	
10/1/2020	$ 10,000,000	
	$ 40,000,000	Total Project

Bonds Dated: 1/1/2019

Final Maturity: 1/1/2049

Sizing Assumptions – Ammonia Springs Clean Water Authority

Costs of Issuance	
$200,000	Legal, FA, Trustee Ratings, Printing, Misc.

Bond Insurance	
40bps	Bond Insurance Premium (Total Debt Service x .40%)

Underwriter's Discount	
$6.50/bond	Takedown, Management Fee, Expenses

Sizing Assumptions – Ammonia Springs Clean Water Authority

Debt Service Reserve Fund

Lesser of:

- Maximum Annual Debt Service
- 125% of Average Annual Debt Service
- 10% of Par Amount

Capitalized Interest

Through 2-year Construction Period
1/1/2021

Sizing Assumptions – Ammonia Springs Clean Water Authority

Ammonia Springs Clean Water Authority

Reinvestment Assumptions

Fund	**Rate**	**Earnings Go To:**
Capitalized Interest Fund:	2.50%	Construction Fund
Construction Fund:	2.50%	Construction Fund
Debt Service Reserve Fund:	5.0% (Bond Yield)	Construction Fund

Sizing Example – Net Funded Project Fund

Sources of Funds:

Par Amount:	$ 46,390,000
Total Sources of Funds:	$ 46,390,000

Uses of Funds:

Project Fund	$ 38,723,636
Cap Interest Fund:	$ 4,008,591
Debt Service Reserve Fund:	$ 2,795,850
Bond Insurance:	$ 357,550
COI:	$ 200,000
Underwriter's Discount:	$ 301,535
Rounding:	$ 2,838
Total Uses of Funds:	**$ 46,390,000**

1/1/2019 Initial Deposit:	$ 38,723,636
Project Fund Earnings	$ 968,704
Cap Interest Fund Earnings	$ 112,609
Debt Service Reserve Fund Earnings	$ 195,051
Total Project Cost	$ 40,000,000

Sizing Example – Capitalized Interest Fund

Sources of Funds:

Par Amount:	$ 46,390,000
Total Sources of Funds:	$ 46,390,000

Uses of Funds:

Project Fund	$ 38,723,636
Cap Interest Fund:	$ 4,008,591
Debt Service Reserve Fund:	$ 2,795,850
Bond Insurance:	$ 357,550
COI:	$ 200,000
Underwriter's Discount:	$ 301,535
Rounding:	$ 2,838
Total Uses of Funds:	**$ 46,390,000**

1/1/2019 Initial Deposit:		$ 4,008,591
7/1/19	Interest Payment	($ 1,005,697)
1/1/20	Interest Payment	($ 1,005,697)
7/1/20	Interest Payment	($ 998,599)
1/1/21	Interest Payment	($ 998,599)
Fund Balance on 1/1/21		$ 0

Sizing Example – Debt Service Reserve Fund

Ammonia Springs Clean Water Authority

Sources of Funds:

Par Amount:	$ 46,390,000
Total Sources of Funds:	$ 46,390,000

Uses of Funds:

Project Fund	$ 38,723,636
Cap Interest Fund:	$ 4,008,591
Debt Service Reserve Fund:	$ 2,795,850
Bond Insurance:	$ 357,550
COI:	$ 200,000
Underwriter's Discount:	$ 301,535
Rounding:	$ 2,838
Total Uses of Funds:	**$ 46,390,000**

Lesser of:

Maximum Annual Debt Service	$ 2,795,850
125% of Average Annual Debt Service	$ 3,491,698
10% of Par Amount	$ 4,639,000

Sizing Example – Bond Insurance Premium

Sources of Funds:

Par Amount:	$ 46,390,000
Total Sources of Funds:	$ 46,390,000

Uses of Funds:

Project Fund	$ 38,723,636
Cap Interest Fund:	$ 4,008,591
Debt Service Reserve Fund:	$ 2,795,850
Bond Insurance:	$ 357,550
COI:	$ 200,000
Underwriter's Discount:	$ 301,535
Rounding:	$ 2,838
Total Uses of Funds:	**$ 46,390,000**

Total Principal & Interest	$89,387,448
	x.40%
Bond Insurance Premium	$ 357,550

Sizing Example – Costs of Issuance

Sources of Funds:

Par Amount:	$ 46,390,000
Total Sources of Funds:	$ 46,390,000

Uses of Funds:

Project Fund	$ 38,723,636
Cap Interest Fund:	$ 4,008,591
Debt Service Reserve Fund:	$ 2,795,850
Bond Insurance:	$ 357,550
COI:	$ 200,000
Underwriter's Discount:	$ 301,535
Rounding:	$ 2,838
Total Uses of Funds:	**$ 46,390,000**

Costs of Issuance:

Bond Counsel:	$100,000
Financial Advisor:	$ 50,000
Trustee:	$ 5,000
Rating Agencies:	$ 30,000
Printing:	$ 7,500
Miscellaneous:	$ 7,500
Total COI:	$200,000

Sizing Example –Underwriter's Discount

Sources of Funds:

Par Amount:	$ 46,390,000
Total Sources of Funds:	$ 46,390,000

Uses of Funds:

Project Fund	$ 38,723,636
Cap Interest Fund:	$ 4,008,591
Debt Service Reserve Fund:	$ 2,795,850
Bond Insurance:	$ 357,550
COI:	$ 200,000
Underwriter's Discount:	$ 301,535
Rounding:	$ 2,838
Total Uses of Funds:	**$ 46,390,000**

Underwriter's Discount:

Takedown: ($3.50/bond):	$ 162,365
Management Fee ($1.00/bond):	$ 46,390
Expenses: ($2.00/bond):	$ 92,780
Underwriter's Discount ($6.50/bond):	$301,535

Debt Service Structure

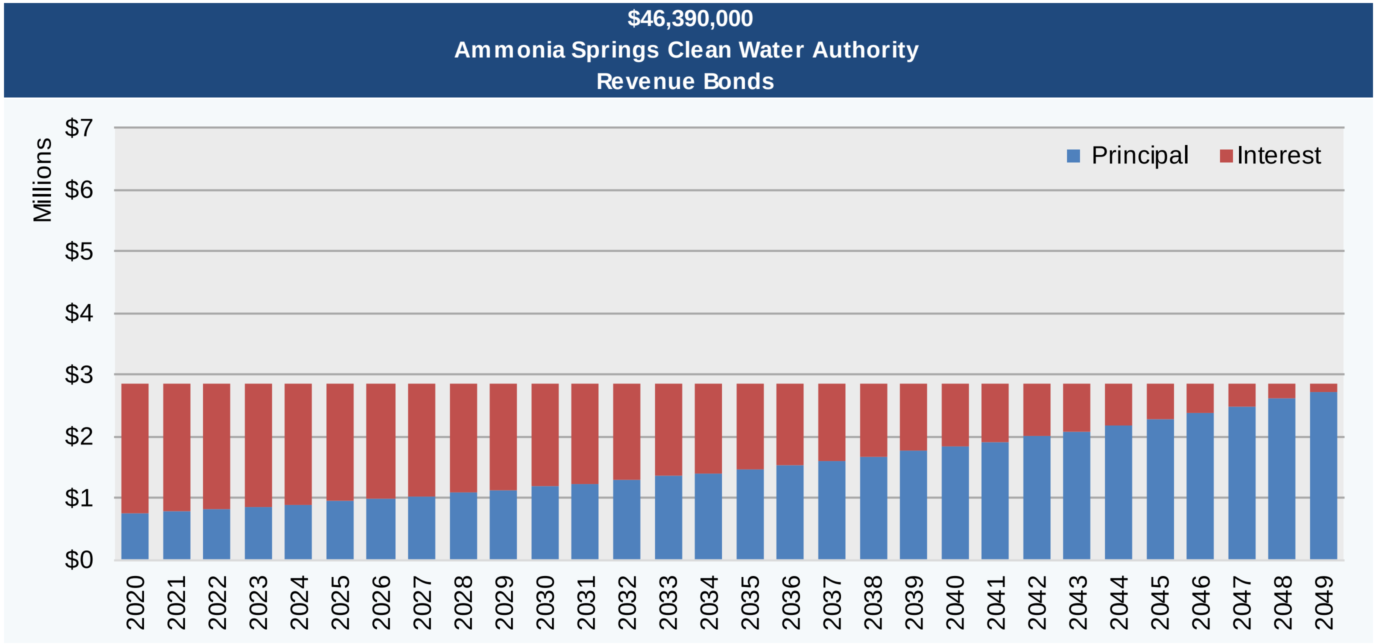
Ammonia Springs Clean Water Authority

Sample Structures

Current Interest vs. Deferred Interest

Optional Redemption

Level Debt Service



DSRF Implications

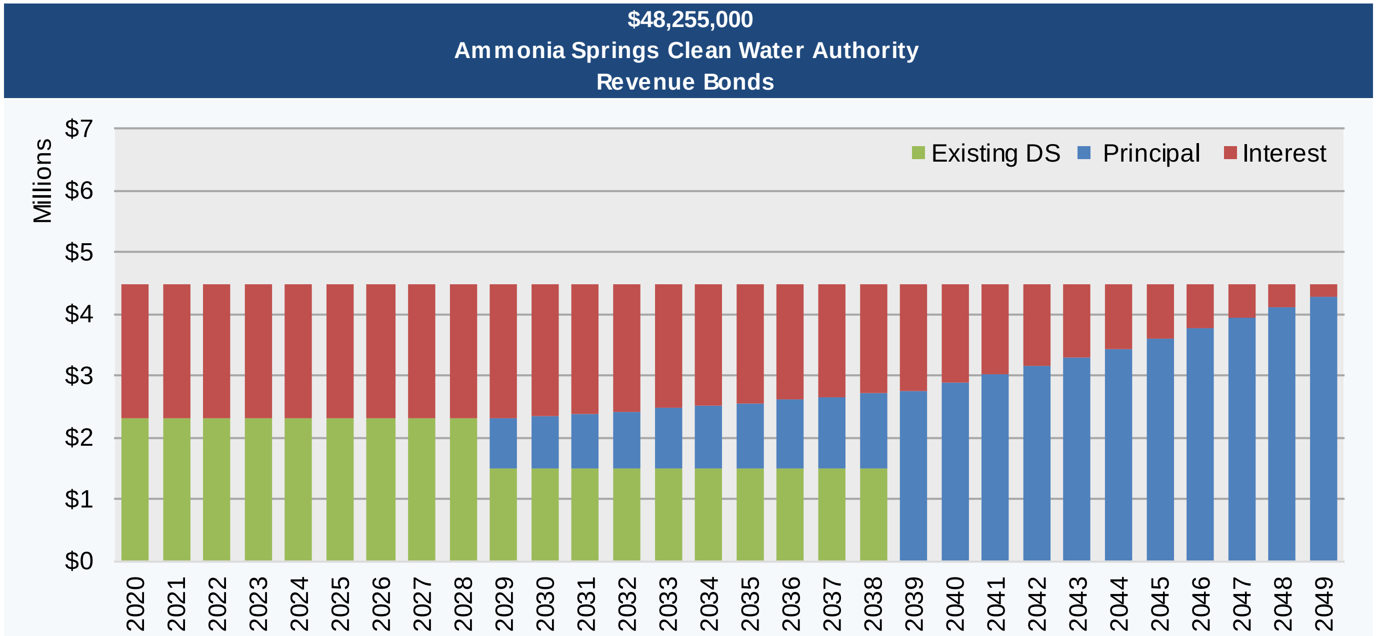
Lesser of:

Maximum Annual Debt Service	$ 2,850,350
125% of Average Annual Debt Service	$ 3,559,845
10% of Par Amount	$ 4,639,000

Bond Insurance Implications

Total Principal & Interest:	$ 85,436,275
	x.40%
Insurance Premium	$ 341,745

“Wrapped” Debt Service



DSRF Implications

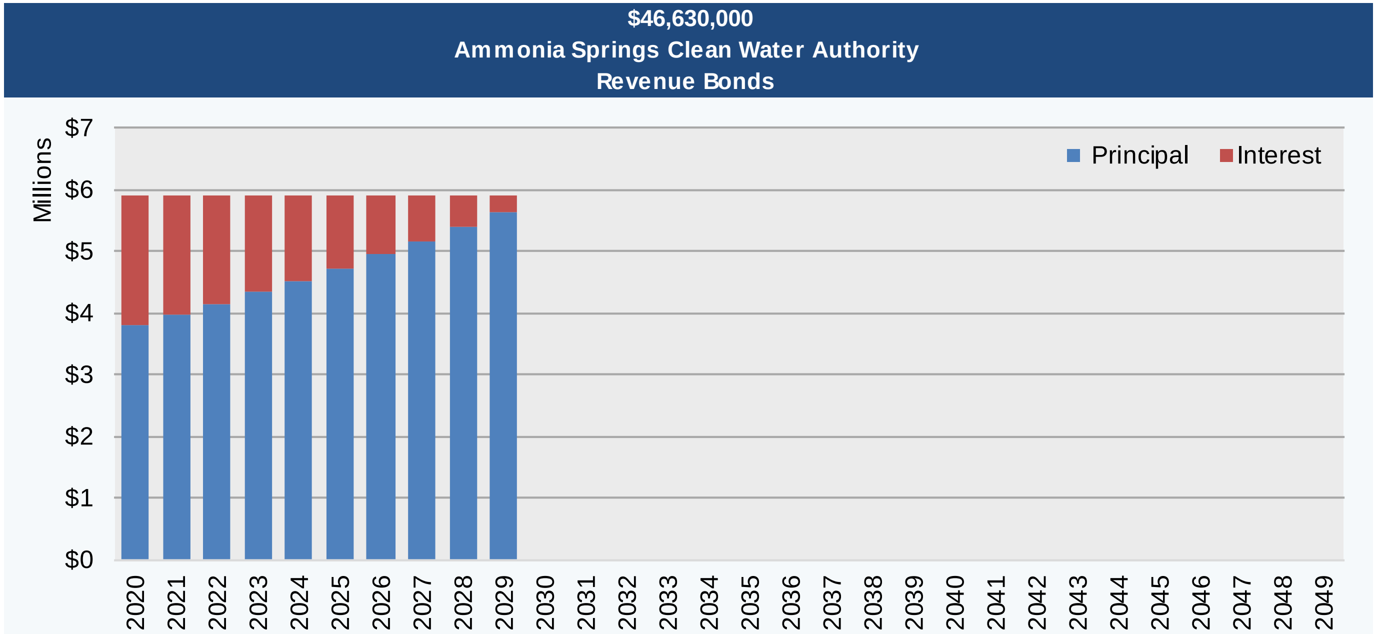
Lesser of:

Maximum Annual Debt Service	$	4,487,050
125% of Average Annual Debt Service	$	4,113,822
10% of Par Amount	$	4,825,500

Bond Insurance Implications

Total Principal & Interest:	$ 98,731,725
	x.40%
Insurance Premium	$ 394,927

Short Maturity



DSRF Implications

Lesser of:

Maximum Annual Debt Service	$ 5,894,150
125% of Average Annual Debt Service	$ 7,366,288
10% of Par Amount	$ 4,663,000

Bond Insurance Implications

Total Principal & Interest:	$58,930,300
	x.40%
Insurance Premium	$ 235,722

Debt Service Structure Comparison

Summary of Debt Service Structures			
	Level Debt Service	**"Wrapped" Debt Service**	**Short Maturity**
Par	$46,390,000	$48,225,000	$46,630,000
Total Debt Service	$85,436,275	$98,731,725	$ 58,930,300
Maximum Annual Debt Service	$2,850,350	$4,487,050	$5,894,150
125% of Average Annual Debt Service	$3,559,845	$4,113,822	$7,366,288
10% of Par	$4,639,000	$4,825,500	$4,663,000

Structuring the Bonds

Ammonia Springs
Clean Water Authority

στο παράθυρο που θα εμφανιστεί επιλέξτε το Λεξικό Γεωργακά στο παράθυρο που θα εμφανιστεί επιλέξτε το Λεξικό Γεωργακά στο παράθυρο που θα εμφανιστεί επιλέξτε το Λεξικό Γεωργακά στο παράθυρο που θα εμφανιστεί επιλέξτε το Λεξικό Γεωργακά στο παράθυρο που θα εμφανιστεί επιλέξτε το Λεξικό Γεωργακά στο παράθυρο που θα εμφανιστεί επιλέξτε το Λεξικό Γεωργακά στο παράθυρο που θα εμφανιστεί επιλέξτε το Λεξικό Γεωργακά στο παράθυρο που θα

$46,390,000

Ammonia Springs Clean Water Authority

Water Revenue Bonds

Dated: January 1, 2019 **Due: January 1, 2049**

στο παράθυρο που θα εμφανιστεί επιλέξτε το Λεξικό Γεωργακά στο παράθυρο που θα εμφανιστεί ι
Γεωργακά στο παράθυρο που θα εμφανιστεί επιλέξτε το Λεξικό Γεωργακά στο παράθυρο που θα εμφ
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επιλέξτε το Λεξικό Γεωργακά στο παράθυρο που θα εμφανιστεί επιλέξτε το Λεξικό Γεωργακά στο παράθυρο που θα

Maturity Schedule

Maturity (Jan 1)	Principal Amount	Interest Rate	Yield
2020	780,000	4.000%	1.820%
2021	795,000	4.000%	2.070%
2022	815,000	4.000%	2.370%
2023	830,000	4.000%	2.670%
2024	855,000	5.000%	3.020%
2025	880,000	5.000%	3.220%
2026	910,000	5.000%	3.370%
2027	940,000	5.000%	3.520%
2028	970,000	5.000%	3.630%
2029	1,005,000	5.000%	3.740%
2030	1,045,000	5.000%	3.840%
2031	1,085,000	5.000%	3.940%
2032	1,130,000	5.000%	4.030%
2033	1,175,000	5.000%	4.110%
2034	1,220,000	5.000%	4.180%
2035	1,275,000	5.000%	4.270%
2036	1,325,000	5.000%	4.350%

$7,610,000 4.72% Term Bonds maturing January 2040
$9,600,000 4.81% Term Bonds maturing January 2045
$12,145,000 4.84% Term Bonds maturing January 2049

Serial Bonds

- Mature "serially" by year
- Take advantage of positively sloped yield curve

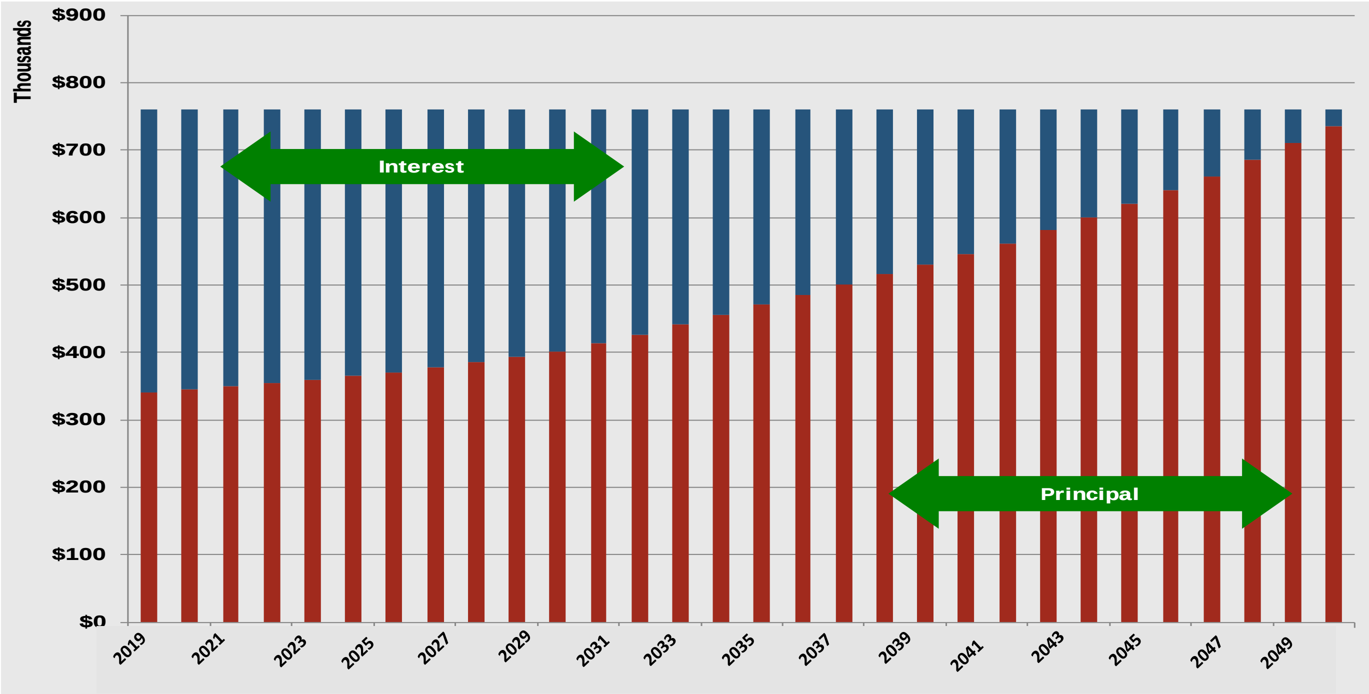
Term Bonds

- Single coupon covering multiple years
- Retired with annual Sinking Fund Payments

Current or Deferred Interest Bonds

Current Interest Bonds

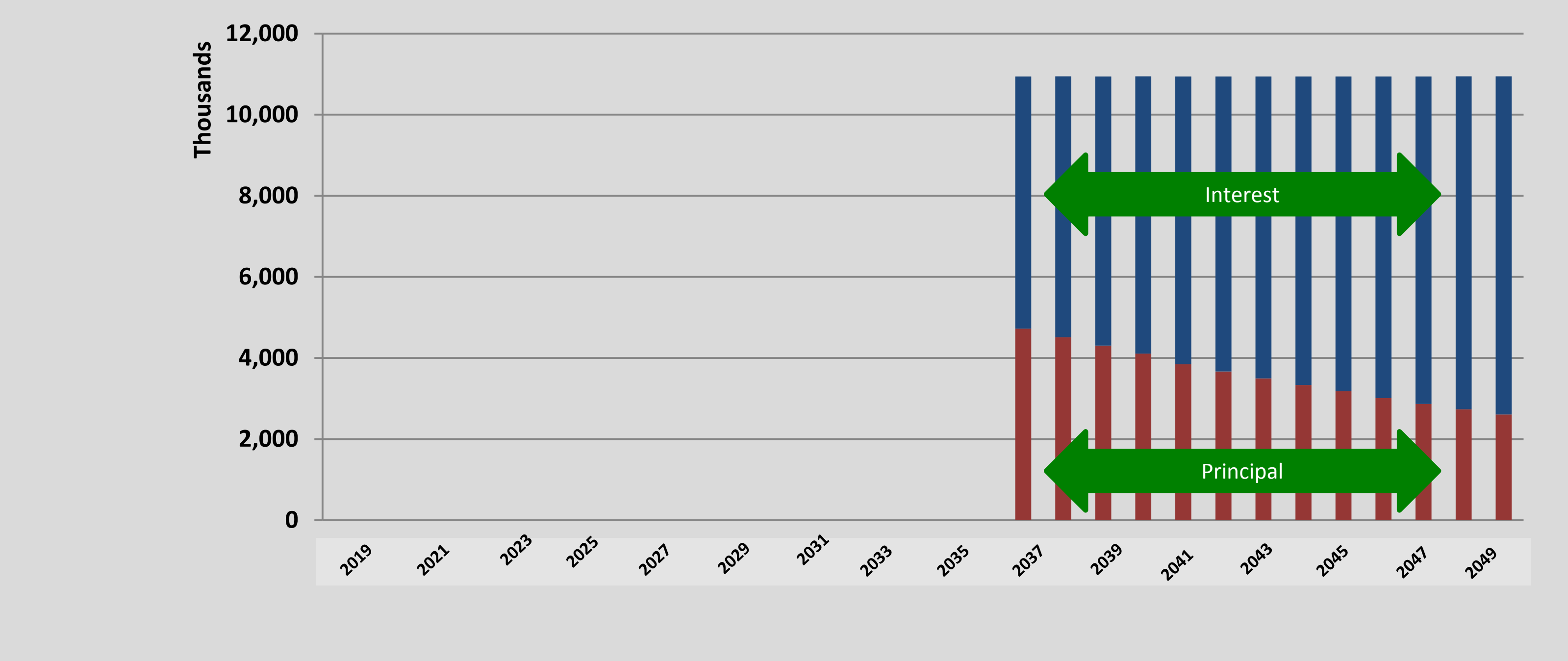
- Pay interest at stated coupon
- Interest typically paid every 6 months
- May be sold at par, at a premium or at a discount
- Investor's yield determined by price paid for the Bond



Current or Deferred Interest Bonds

Capital Appreciation Bonds

- “Zero” coupon or deferred interest bonds
- Interest accretes to maturity
- Sold at a deep discount
- Investor’s yield determined by price paid for the Bond



Comparison of Current Interest and Deferred Interest Structures

	Current Interest Bonds	Capital Appreciation Bonds
Principal	$46,390,000	$46,390,000
Interest	$42,493,734	$95,867,460
Total[1]	$88,883,734	$142,257,674

[1]May not total due to rounding

Couponing and Redemption (Call) Features

Optional Redemption

- "Standard" optional redemption period is 10 years
- Callable bonds generally have a higher yield than non-callable bonds
- Par Bonds, Original Issue Discount Bonds, and Original Issue Premium Bonds

10-year Call

	Maturity	Coupon	Yield	Callable	Price
Par Bond	2039	5.00%	5.00%	2029	100%
Discount Bond	2039	5.00%	5.10%	2029	98.755%
Premium Bond	2039	5.00%	4.90%	2029	101.783%

7-year Call

	Maturity	Coupon	Yield	Callable	Price
Par Bond	2039	5.00%	5.00%	2026	100%
Discount Bond	2039	5.00%	5.10%	2026	98.755%
Premium Bond	2039	5.00%	4.90%	2026	100.586%

Refunding Considerations

Tax Exempt Advance Refunding

- Old Bonds are <u>not</u> currently subject to optional redemption
- New Bond proceeds are used to fund an escrow that defeases old bonds to call date
- Escrow invested in Treasury (SLGs) with maximum permitted yield equal to bond arbitrage yield
- Can only advance refund one time

ILLEGAL

<u>The Tax Cut and Jobs Act of 2017 eliminated the ability to issue tax exempt advance refunding bonds.</u>

Current Refunding

- Existing bonds are currently subject to optional redemption
- New tax exempt bond proceeds are used to redeem old bonds

Defeasance

- **Legal Defeasance**
  - Escrow securities backed by full faith & credit of U.S. government (e.g., U.S. Treasuries / SLGS)
  - Requires bond counsel opinion
  - Debt removed from books

- **Economic Defeasance**
  - Escrow securities not backed by full faith & credit of U.S. government (e.g., Corporates & Agencies)
  - Higher yield / Greater savings
  - Debt remains on the books

Defeasance Escrow

- **Refunding (Defeasance) Escrow**
  - A portfolio of "eligible securities", as defined in the Indenture (U.S. Treasuries / SLGS)
  - Cash flows sufficient to pay:
    - Principal
    - Interest
    - Call Premium

    to the call date, without reinvestment

Escrow Requirements

Non-callable maturities	2016	190,000
	2017	195,000
	2018	200,000
	2019	205,000
	2020	215,000
Callable maturities	2021	220,000
	2022	225,000
	2023	235,000
	2024	240,000
	2025	250,000
	2026	260,000
	2027	275,000
	2028	285,000
	2029	295,000
	2030	310,000
	2031	325,000
	2032	340,000
	2033	355,000
	2034	375,000
	2035	390,000
	2036	410,000
	2037	430,000
	2038	455,000
	2039	475,000

Date	Principal	Interest	Principal	Call Premium	Escrow Requirement
2/1/2016				2.00%	
6/1/2016	-	154,423			154,423
12/1/2016	190,000	154,423			344,423
6/1/2017	-	151,953			151,953
12/1/2017	195,000	151,953			346,953
6/1/2018	-	149,320			149,320
12/1/2018	200,000	149,320			349,320
6/1/2019	-	146,520			146,520
12/1/2019	205,000	146,520			351,520
6/1/2020	-	143,548			143,548
12/1/2020	215,000	143,548	6,150,000	123,000	6,631,548
	$ 1,005,000	$ 1,491,528	$ 6,150,000	$ 123,000	$ 8,769,528

$2,496,528 Principal & Interest to Dec. 1, 2020

$ 6,150,000 Bonds Outstanding Dec. 1, 2021 +

$ 123,000 2.0% Redemption Premium

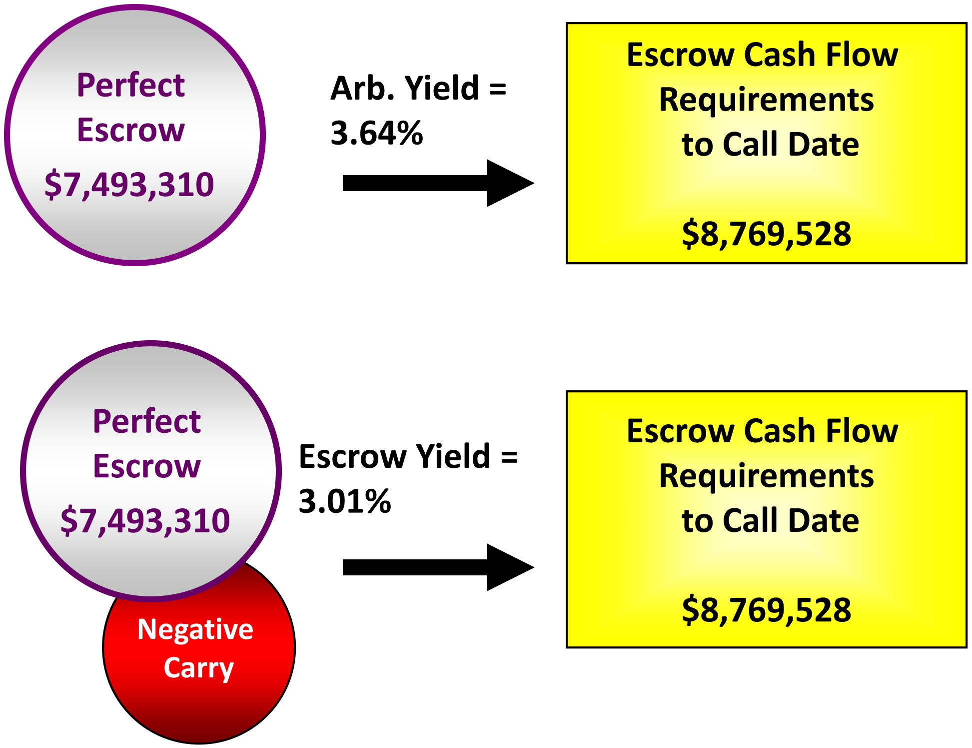
$ 8,769,528 TOTAL ESCROW REQUIREMENT

Escrow Structuring

	Date	Escrow Requirement	U.S. Treasuries	Coupon	06/01/16	12/01/16	06/01/17	12/01/17	06/01/18	12/01/18	06/01/19	12/01/19	06/01/20	12/01/20	Escrow Cash Flows
	2/1/2016		-												-
1	6/1/2016	154,423	34,210	1.50%	257	2,245	377	2,755	452	3,234	534	3,738	582	106,040	154,423
2	12/1/2016	344,423	224,467	2.00%		2,245	377	2,755	452	3,234	534	3,738	582	106,040	344,423
3	6/1/2017	151,953	34,241	2.20%			377	2,755	452	3,234	534	3,738	582	106,040	151,953
4	12/1/2017	346,953	229,618	2.40%				2,755	452	3,234	534	3,738	582	106,040	346,953
5	6/1/2018	149,320	34,741	2.60%					452	3,234	534	3,738	582	106,040	149,320
6	12/1/2018	349,320	235,193	2.75%						3,234	534	3,738	582	106,040	349,320
7	6/1/2019	146,520	35,627	3.00%							534	3,738	582	106,040	146,520
8	12/1/2019	351,520	241,161	3.10%								3,738	582	106,040	351,520
9	6/1/2020	143,548	36,926	3.15%									582	106,040	143,548
10	12/1/2020	6,631,548	6,525,508	3.25%										106,040	6,631,548
		$ 8,769,528	$ 7,631,692		$ 257	$ 4,489	$ 1,130	$ 11,022	$ 2,258	$ 19,403	$ 3,206	$ 22,428	$ 3,490	$636,237	$ 8,769,528

- Escrow cash flow requirement = $8,769,528
- Escrow funding costs = $7,631,692
- Escrow can yield up to the same rate as the arbitrage yield on the refunding bonds (e.g., 3.64%)
- Perfect escrow would cost = $7,493,310

Negative Carry (Negative Arbitrage)



$ 8,769,528 Escrow Requirement
$ 7,631,692 Escrow Cost
$ 1,137,836 Investment Earnings

$ 8,769,528 Escrow Requirement
$ 7,493,310 Perfect Escrow Cost
$ 1,276,218 Investment Earnings

$ (138,382) Negative Carry

- **Proceeds invested @ the bond rate pays for itself > "carry"**
- **Investment yield (3.01%) lower than bond yield (3.64%)**
- **Inefficient Escrow**: increase par value of refunding bonds by **2.1%**
- **$138,382** in Negative Carry ("negative arbitrage")

Bond Sizing Requirements

Bonds
Outstanding
$6.15 Million

+

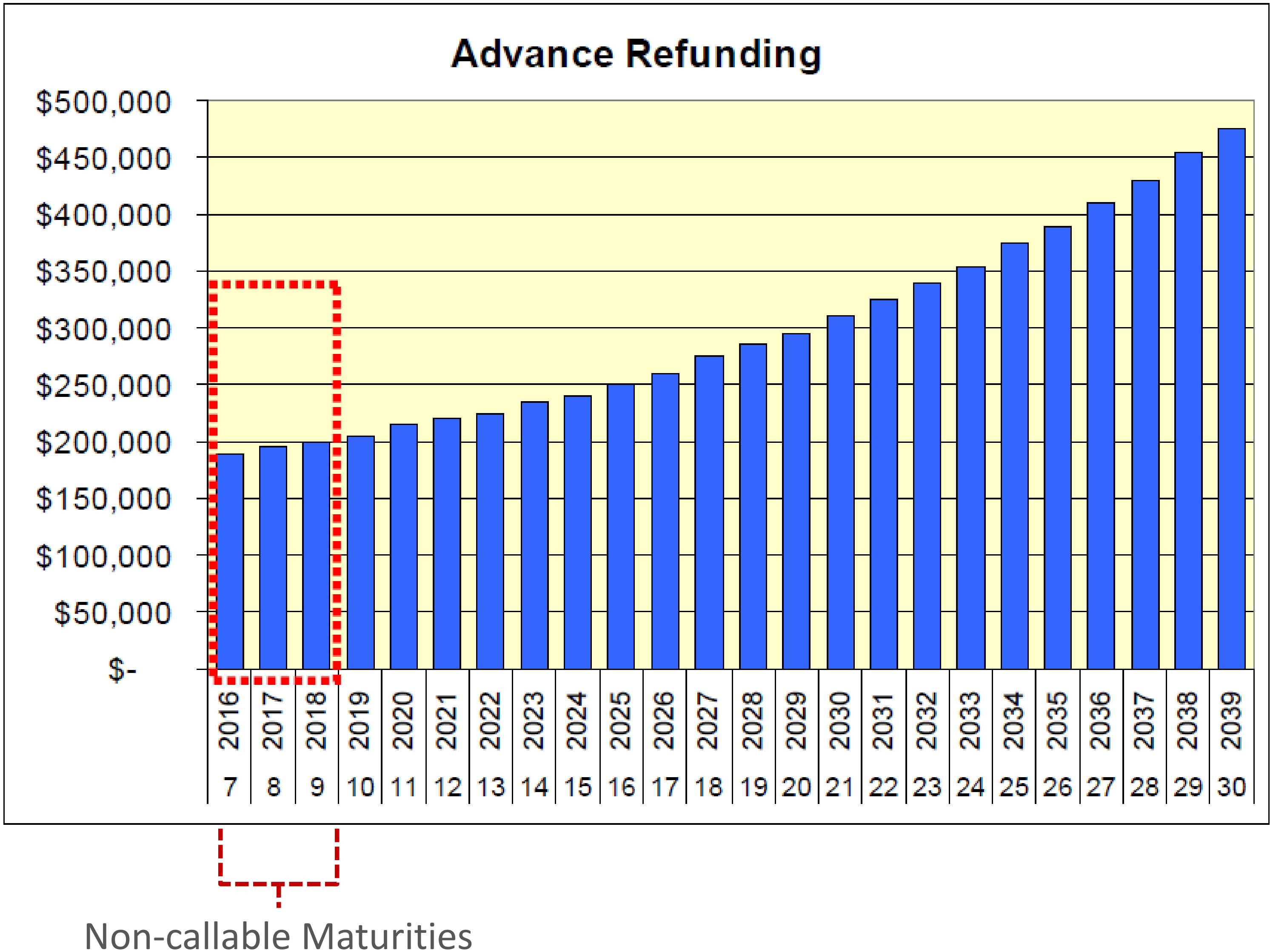
Additional Costs
3.0% to 6.0%

1. **Cost of Issuance:**
   .50% to 1.0%
2. **Underwriter's Discount:**
   .50% to 1.0%
3. **Redemption Premium:**
   2.0% to 3.0%
4. **Bond Insurance:**
   (~2x principal) .50% to 1.0%

Current Refunding Bonds:

$6,580,000

Advance Refunding



Bond Sizing Requirements

Bonds Outstanding $6.15 Million

Principal & Interest $1.6 Million

+

Additional Costs
3.0% to 10.0%

1. **Cost of Issuance:**
   .50% to 1.0%
2. **Underwriter's Discount:**
   .50% to 1.0%
3. **Redemption Premium:**
   2.0% to 3.0%
4. **Bond Insurance:**
   (~2x principal) .50% to 1.0%
1. **Negative Carry *:**
   1.0% to 3.0%

* Advance Refunding

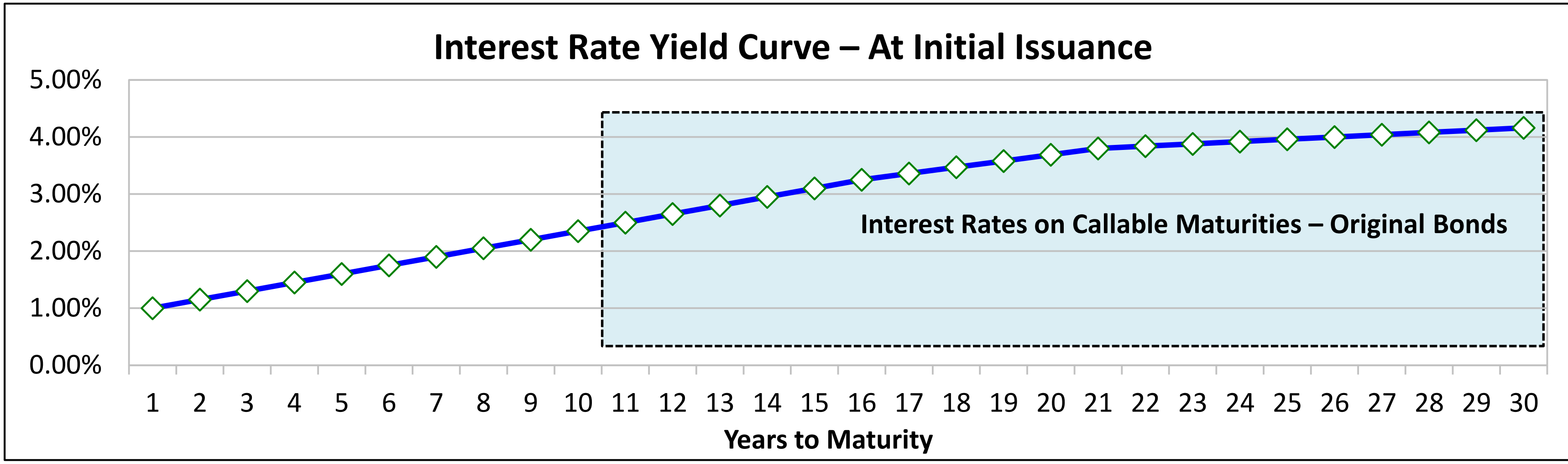
Advance Refunding Bonds:

$8,000,000

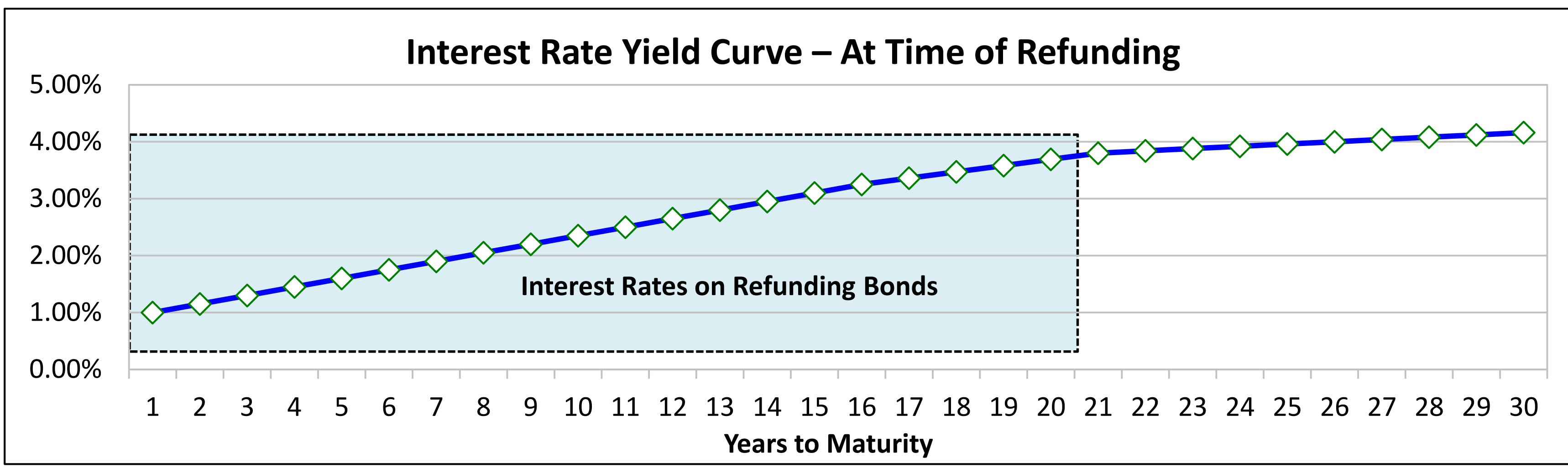
Purpose of Refunding Bonds

- Debt Service Savings
- Cash Flow Restructuring
- Consolidation of Debt
- Remove Restrictive Covenants
- Combination (of above)

Rolling Down the Yield Curve

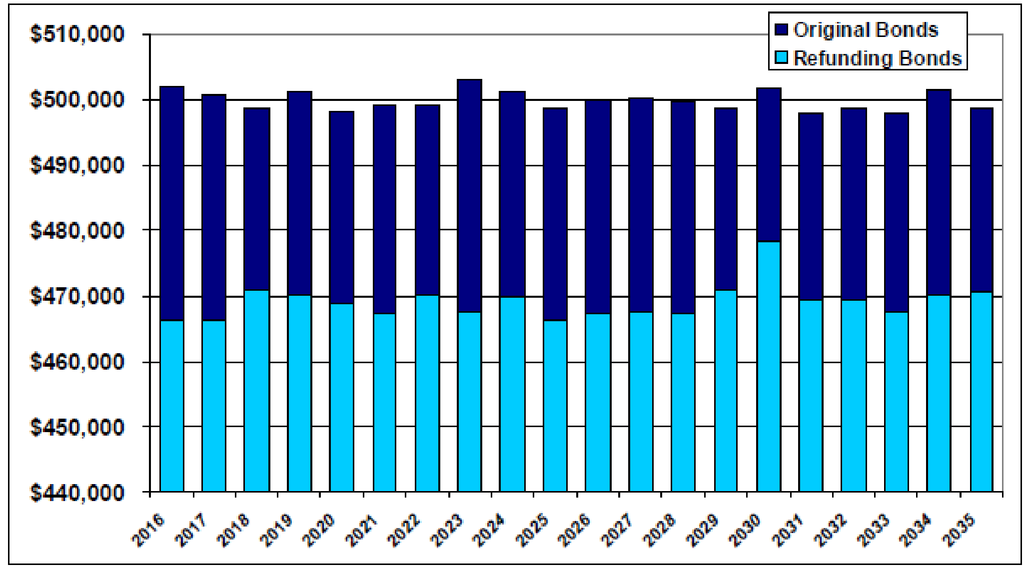


10 years later, at the call date, we are current refunding the callable maturities



Measuring Savings

	Year	Original Bonds	Refunding Bonds	Cash Flow Savings
1	2016	502,095	447,428	54,668
2	2017	500,645	450,303	50,343
3	2018	498,715	457,625	41,090
4	2019	501,290	459,445	41,845
5	2020	498,065	460,260	37,805
6	2021	499,065	460,173	38,893
7	2022	499,065	464,153	34,913
8	2023	503,145	461,903	41,243
9	2024	501,320	463,938	37,383
10	2025	498,495	460,245	38,250
11	2026	499,925	461,100	38,825
12	2027	500,200	461,180	39,020
13	2028	499,763	460,290	39,473
14	2029	498,613	463,560	35,053
15	2030	501,750	470,780	30,970
16	2031	498,000	461,905	36,095
17	2032	498,500	462,465	36,035
18	2033	498,000	462,060	35,940
19	2034	501,500	465,865	35,635
20	2035	498,750	468,450	30,300
		$9,996,900	$9,223,125	$ 773,775
			NPV Savings	$ 560,735



- $38,689 Avg. Annual Cash Flow Savings
- $560,735 NPV Savings
- 6.9% of Refunded Bonds (Par Amount of $8.125M)
- 6.7% of Refunding Bonds (Par Amount of $8.365M)

The Impact of Investments

Must take into account impact of investments on the Debt Service Reserve Fund

- **Gross-to-Gross Refunding**
  - Comparison solely of gross debt service
  - Does not take into account earnings from DSRF investments

- **Net-to-Net Refunding**
  - Compares Net Debt Service on refunding to prior bonds
  - Takes into account investment earnings of DSRF

Net-to-Net Refunding

	Year	Original Bonds	DSR Earnings	Net Debt Service	Refunding Bonds	DSR Earnings	Net Debt Service	Gross Savings	NPV Savings	Net Savings	NPV Savings
1	2016	502,095	25,157	476,938	466,203	16,749	449,454	35,893	34,632	27,484	26,518
2	2017	500,645	25,157	475,488	466,203	16,749	449,454	34,443	32,065	26,034	24,237
3	2018	498,715	25,157	473,558	470,848	16,749	454,099	27,868	25,033	19,459	17,480
4	2019	501,290	25,157	476,133	470,018	16,749	453,269	31,273	27,105	22,864	19,817
5	2020	498,065	25,157	472,908	468,808	16,749	452,059	29,258	24,467	20,849	17,436
6	2021	499,065	25,157	473,908	467,208	16,749	450,459	31,858	25,706	23,449	18,921
7	2022	499,065	25,157	473,908	470,208	16,749	453,459	28,858	22,467	20,449	15,921
8	2023	503,145	25,157	477,988	467,668	16,749	450,919	35,478	26,651	27,069	20,334
9	2024	501,320	25,157	476,163	469,703	16,749	452,954	31,618	22,917	23,209	16,822
10	2025	498,495	25,157	473,338	466,163	16,749	449,414	32,333	22,612	23,924	16,732
11	2026	499,925	25,157	474,768	467,173	16,749	450,424	32,753	22,101	24,344	16,427
12	2027	500,200	25,157	475,043	467,573	16,749	450,824	32,628	21,244	24,219	15,769
13	2028	499,763	25,157	474,605	467,178	16,749	450,429	32,585	20,471	24,176	15,188
14	2029	498,613	25,157	473,455	470,958	16,749	454,209	27,655	16,763	19,246	11,666
15	2030	501,750	25,157	476,593	478,533	16,749	461,784	23,218	13,579	14,809	8,661
16	2031	498,000	25,157	472,843	469,470	16,749	452,721	28,530	16,100	20,121	11,355
17	2032	498,500	25,157	473,343	469,270	16,749	452,521	29,230	15,916	20,821	11,337
18	2033	498,000	25,157	472,843	467,680	16,749	450,931	30,320	15,929	21,911	11,512
19	2034	501,500	25,157	476,343	470,050	16,749	453,301	31,450	15,943	23,041	11,680
20	2035	498,750	528,302	(29,552)	470,700	495,281	(24,581)	28,050	13,720	(4,971)	(2,431)
		$ 9,996,900	$ 1,006,290	$ 8,990,610	$ 9,381,608	$ 813,505	$ 8,568,102	$ 615,293	$ 435,421	$ 422,508	$ 305,381
	DSR	$ 503,145	5.00%		$ 478,533	3.50%					
					Savings as % Refunded Bonds			$6,150,000	7.08%		4.97%
					Savings as % Refunding Bonds			$6,580,000	6.62%		4.64%

- Net-to-Net Refunding reflects true savings
- May reduce savings level (e.g. 7.08% vs. 4.97%)

Variable Rate Bonds

Pros and Cons of Variable Rate Debt

Historical Variable Interest Rates and Issuance

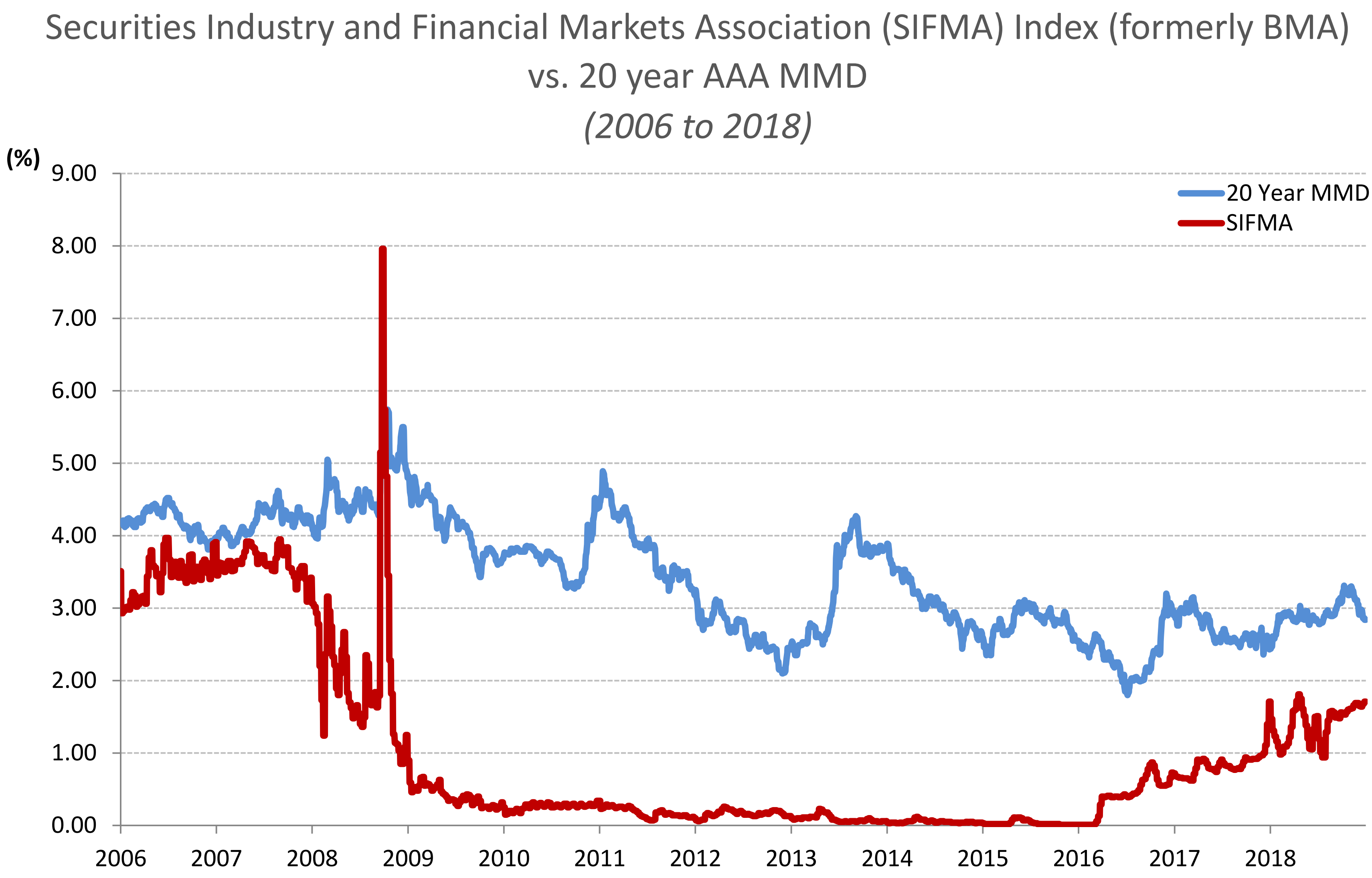
Structuring Options

Pros and Cons of Alternative Structures

Pros and Cons of Variable Rate Debt

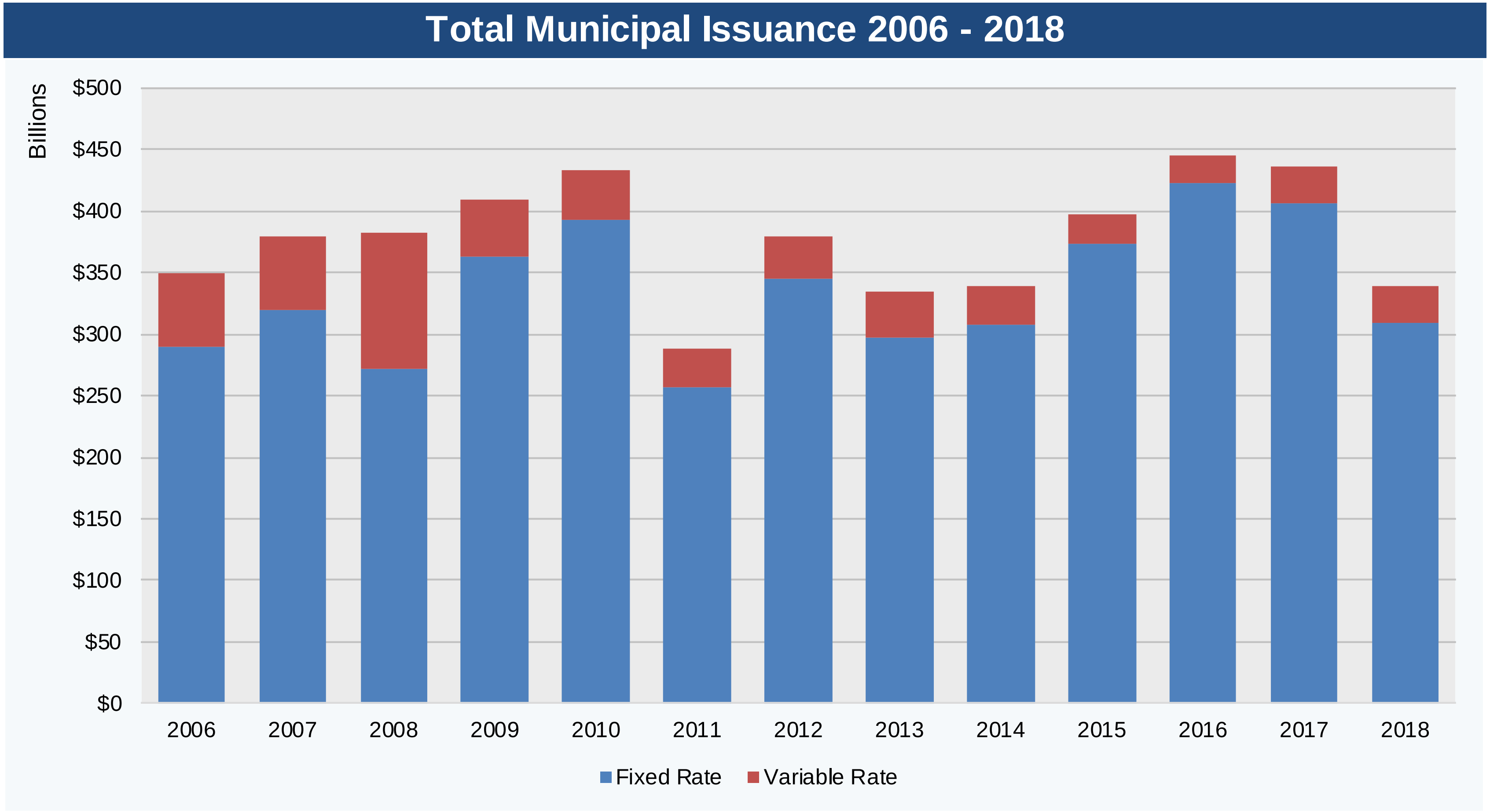
	PROS	CONS
Variable Rate	Historically lower cost Easier to restructure/finance Hedge for floating rate assets	Interest rates may rise/Budget issues Takes more time to manage Bank renewal and trading risk
Fixed Rate	No interest rate risk Easier to budget Less time required to manage	Less flexibility to refinance Historically higher costs Poor hedge for floating rate assets

Variable Rate vs. Fixed Rate



Source: TM3

Variable Rate Issuance over Time



Source: The Bond Buyer

Variable Rate Structuring Options

Historically, there have been a number of ways for issuers to achieve variable rate exposure in the municipal market

- Commercial Paper
- Variable Rate Demand Bonds
- Floating Rate Notes
- Direct Purchase
- Auction Rate Securities
- Interest Rate Swaps

Variable Rate Structuring Options

Commercial Paper

- Can be drawn down and paid back as needed
- Outstanding CP is remarketed for a maximum of 270 days
- Bank credit facility required for liquidity
- Money Market Funds are the primary investor
- Often used to fund construction draws and then taken out with long-term bonds
- Interest rate determined by CP Dealer

Variable Rate Structuring Options

Variable Rate Demand Bonds

- Long-term bond with rate that resets periodically (daily, weekly, monthly, etc.)
- Remarketing Agent sets the rate for the issuer and is paid a quarterly fee
- Investor can “put” bonds on short notice (allows bond to trade at par)
- Bank credit facility required to support put

Credit Facilities

2007 Top Letter of Credit Providers			
Rank	Firm	Amount	Issues
1	Bank of America	2,364.6	101
2	J P Morgan Chase	2,340.6	85
3	Wells Fargo Bank	1,688.6	98
4	SunTrust Bank	1,354.4	57
5	Regions Bank	1,295.8	42
6	The Bank of New York Mellon	1,024.8	60
7	LaSalle Bank	955.1	40
8	US Bank	821.8	77
9	KeyBanc	814.0	40
10	Sovereign Bank	699.8	29

2018 (1/1 to 9/30) Top Letter of Credit Providers			
Rank	Firm	Amount	Issues
1*	Barclays	238.2	2
1*	Sumitomo Mitsui Banking Corp	238.2	2
3	US Bank NA	212.9	4
4	TD Bank NA	208.3	2
5	Wells Fargo Bank	200.0	2
6	PNC Bank NA	145.9	4
7	Fed Home Loan Bk San Francisco	79.6	2
8	Federal Home Loan Bank Chicago	27.5	1
9	East West Bank	20.0	1
10	Citizens Bank	12.0	1

*Tie
Source: SDC

- Bank Credit capacity was severely constrained after the financial crisis in 2008 and 2009
- Fewer banks with less capital drove LOC pricing to high levels
- The credit market has stabilized and credit pricing has fallen to much lower levels

Variable Rate Structuring Options

Floating Rate Notes

- Interest rate resets based on an index (i.e. SIFMA or LIBOR)
- Rate typically based on a spread over or under the index (i.e. SIFMA +/- X bps)
- Investor does not have a put, so no need for a bank credit facility
- Limited role for Remarketing Agent
- Index period is typically less than 5 years. At the end of the index period, the issuer and remarketing agent remarkets the bond with a new rate for another index period or switches to a different variable rate mode

Variable Rate Structuring Options

Direct Purchase

- Alternative to a VRDB or FRN
- Issuer deals directly with a bank or other lender
- Interest rate can be fixed or floating
- No remarketing agent, rate based on an index plus a spread (ie 70% of LIBOR + XX bps)
- Usually, no rating or disclosure documents

Variable Rate Structuring Options

Auction Rate Securities

- Long-term bond with rate that resets periodically (weekly, monthly, etc.)
- No "put" feature and thus, no bank facility
- Rate reset via Dutch Auction process

The ARS market died in 2008 with the demise of large scale bond insurance

Pros and Cons of Variable Rate Structures

Summary of Variable Rate Structures				
Attribute	**Traditional VRDBs**	**Commercial Paper**	**Index Floater**	**Direct Purchase**
Reset Method	Remarketing Agent	CP Dealer	Index + Fixed Spread	Index + Fixed Spread
Bank Credit	Yes	Yes	No	Yes
Bank Counterparty Risk	Yes	Yes	No	No
Remarketing Agent Risk	Yes	Yes	No	No
Bank Facility Renewal Risk	Yes	Yes	No	Yes
Roll-Over Risk	No	No	Maybe	No
Term Out	Yes	Yes	Maybe	Yes
Ability to call bonds quickly	High	Moderate/ High	Moderate	High
Rating Required	Yes	Yes	Yes	No
Disclosure Document	Yes	Yes	Yes	No

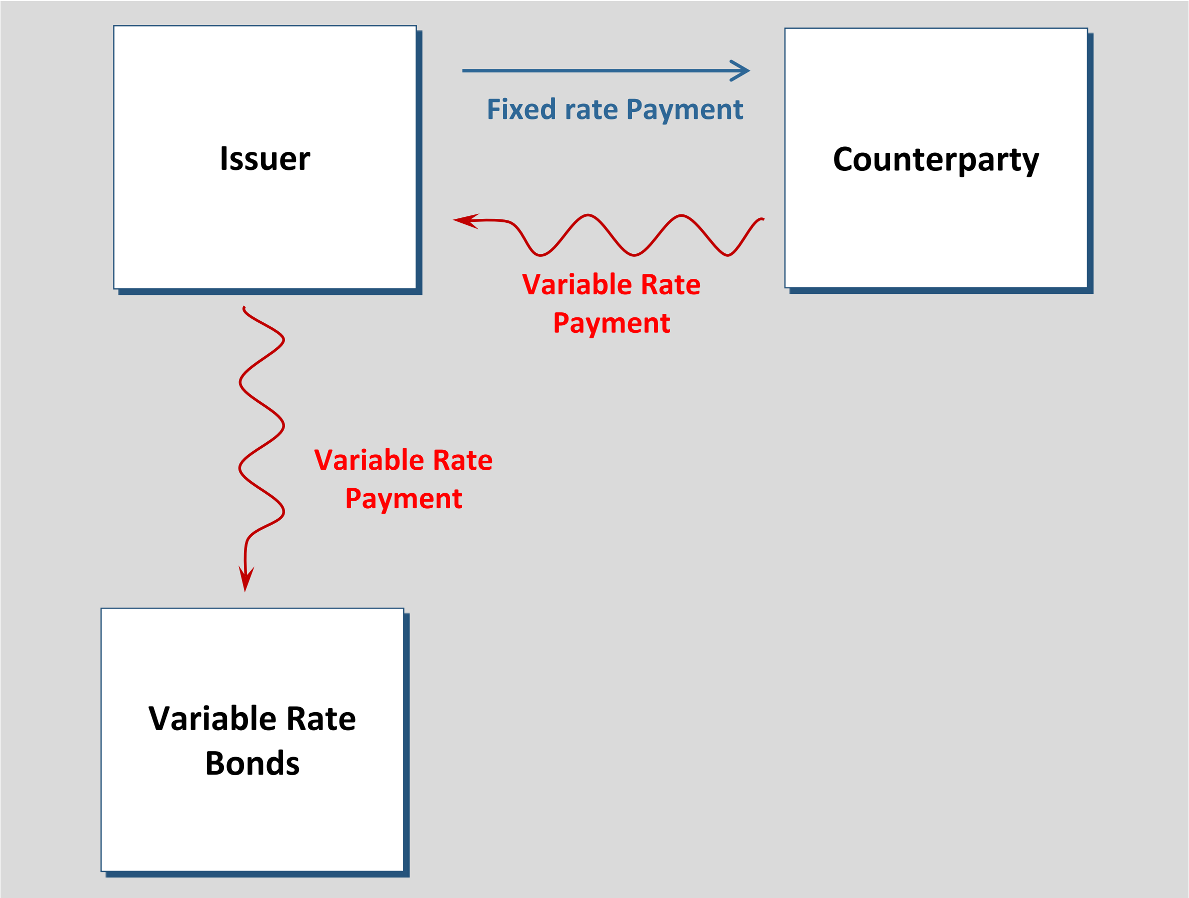
The Best Portfolio Mix-

There isn't one…

- **Economic, political, demographic, regulatory, etc. factors matter**
- **Risk-centric approach to debt policy might help reduce cost and limit risks**
  - Traditional fixed versus variable rate debt and risk aversion
    - Certain benefits
    - Opportunity cost – the foregone lower costs of other alternatives – focus on hidden costs of decisions
    - Exchange of one set of risks for another
    - Commitment risk – lack of flexibility to respond to future risks

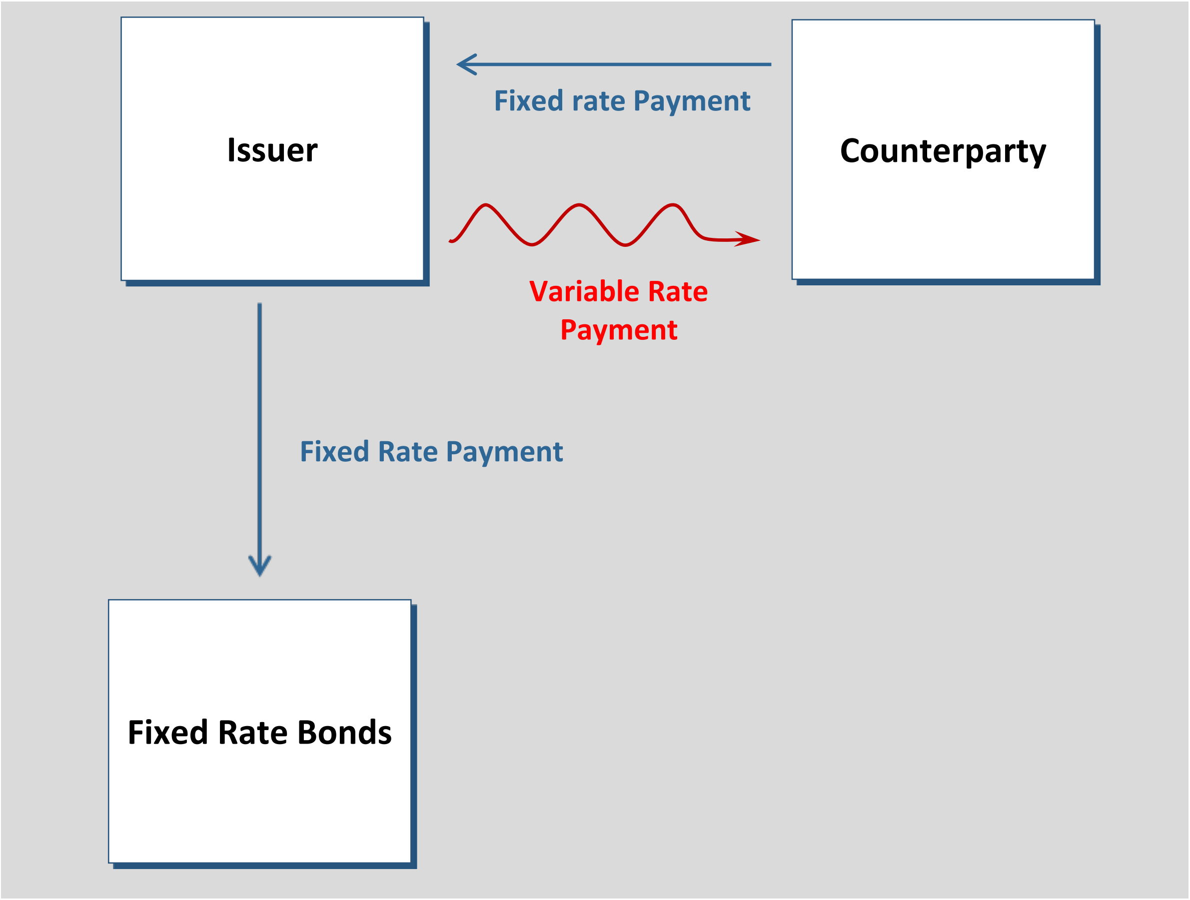
Managing Interest Rate Swaps-Fixed Payor Swaps

Many issuers have used interest rate swaps to create synthetic **fixed rate** debt



Managing Interest Rate Swaps-Fixed Receiver Swaps

Many issuers have also used interest rate swaps to create **synthetic variable** rate debt



Interest Rate Swaps Have a Number of Risks

Basis Risk	Swap variable rate received and the actual bond variable rate does not match perfectly	• LOC bank is downgraded, causing bonds to trade at higher spread to SIFMA • Market rates compress
Tax Event Risk	Changes in income tax rates alter the value of tax-exempt interest rates relative to taxable interest rates	• If tax rates go down, variable bond yield will go up
Counterparty Risk	Swap counterparty will not perform pursuant to the contract's terms. For example if the swap provider defaults or its credit rating declines	• Lehman, DEPFA, AMBAC, UBS
Termination Risk	A material decline in credit worthiness could lead to a termination of the swap and require a payment to be made to or from the issuer depending on prevailing market conditions at the time of termination	• Negotiate favorable credit triggers and terms for collateral posting • Monitor the mark to market value of the swap

New Consideration-Change in Floating Rate Indexes

- **There have been two primary indexes in use in the municipal swap market**
  - % of LIBOR (London Interbank Offered Rate) – generic rate that theoretically represents what banks would pay to borrow from one another.
  - SIMFA Swap Index (Securities Industry and Financial Markets Association) – a compilation of weekly tax exempt variable rates that is published every Wednesday.
- **Change is coming as the LIBOR Index will no longer be calculated after 2021**
  - Issuers with LIBOR exposure will need to amend documents to change the index.
  - The most discussed replacement index is SOFR (Secured Overnight Financing Rate) which is a rate based on the overnight repurchase agreement market.

If You Have an Interest Rate Swap…

- **Monitor the bank providing liquidity for the variable rate bonds**
  - Rating
  - Expiration Date of credit facility
  - Trading characteristics
- **Monitor the performance of your Remarketing Agent**
- **Monitor the credit rating of your swap counterparty**
- **Monitor long-term interest rates**
  - As rates go up, termination values should fall
  - May create an opportunity to terminate the swap
- **If you have a LIBOR swap, discuss the implications of changing the index with your swap advisor**