# SESSION FIVE: MARKETING & PRICING



Municipal Debt Essentials – Day 2 Accessing the Market March 14, 2012 Kellogg West Conference Center, Pomona, CA

> Outline of presentation by: TIM SCHAEFER Principal Owner



Newport Beach, California

#### CDIAC

CALIFORNIA DEBT AND INVESTMENT A D V I S O R Y COMMISSION

## SESSION OBJECTIVE



"I need an interpreter. Send in someone who speaks jargon." 1. Demystify the bond pricing process

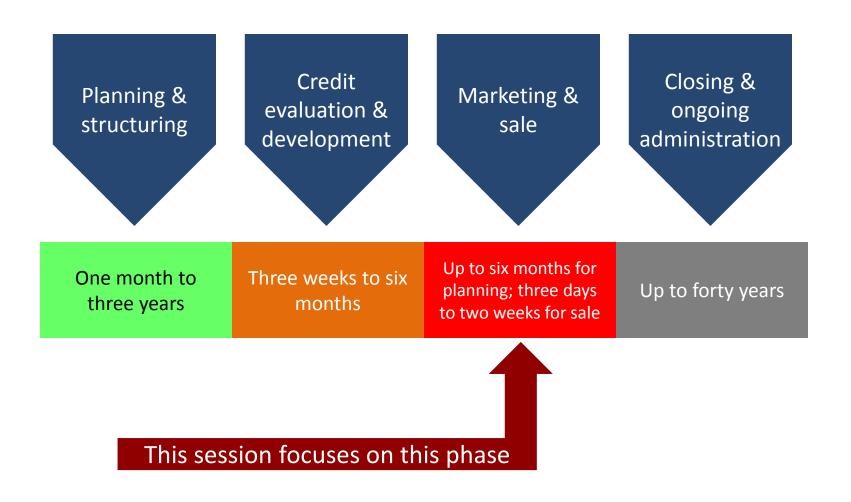
- 2. Learn to evaluate price execution on your bond sale
- 3. Develop techniques to improve your future results
- 4. Acquire some useful tools and tips

This session isn't designed to make you a bond "expert," nor will it focus on individual bond issues.

It will offer practical advice to use in negotiated sales to help you get started toward better results.



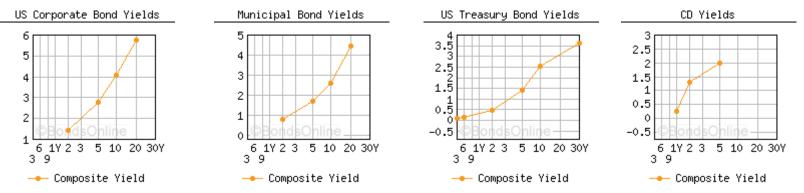
#### **ISSUANCE PROCESS – REVIEW**





### UNDERSTANDING INTEREST RATES

What is a "yield curve"? It's a representation of interest rates over time:



What a yield curve can tell you; and, what it cannot . . . .

The "shape" of the yield curve is important. By analyzing the shape of the curve, one can estimate what the market's expectations are for future conditions.

A yield curve normally has an upward sloping shape – called a "positive" or "normal" yield curve. In a normal yield curve, shorter-term yields are lower than longer-term yields, with yields generally increasing as time to maturity increases. <u>Yields are higher on longer maturities because these bonds have more volatile prices for a given change in interest rates.</u>

In the "Tool Kit" there are several resources that you can use to develop a greater understanding of rates using yield curves compiled by others.



## PRICES & YIELDS MOVE INVERSELY

Once interest rates are established by the issuer, they remain constant – usually for the life of the loan; what changes are bond <u>values</u> The higher the yield (for a fixed interest rate) the lower the price (<u>value</u>) for that bond, and viceversa Buyers seek to protect themselves from future adverse changes in the price (value) of their investments

Benchmarking is critically important in municipal pricing – the market establishes price (and value) by "relational" means – **"What should the yield on this bond be compared to the available yield on something else?"** 

There are some useful benchmarks you can use for comparison:



#### <u>General</u>

Bond Buyer Indices (11, 20, RBI)

U.S. Treasuries ("constant maturity")

S&P Composites

#### **Specific**

Municipal Market Advisors ("MMA")

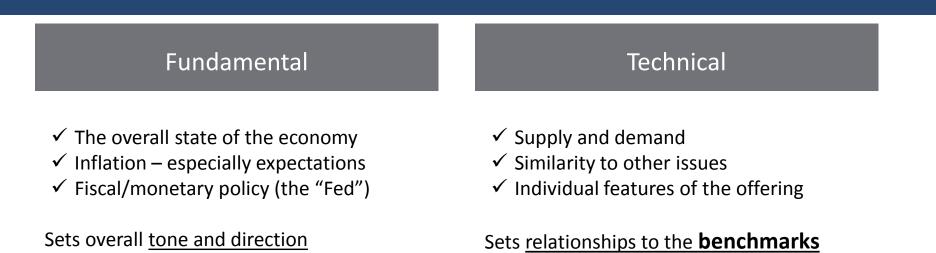
Delphis Hanover (by credit quality)

Issues comparable to yours

We will use the "Tool Kit" for examples of the specific benchmarks.



## FACTORS INFLUENCING YIELDS



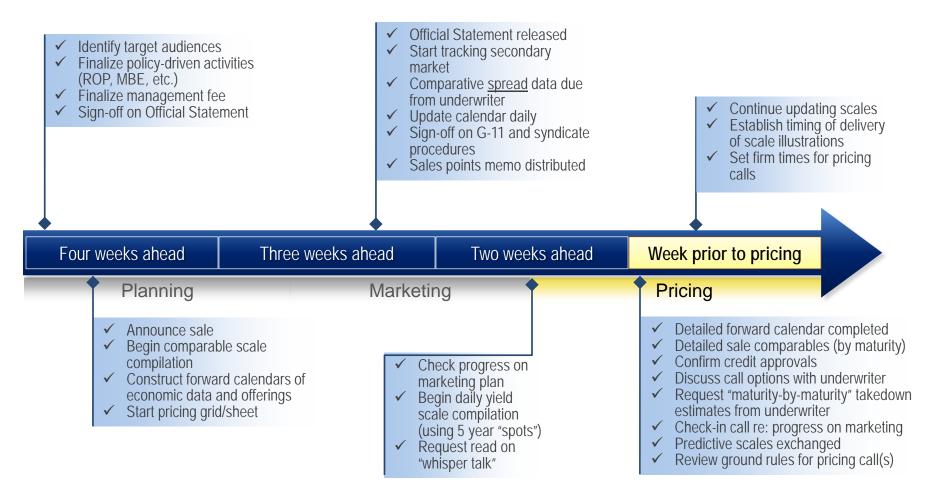


Start the pricing exercise several weeks ahead of time by creating a pricing workbook, chart, or table of factors that will affect your interest rates. Then, each day, plot the direction of influence on prices & yields.

Consult the benchmarks weekly at first, then daily to develop a "grid" of where you think the yields will be established on your issue

This is an excellent visualization tool to understand market sentiment and will strengthen your negotiating skills.

## EXAMPLE OF A PRICING TIMELINE





## TARGETED INVESTOR TEMPLATE

Tier I	Tier II	Tier III
1. Trades over \$1.0 million	1. Trades over \$250k	1. Trades less than \$50k
2. Very price sensitive	2. Sophisticated, but less price sensitive	2. Least price sensitive of investors – may
3. Active traders	than Tier I investors	include active retail accounts
4. Covered by every Wall Street firm	3. Usually not active traders	3. Buy and hold accounts
	4. Covered by many firms	4. Very rarely trade
Examples OF Tier I investors:		5. Quality conscious; name driven
<ul> <li>Large pension funds</li> </ul>	Examples of Tier II investors:	6. Coverage often omitted by many firms
<ul> <li>Insurance companies</li> </ul>	<ul> <li>Small insurance companies</li> </ul>	
<ul> <li>Major money managers</li> </ul>	<ul> <li>Corporations</li> </ul>	Examples of Tier III investors:
<ul> <li>Major mutual funds</li> </ul>	<ul> <li>Small pension funds</li> </ul>	✓ Small corporations
<ul> <li>Common trust funds</li> </ul>	<ul> <li>Regional money managers</li> </ul>	<ul> <li>Small bank trust accounts</li> </ul>
	<ul> <li>Regional trust funds and/or directed</li> </ul>	<ul> <li>High net worth individuals</li> </ul>
	accounts	<ul> <li>Locally-directed individuals</li> </ul>



## WHAT IS "MR. MARKET" SAYING?

Begin with a basic understanding of what the overall markets are doing, then look at your own issues; follow with issues comparable to yours.

You can search for this data on the Municipal Securities Rulemaking Board's "EMMA" web site, found at: <u>www.emma.msrb.org.</u>

EMMA can furnish valuable insight into the level of customer activity and buying in the market.

This data shows the average number of trades and the daily volume for the six-week period July 12, 2010 through August 20, 2010.





IN THIS DATA SET, CUSTOMER "BUYS" WERE HALF OF THE MARKET DURING THIS PERIOD; BUYS OUTPACED SELLS BY CUSTOMERS ALMOST **3** TO **1** BY <u>NUMBER</u> AND **1.5** TO **1** BY <u>AMOUNT</u> DURING THE SAME PERIOD.

This is a probable indication of a "rising price/falling yield" market.



## **BASIC TRUTHS ABOUT BUYERS**



#### Institutional buyers:

- ✓ buy in large size
- ✓ make decisions quickly
- ✓ very price sensitive

#### Retail buyers:

- ✓ buy in smaller size
- ✓ take longer to make decisions
- ✓ not as price sensitive

Accessing them is not as easy as it looks . . .





### **REVIEW YOUR OWN BONDS**

#### The table below displays trades larger than \$100,000 of a City of Los Angeles General Obligation Bond, issued August 2009, maturing September 1, 2023, during the period August 13, 2010 through August 20, 2010.

Trade date & time **Trade Price** Yield Par Amount Type of Trade 08/20/2010 : 12:29 PM 250,000 Inter-dealer Trade 102.307 08/20/2010 : 12:27 PM 102.237 250,000 Inter-dealer Trade 08/20/2010 : 12:04 PM 200,000 Customer bought 103.484 3.30 08/20/2010:09:15 AM 102.307 57 200,000 Inter-dealer Irade 08/20/2010 : 09:13 AM 102.237 200.000 Inter-dealer Trade 08/19/2010:02:38 PM 102.247 100,000 Inter-dealer Trade 08/19/2010 : 02:38 PM 100,000 Customer bought 102.407 3.437 08/19/2010 : 02:38 PM 100.000 Inter-dealer Trade 102 207 08/19/2010 : 02:38 PM 102.307 100.000 Inter-dealer Trade 08/19/2010 : 01:56 PM 104.175 3.213 250,000 Customer bought 08/13/2010 : 01:56 PM 102.300 250,000 Inter-dealer Trade 02/19/2010 : 01:25 PM 3.30 103.485 100,000 Customer bought 08/19/2010 : 01:18 PM 102.367 100,000 Inter-dealer Trade 08/19/2010 : 01:16 PM 102.307 100,000 Inter-dealer Trade 08/18/2010 : 03:45 PM 102.301 100,000 Inter-dealer Trade 104.176 08/18/2010 : 03:45 PM >> 3.213 100,000 Customer bought 08/18/2010 : 11:55 AM 103.657 100,000 Customer bought 3.278 08/18/2010 : 11:55 AM 102.301 100.000 Inter-dealer Trade 08/16/2010 : 11:47 AM 102.805 3.387 300,000 Customer bought 08/16/2010 : 11:47 AM 102.305 300,000 Inter-dealer Trade

(Caution: Smaller trades may be "outliers" and often do not represent market yields.)

Then, look at trading levels for your outstanding bonds, if they are similar in attributes to the proposed bond issue. (This part is easier if you have the "CUSIP" number for the existing bonds; you'll find that on the official statement for that issue.)

Investors bought bonds at yields between 3.213% and 3.437% during a single 24-hour period.

Notice that bonds traded at a variety of yields; but, it appears that 3.30% is the most recent "proven" level.



### COMPARABLE ISSUES

The next step is to examine issues scheduled for sale that are "comparable" to the one you are selling.

Let's assume you are selling \$10 million, lease revenue bonds for a new city hall, with a projected rating of "A."



289,335,000	Sonoma County	Pension Obligation Bonds, Series 2010A
193,000,000	Los Angeles, City of	Senior lien wastewater revenue bonds (Moody's: Aa2) Taxable "Build America Bonds"
100,000,000	Really Big State Bonds	General Obligations (Moody's: Aa2; S&P: AA; Fitch: AA )
136,000,000	Los Angeles, City of	Subordinate lien wastewater revenue bonds (Moody's: Aa3; S&P: AA)
12,000,000	Likebonds	2010 Court House Renovation COPs (Moody's: A2; S&P: A; Fitch: A+)
8,000,000	Southern Humboldt USD	General obligation bonds (S&P: A+)
5,780,000	San Diego USD	School Building Bonds, Series 2010
3,000,000	Otherbonds	Golf Course Revenue Bonds (rating forthcoming)

Look for issues that are similar in size, rating and purpose. Also look for similar geography, frequency of issue, demographic similarities, etc.

## WHAT TO LOOK FOR IN THE PRICING

There are numerous prices that will be used:

- 1. Retail offering price:
  - ✓ Price paid to the broker/dealer by the final investor
- 2. Primary (bid) price:
  - ✓ The price paid to you (the issuer) by the wholesaler (the underwriter)
- 3. Concession price:
  - ✓ Price paid by a broker/dealer who is not the originating underwriter

# The critical one to focus on is the retail offering price (this is presented as the "preliminary scale." )

That's the foundation for successful negotiation. If you know what the investor will pay, then it's much easier to ascertain if the underwriter has delivered the "best" sale or is relying on other "middle-men" to do so.

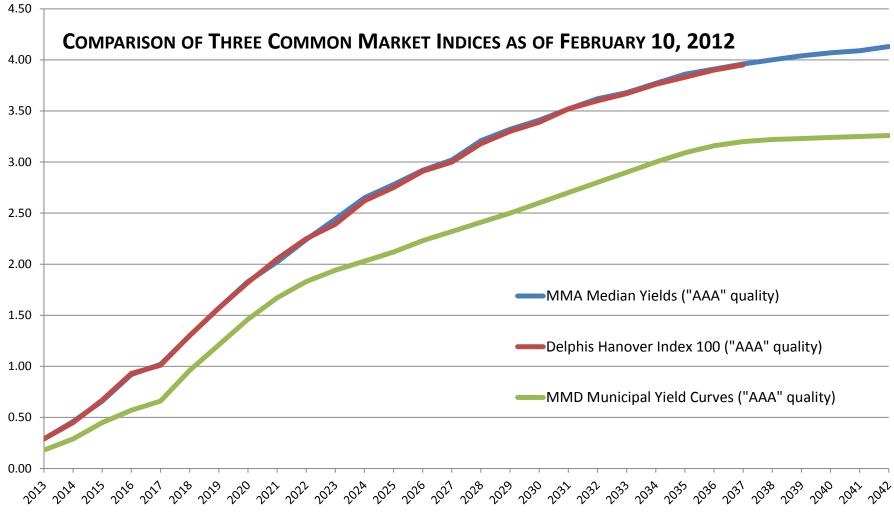




## YOUR BASIC "TOOL KIT"



### NOT ALL BENCHMARKS ARE EQUAL!





## THE PRELIMINARY SCALE

Here is the most recent illustration of rates from your underwriter, along with three "comparable" issues identified by the underwriter's desk.



	\$10,000,000	\$3,000,000	\$100,000,000	\$12,000,000
ISSUE:	"Newbonds"	"Otherbonds"	"REALLY BIG STATE BONDS"	"Likebonds"
MATURITY	CITY HALL LEASE REVS	GOLF COURSE COP	GEN'L OBLIGATION	COURT HOUSE
2011	1.05%	1.65%	0.60%	
2012	1.30%	1.95%	0.75%	
2013	1.65%	2.25%	1.05%	
2014	1.85%	2.50%	1.30%	
2015	2.25%	2.85%	1.65%	2.15%
2016	2.65%	3.35%	2.05%	2.60%
2017	3.00%	3.65%	2.30%	2.90%
2018	3.30%	3.85%	2.50%	3.20%
2019	3.60%	4.05%	2.75%	3.50%
2020	3.90%	4.35%	3.00%	3.75%
Rating:	A3/A-/NR	NR/BBB+/BBB	Aa2/AA/AA	A2/A/A+
Spread:	\$15/1,000	\$35/1,000	\$2/1,000	\$18/1,000



## Order Period Results

You concluded that the illustration on the previous page was "close enough" to the market, and gave the underwriter permission to enter the market with those prices (yields). Here are the orders received:

i di	<u>Comments</u>	<u>Orders</u>	<u>Prices</u> Yields	<u>Coupon</u> <u>Rates</u>	<u>Amounts</u>	<u>Maturity</u>
	Retail, advisory, (500 stocked by senior manager)	850	100%	1.05%	945,000	2011
	A.O.N. w/'13's	All	100%	1.30%	955,000	2012
Gef	(See '12)	All	100%	1.65%	970,000	2013
	Stocked by members	1,900	100%	1.85%	985,000	2014
	Stocked by members	300	100%	2.25%	1,005,000	2015
of	Insurance company (on a "swap")	2,600	100%	2.65%	1,030,000	2016
What s 1. Seve	3,000 stocked by non-member; 350 away to retail	3,350	100%	3.00%	1,060,000	2017
"ove 201	1,000 to hedge fund; 200 stocked by member	1,200	100%	3.30%	1,095,000	2018
2. In the	2,500 to hedge fund; 1,500 stocked by senior manager	4,000	100%	3.60%	1,135000	2019
3. The any	3,000 stocked by managers; balance to hedge fund	3,650	100%	3.90%	1,180,000	2020



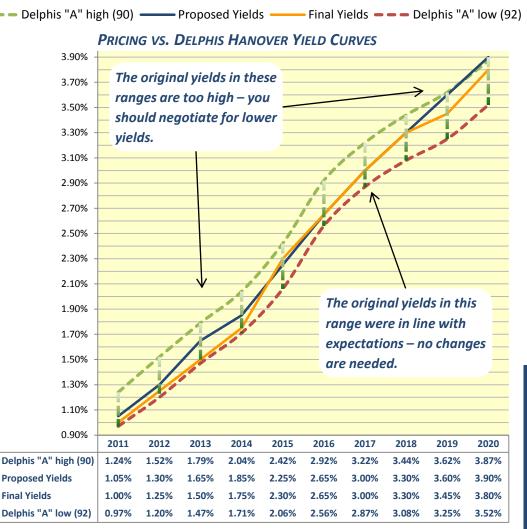
"We appear to have slightly overestimated this month's avalanche of frenzied customers with wads of cash they couldn't wait to spend."

#### What stands out:

- Several of the maturities are significantly "oversubscribed" (2014, 2016, 2017, 2019, 2020).
- 2. In two of the oversubscribed maturities, there are orders from a "hedge fund."
- 3. The longest maturities don't seem to have any retail orders at all.
- 4. What does the term "stocked" mean?



### COMPARING THE DATA



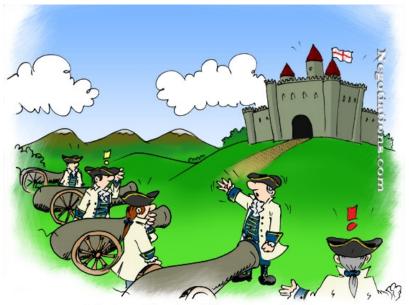


"I'm razzled, but not dazzled."

Look at the red and green dashed lines in the chart to the left – they represent the boundaries of yields you expected in the pricing based on the Delphis Hanover curves. The solid blue line are the preliminary yields. The solid orange line is what you want to negotiate to – the FINAL yields. These are presented on page 30.



## NEGOTIATING A FINAL PRICE



Lets be subtle about this, we want to do business with them in the future.

The red shaded areas show the original proposal. We improved on the red areas and had to give up higher yields on the maturity shaded in green.

<u>MATURITY</u>	<u>Amounts</u>	<u>Coupon</u>	<u>Price</u> (Yield)	<u>Preliminary</u> <u>Yields</u>
2011	945,000	1.00%	100%	1.05
2012	955,000	1.25%	100%	1.30
2013	970,000	1.50%	100%	1.65
2014	985,000	1.75%	100%	1.85
2015	1,005,000	2.25%	2.30%	2.25
2016	1,030,000	2.70%	2.65%	2.65
2017	1,060,000	2.90%	3.00%	3.00
2018	1,095,000	3.30%	100%	3.30
2019	1,135,000	3.40%	3.45%	3.60
2020	1,180,000	3.75%	3.80%	3.90
	Interest Cost:	<u>1</u>	<u>,719,917</u>	<u>1,772,110</u>

#### Interest cost saved through this negotiation: \$52,000!





## FOR MARKET OVERVIEW: BOND DESK GROUP

#### www.bonddeskgroup.com

Click on home page; there is a matrix of Treasury, CD, agency, municipal and corporate rates presented at the top.

There is a very useful yield curve for the benchmark 10-year U.S. Treasury, that displays intra-day yields.

You can also select several other useful benchmarks and historical charts using the red hyperlinks.

#### BONDDESKGROUP





**Comprehensive Fixed Income Trading Technologies** 

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More.



## SPOT RATES – BLOOMBERG: "RATES & BONDS"

#### www.bloomberg.com

"rates and bonds" displays U. S. Treasuries, a yield curve, and national, municipal "spots" (rates for 5,

10, 20 & 30 year maturities) assuming

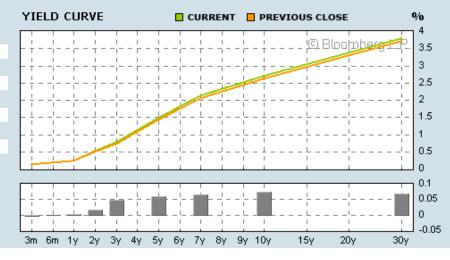
"Aaa/AAA/AAA" ratings.

Governm	ent Bonds				
AUSTRALIA	BRAZIL	GERMANY	HONG KONG	JAPAN UK	US
U.S. Treas	suries				
	COUPON	MATURITY DATE	CURRENT PRICE/YIELD	PRICE/YIELD CHANGE	TIME
3-MONTH	0.000	12/02/2010	0.12 / .12	-0.003 /003	17:00
6-MONTH	0.000	03/03/2011	0.18 / .18	-0.001 /001	17:00
12-MONTH	0.000	08/25/2011	0.22 / .23	0.002 / .002	17:00
2-YEAR	0.375	08/31/2012	99-23+/.51	-0-01/.017	17:00
3-YEAR	0.750	08/15/2013	99-28½ / .79	-0-04+/.048	17:00
5-YEAR	1.250	08/31/2015	98-28½ / 1.48	-0-09/.059	17:00
	1.875	08/31/2017	98-121/2 / 2.12	-0-13½ / .066	17:04
	2,625	08/15/2020	99-12 / 2.70	-0-20+/.074	17:04
	3.875	08/15/2040	101-21½ / 3.78	-1-07 / .067	17:01

#### **Municipal Bonds**

#### NATIONAL MUNICIPAL BOND YIELDS: TRIPLE-A RATED, TAX-EXEMPT GENERAL OBLIGATION BONDS

	CURRENT YIELD	PREVIOUS YIELD	CHANGE IN YIELD	28% EQ YIELD	1 WEEK PRIOR YIELD
2-YEAR	0.33%	0.33%	0.00%	0.46%	0.31%
5-YEAR	1.08%	1.06%	0.01%	1.50%	1.11%
7-YEAR	1.60%	1.59%	0.01%	2.22%	1.66%
10-YEAR	2.31%	2.31%	0.00%	3.21%	2.48%
15-YEAR	3.43%	3.43%	0.00%	4.76%	3.51%
20-YEAR	3.83%	3.83%	0.00%	5.32%	3.91%
30-YEAR	4.08%	4.08%	0.00%	5.67%	4.20%





### **BENCHMARKS: SIFMA**

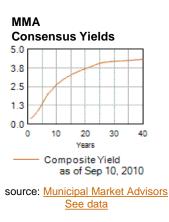
#### S&P COMPOSITE YIELDS, MMA CONSENSUS YIELDS, STATE-SPECIFIC

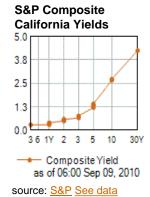
#### www.investinginbonds.com

Click on "Markets-at-a-Glance," then scroll down to

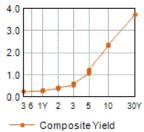
"Composite Yield Curves."

Use hyperlinks to produce data table.





#### S&P AAA Composite Yields



as of 06:00 Sep 09, 2010

source: <u>S&P</u>. <u>See data</u>



Term

3 mont

6 mont

1 year

2 year

3 year

4 year

5 year

6 year

7 year

8 year

9 year

10 year

11 year

12 yea

13 year

14 year

15 year

16 year

17 year

18 year

19 year

20 year

21 year

22 year

23 year

24 year

25 year

26 year

27 year

28 year

29 year

30 year

#### Data: Standard & Poor's Composite Yield Table

									_
	AAA Non-Call	<b>A</b> AA	AAA % Trsy					Pre-Ref	Gov
th	0.24	0.24	1.69	0.30	0.25	0.74	1.65	0.22	0.14
th	0.26	0.26	1.39	0.33	0.27	0.78	1.93	0.26	0.19
	0.27	0.27	0.66	0.37	0.30	0.82	1.95	0.29	0.87
	0.39	0.39	0.99	0.56	0.43	1.13	2.22	0.41	3.83
	0.58	0.58	-	0.78	0.60	1.30	2.43	0.57	
	0.81	0.81		1.04	0.89	1.54	2.69	0.84	
	1.16	1.16	-	1.45	1.24	1.97	3.07	1.19	
	1.45	1.45	-	1.77	1.56	2.29	3.49	1.44	
	1.74	1.74	-	2.08	1.86	2.55	3.76	1.71	
	1.97	1.97	-	2.32	2.09	2.72	3.96	1.91	
	2.19	2.19	-	2.54	2.31	2.88	4.13	2.14	
Г	2.36	2.36	-	2.75	2.52	3.03	4.25	2.33	
Г	2.51	2.51		2.89	2.66	3.16	4.39	2.50	-
Г	2.59	2.62		3.02	2.78	3.29	4.52	2.63	
Г	2.68	2.73		3.13	2.89	3.39	4.61	2.71	
Г	2.77	2.82		3.25	2.96	3.50	4.70	2.84	
Г	2.87	2.90		3.34	3.05	3.60	4.75	2.94	
Г	2.97	2.99	-	3.44	3.15	3.70	4.82	3.03	
Г	3.08	3.08	-	3.54	3.24	3.78	4.85	3.15	
г	3.18	3.17		3.63	3.33	3.87	4.88	3.22	
г	3.27	3.26		3.73	3.41	3.94	4.94	3.29	
Г	3.35	3.34		3.82	3.50	4.02	4.98	3.40	
Г	3.45	3.44	-	3.91	3.60	4.10	5.00	3.49	
Г	3.54	3.52	-	3.99	3.69	4.15	5.04	3.59	
г	3.59	3.58	-	4.03	3.77	4.22	5.06	3.66	
г	3.64	3.62		4.06	3.81	4.25	5.10	3.70	
Г	3.70	3.65		4.09	3.83	4.27	5.13	3.73	
Г	3.75	3.67	-	4.12	3.84	4.29	5.15	3.75	-
Г	3.75	3.69	-	4.13	3.85	4.30	5.15	3.76	
Г	3.78	3.70	-	4.14	3.86	4.32	5.17	3.79	
r	3.79	3.71	-	4.15	3.86	4.33	5.18	3.80	
Г	3.79	3.73	-	4.16	3.87	4.35	5.19	3.82	
						* at	of 06	:00 Sep 09,	
						_		source	

## Investing Reads

#### How to read this chart

#### What is it?

The Standard & Poor's (S&P) Composite Yield Table shows the yield composites of municipal bonds of various maturities from three months to 30 years, In some cases in comparison to U.S. Treasury securities with the corresponding maturity. The composite is based on bonds of that maturity held by a mutual fund that Standard and Poor's prices dally. Composites represent municipal bonds that are callable and noncallable AAA-rated, Insured (INS), AA-rated, A, BBB and prerefunded issues; and bonds issued by New York State, California, Texas, Pennsylvania, Florida and Massachusetts Issuers.

#### Why do I care?

Rates of return on municipal bonds vary by maturity, credit rating and other factors. This table shows indicative rates of return for categories of municipal bonds based on current market conditions. Rates of return on individual bonds may vary.

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#### THE GOLD STANDARD – DELPHIS HANOVER VIA THE WALL STREET JOURNAL

#### <u>www.wsj.com</u>

Click on "markets," then "market data," then "bond rates & credit markets," then "bond yields," then scroll down to "range of municipal yield curve scales" and click for a large table – select the general credit quality of your issue

Market Data Home	U.S. Stocks	International Markets	ETFs	Mutual Funds	Bonds, Rate Credit Mark	
Bond Yield	s					
TREASURY	ISSUES					
GO TO: Range	of Municipal Yield	Curve Scales				
Friday, Septem	ber 03, 2010					
Prices and yiel maturities. Dat		Freasurys, or the m	nost recently issued	10.S. Treasury s	ecurities, for v	arious
	a as ur s p.m. Er.					
	a as or 5 p.m. E1.					
	Coupor	Curre n pric		ious	Change	Yield
	•		e pr		Change unch.	<b>Yield</b> 0.142
Maturity 09/30/10	Coupor	n pric	e pri 9 99	ce	-	
Maturity 09/30/10 12/02/10	Coupor	n pric 99.9	e pri 9 99 7 99	99	unch.	0.142
Maturity 09/30/10 12/02/10 03/03/11	Coupoi 	n pric 99.9 99.9	e pri 9 99 7 99 1 99	99 96 90 90 90 90 90 90 90 90 90 90 90 90 90	unch. unch.	0.142
Maturity 09/30/10 12/02/10 03/03/11 08/25/11	Coupor	n pric 99.9 99.9 99.9 99.9	e pri 9 99 7 99 1 99 7 99	99 96 90 90 90 90 90 90 90 90 90 90 90 90 90	unch. unch. 0.01	0.142 0.132 0.183
Maturity 09/30/10 12/02/10 03/03/11 08/25/11 08/31/12	Coupor   	n pric 99.9 99.9 99.9 99.9 99.7 99.7	e pri 9 999 7 999 1 99 7 99 7 99 2 99	99 96 90 77	unch. unch. 0.01 unch.	0.142 0.132 0.183 0.234
Maturity 09/30/10 12/02/10 03/03/11 08/25/11 08/31/12 08/31/12	Coupor     0.375	n pric 99.9 99.9 99.9 99.9 99.7 99.7 99.8	e pr 9 99 7 99 1 99 7 99 7 99 2 99 8 100	99         99           96         90           90         77           75         90	unch. unch. 0.01 unch. -0.03	0.142 0.132 0.183 0.234 0.517
Maturity 09/30/10 12/02/10 03/03/11 08/25/11 08/31/12 08/15/13 08/31/15	Coupor     0.375 0.750	n pric 99.9 99.9 99.9 99.9 99.7 99.7 99.8 98.8	e pr 9 99 7 99 1 99 7 99 7 99 2 99 8 100 8 99	99         99           96         90           90         77           75         100           16         90	unch. unch. 0.01 unch. -0.03 -0.13	0.142 0.132 0.183 0.234 0.517 0.793
Maturity	Coupor    0.375 0.750 1.250	n pric 99.9 99.9 99.9 99.7 99.7 99.8 98.8 98.8	e pr 9 999 7 999 7 999 7 999 2 999 8 100 8 999 8 98	99         99           96         90           90         77           75         100           16         90	unch. unch. 0.01 unch. -0.03 -0.13 -0.28	0.142 0.132 0.183 0.234 0.517 0.793 1.485

RANGE OF MUNICIPAL YIELD CURVE SCALES GO TO: Treasury Issues Friday, September 03, 2010 ange of credit quality, from Triple-A-rated through non-rated tax-exempt issues. Yields on a 360-day basis. Data as of 4 p.m. ET. 92 100 96 88 Index Aaa 98 Aa 94 Α 90 Baa 86 2011 0.33 0.40 0.50 0.67 0.97 1.24 1.59 1.87 0.70 2012 0.50 0.57 0.89 1.20 1.52 1 86 2 14 2013 0.74 0.98 1.17 1.47 1.79 2.16 0.81 2 4 4 2014 0.98 1.06 1.25 1.41 1.71 2.04 2.41 2.69 2015 1.32 1.40 1.56 1.78 2.06 2.42 2.78 3.06 2016 1.69 1.78 1.96 2.22 2.56 2.92 3.28 3.56 2017 1.97 2.06 2.23 2.49 2.87 3.22 3.59 3.86 2018 2.19 2.28 2.45 2.71 3.08 3.44 3.81 4.08 2019 2.39 2.48 2.66 2.91 3.25 3.62 3.99 4.26 2020 2.63 2.72 2.92 3 19 3.52 3.87 4 25 4.52 2021 2.73 2.81 3.04 3.40 3.75 4.13 4.56 4.84 2022 2.87 2.95 3.18 3.53 3.89 4.27 4.70 4.98 2023 3.01 3.09 3.31 3.65 4.02 4.40 4.82 5.08 2024 3 13 3.21 3 4 2 374 4 10 4 48 4 90 5 16 3.25 3.53 4.15 4.53 4.96 5.22 2025 3.33 3.82 2026 3.37 3.45 3.67 3.95 4.29 4.64 5.05 5.31 2027 3.45 3.54 3.75 4.04 4.36 4.72 5.12 5.38 2028 3.54 3.63 3.84 4.13 4.44 4.80 5.21 5.47 2029 3.61 4.50 4.86 5.28 3.70 3.91 4.18 5.54 3.68 4.55 5.58 2030 3.76 3.97 4.24 4.91 5.32 2031 3.76 3.82 4.01 4.31 4.59 4.94 5.37 5.62 2032 3.85 3.91 4.09 4.35 4.62 4.95 5.38 5.63 2033 3.92 3.98 4.18 4.44 4.71 5.04 5.47 5.73 5.56 2034 4.00 4.06 4.27 4.53 4.81 5.15 5.82 2035 4.04 4.11 4.31 4.56 4.84 5.17 5.58 5.84 2040 4.19 4.26 4.46 4.73 5.05 5.36 5.76 6.01 2045 4.24 4.32 4.52 4.79 5.09 5.41 5.80 6.05 2050 4.29 4.37 4.56 4.83 5.13 5.45 5.83 6.11 High-grades weakened by .02 overall. Secondary market activity waslight 00116451 Source: Delphis Hanover



