

# Moody's Approach to Local Government Credit Analysis

**Eric Hoffmann**, Senior Vice President / Manager,  
Public Finance Department

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# Agenda

1. Moody's Credit Rating Basics
2. Initial Credit Rating Process
3. Maintenance of the Rating
4. General Obligation Methodology
5. Lease, Appropriation, Moral Obligation Methodology
6. Municipal Utility Revenue Debt Methodology

1

Moody's Credit Rating  
Basics

# The Meaning of a Moody's Credit Rating

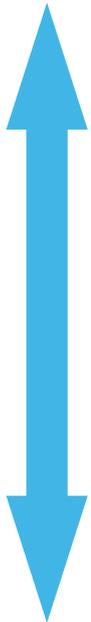
- » An indication of the relative risk that 1) a municipal debtor may not fully make its debt service payments as scheduled and 2) in the event of non-payment, investors likely financial losses

## Types of Credit Ratings:

- » Long-term and short-term
- » Underlying, enhanced, fully-supported, insured
- » Issuer Rating
- » Indicative rating

# Moody's Global Long-Term Rating Scale

Lowest  
Risk



Highest  
Risk

**Aaa** Obligations rated Aaa are judged to be of the highest quality, subject to the lowest level of credit risk.

**Aa** Obligations rated Aa are judged to be of high quality and are subject to very low credit risk.

**A** Obligations rated A are judged to be upper-medium grade and are subject to low credit risk.

**Baa** Obligations rated Baa are judged to be medium-grade and subject to moderate credit risk and as such may possess certain speculative characteristics.

**Ba** Obligations rated Ba are judged to be speculative and are subject to substantial credit risk.

**B** Obligations rated B are considered speculative and are subject to high credit risk.

**Caa** Obligations rated Caa are judged to be speculative of poor standing and are subject to very high credit risk.

**Ca** Obligations rated Ca are highly speculative and are likely in, or very near, default, with some prospect of recovery of principal and interest.

**C** Obligations rated C are the lowest rated and are typically in default, with little prospect for recovery of principal or interest.

Note: Moody's appends numerical modifiers 1, 2, and 3 to each generic rating classification from Aa through Caa. The modifier 1 indicates that the obligation ranks in the higher end of its generic rating category; the modifier 2 indicates a mid-range ranking; and the modifier 3 indicates a ranking in the lower end of that generic rating category. Additionally, a "(hyb)" indicator is appended to all ratings of hybrid securities issued by banks, insurers, finance companies, and securities firms.\*

# Moody's Short-Term Rating Scales

## Global Short-Term Rating Scale

- |     |   |
|-----|---|
| P-1 | Issuers (or supporting institutions) rated Prime-1 have a superior ability to repay short-term debt obligations.    |
| P-2 | Issuers (or supporting institutions) rated Prime-2 have a strong ability to repay short-term debt obligations.      |
| P-3 | Issuers (or supporting institutions) rated Prime-3 have an acceptable ability to repay short-term debt obligations. |
| NP  | Issuers (or supporting institutions) rated Not Prime do not fall within any of the Prime rating categories.         |

## MIG Scale

- |       |  |
|-------|--|
| MIG 1 | This designation denotes superior credit quality. Excellent protection is afforded by established cash flows, highly reliable liquidity support, or demonstrated broad-based access to the market for refinancing. |
| MIG 2 | This designation denotes strong credit quality. Margins of protection are ample, although not as large as in the preceding group.  |
| MIG 3 | This designation denotes acceptable credit quality. Liquidity and cash-flow protection may be narrow, and market access for refinancing is likely to be less well-established.                                     |
| SG    | This designation denotes speculative-grade credit quality. Debt instruments in this category may lack sufficient margins of protection.  |

## VMIG Scale

- |        |   |
|--------|---|
| VMIG 1 | This designation denotes superior credit quality. Excellent protection is afforded by the superior short-term credit strength of the liquidity provider and structural and legal protections that ensure the timely payment of purchase price upon demand.  |
| VMIG 2 | This designation denotes strong credit quality. Good protection is afforded by the strong short-term credit strength of the liquidity provider and structural and legal protections that ensure the timely payment of purchase price upon demand.   |
| VMIG 3 | This designation denotes acceptable credit quality. Adequate protection is afforded by the satisfactory short-term credit strength of the liquidity provider and structural and legal protections that ensure the timely payment of purchase price upon demand.   |
| SG     | This designation denotes speculative-grade credit quality. Demand features rated in this category may be supported by a liquidity provider that does not have an investment grade short-term rating or may lack the structural and/or legal protections necessary to ensure the timely payment of purchase price upon demand. |

# 2

## Initial Credit Rating Process

# The 6-Step Rating Process



Assignment	Methodology	Analysis	Discussions	Committee	Publication
The rating process starts with the assignment of a Lead Analyst	The Lead Analyst identifies the appropriate methodology	The Lead Analyst gathers information and begins to analyze the credit	The Lead Analyst holds a credit discussion with the Issuer (in-person/ conference call)	The Lead Analyst develops a recommendation and presents it to a committee of senior analysts	The Lead Analyst informs the marketplace of any rating actions by publishing a report

# Methodologies -- Publicly Available on Moodys.com

## You Browsed By:

### RESEARCH TYPE

Methodology (Remove)  
**Rating Methodologies**  
 (Remove)

### MARKET SEGMENT

U.S. Public Finance (Remove)  
**Local Government** (Remove)

### REGION

**North America** (Remove)

### COUNTRY/JURISDICTION

**United States** (Remove)

Search within results

GO

## Refine by:

### RESEARCH TYPE

Rating Methodology (12)

### MARKET SEGMENT

Charter School (6)  
 City (incl. Town, Village and Township) (9)  
 Community College District (Tax-backed) (5)  
 County (9)  
 Fire District (4)  
 Library District (5)  
 Other Special Districts (7)  
 Park/Recreation District (8)  
 Public K-12 School District (7)  
 Small Business Administration (3)  
 Special Assessment / Mello Roos (3)  
 Tax Increment / Tax Allocation (4)  
 Texas Municipal Utility Districts (MUDs) (3)

STATE / PROVINCE

## Rating Methodologies - Local Government - North America - United States

### Research

Select Dates From:  To:

Results 1 - 13 Of 13

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Date	Document Type	Title	Issuer/Entity
09 Jul 2018	Rating Methodology	Lease, Appropriation, Moral Obligation and Comparable Debt of US State and Local Governments	
06 Jun 2018	Rating Methodology	Government-Related Issuers	
01 Jun 2018	Rating Methodology	Community College Revenue-Backed Debt	
20 Dec 2017	Rating Methodology	Tax Increment Debt	
19 Dec 2017	Rating Methodology-Cross Sectr	Adjustments to US State and Local Government Reported Pension Data	
14 Dec 2017	Rating Methodology	State Aid Intercept Programs and Financings	
19 Oct 2017	Rating Methodology	US Municipal Utility Revenue Debt	
19 Jul 2017	Rating Methodology	US Public Finance Special Tax Methodology	
16 Dec 2016	Rating Methodology	US Local Government General Obligation Debt	
23 Nov 2016	Rating Methodology	Special Assessment / Special Property Tax (Non-Ad Valorem) Debt	
07 Sep 2016	Rating Methodology	US Charter Schools	
18 Jul 2012	Rating Methodology	Public Sector Pool Financings	
31 Jul 2009	Special Comment	Credit Aspects of Build America Bonds	

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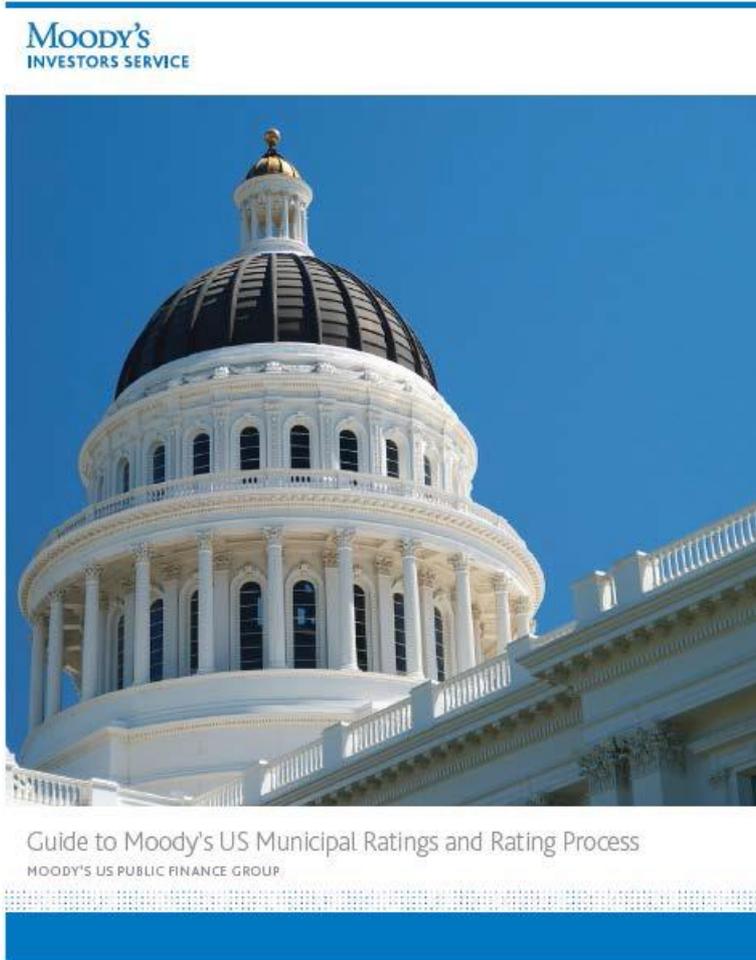
# Methodologies: Consistency & Nuance

- » Three broad methodology types: cross-sector, sector, and security
  
- » Most commonly used methodologies:
  - US Local Government General Obligation Debt
  - Lease, Appropriation, Moral Obligation and Comparable Debt of US State and Local Governments
  - US Municipal Utility Revenue Debt
  
- » Sector and security specific methodologies general structure:
  - A “scorecard” that provides guidance on likely rating level for the typical credit
  - A list of common adjustments that might be made to the scorecard guidance, reflecting state, sector or security specific variations from the typical credit
  - Allowance for additional considerations that may not be common
  
- » All ratings are ultimately determined by vote in a rating committee

# Methodologies: Consistency & Nuance

- » Typical general obligation: Contractual full faith and credit pledge of unlimited ad valorem taxing power of the local government
- » California local government GO bonds are not “typical”
  - Directly voter approved
  - Benefit from statutory lien
  - Some have a third-party “lockbox”
  - May have “special revenue” status in bankruptcy
- » California local government GO bonds above-average GO security results in a half to full notch automatic adjustment upward in the scorecard rating guidance
- » California also uses a relatively unusual legal theory for lease-backed obligations (“abatement” rather than “annual appropriation”)

# Moody's Issuer Guide



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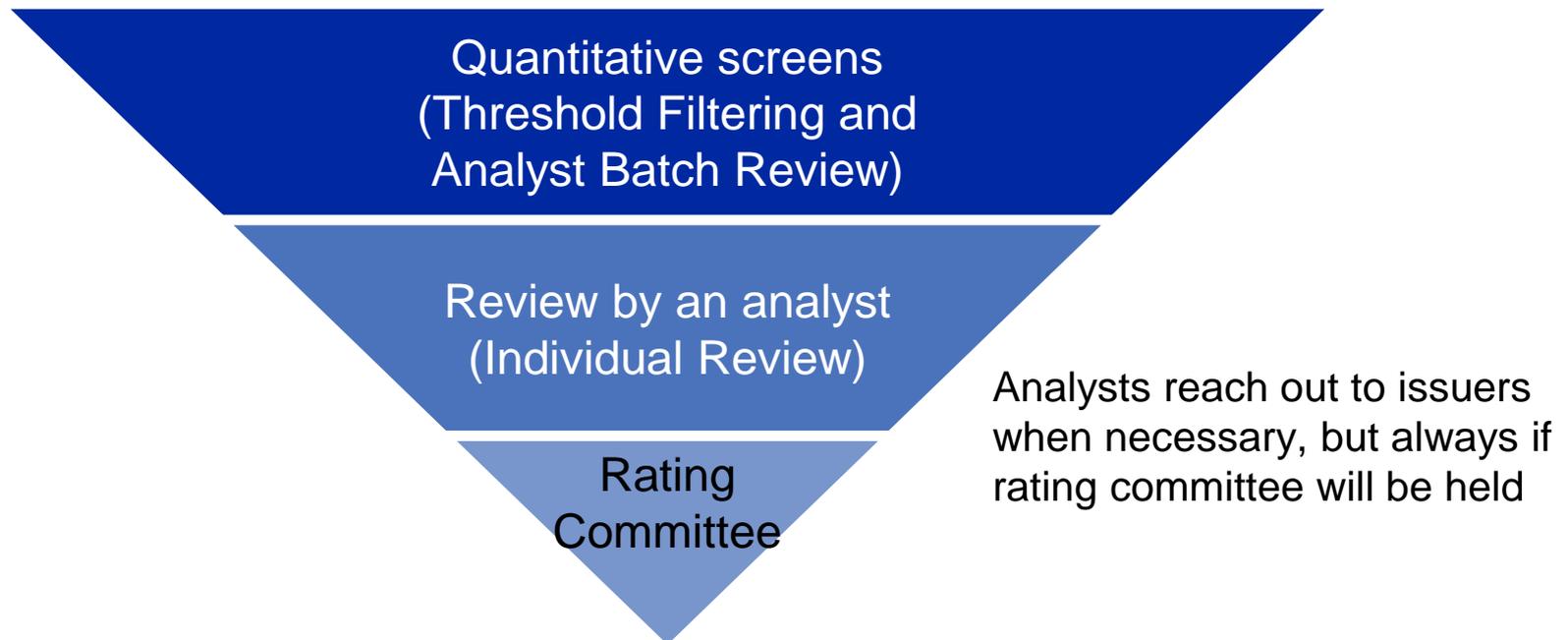
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# 3

## Maintenance of the Rating

# US PFG Monitoring Framework

- » We review every rating at least annually
- » Initial surveillance process involves multiple, quantitative screens
- » Most ratings are deemed appropriate through the various screening and review steps
  - Some proceed to a rating committee for possible rating action



# US PFG Monitoring Framework

- » For credits that go to a rating committee, the rating process is the same for initial ratings as it is for reviews of existing ratings
- » We have one combined group responsible for initial ratings and surveillance
- » Analysts reach out to issuers for additional information when necessary and will always contact the issuer if a credit could go to a rating committee
- » Financial advisors, auditors, bond counsel, etc. are welcome to participate in the credit discussion with the issuer

# 4

## General Obligation Methodology

# Methodology Scorecard: Analytical Starting Point

EXHIBIT 1

## Scorecard Factors and Weights

Local Governments

Broad Rating Factors	Factor Weighting	Rating Sub-factors	Sub-factor Weighting
Economy/Tax Base	30%	Tax Base Size (full value)	10%
		Full Value Per Capita	10%
		Wealth (median family income)	10%
Finances	30%	Fund Balance (% of revenues)	10%
		Fund Balance Trend (5-year change)	5%
		Cash Balance (% of revenues)	10%
		Cash Balance Trend (5-year change)	5%
Management	20%	Institutional Framework	10%
		Operating History	10%
Debt/Pensions	20%	Debt to Full Value	5%
		Debt to Revenue	5%
		Moody's-adjusted Net Pension Liability (3-year average) to Full Value	5%
		Moody's-adjusted Net Pension Liability (3-year average) to Revenue	5%

# Methodology Scorecard: Analytical Starting Point

## Appendix A: US Local Government General Obligation Scorecard

	<i>Very Strong</i>	<i>Strong</i>	<i>Moderate</i>	<i>Weak</i>	<i>Poor</i>	<i>Very Poor</i>	
	<b>Aaa</b>	<b>Aa</b>	<b>A</b>	<b>Baa</b>	<b>Ba</b>	<b>B &amp; Below</b>	<b>Weight</b>
<b>Economy/Tax Base (30%)</b>							
Tax Base Size: Full Value	> \$12B	\$12B ≥ n > \$1.4B	\$1.4B ≥ n > \$240M	\$240M ≥ n > \$120M	\$120M ≥ n > \$60M	≤ \$60M	10%
Full Value Per Capita	> \$150,000	\$150,000 ≥ n > \$65,000	\$65,000 ≥ n > \$35,000	\$35,000 ≥ n > \$20,000	\$20,000 ≥ n > \$10,000	≤ \$10,000	10%
Socioeconomic Indices: MFI	> 150% of US median	150% to 90% of US median	90% to 75% of US median	75% to 50% of US median	50% to 40% of US median	≤ 40% of US median	10%
<b>Finances (30%)</b>							
Fund Balance as % of Revenues	> 30% > 25% for School Districts	30% ≥ n > 15% 25% ≥ n > 10% for SD	15% ≥ n > 5% 10% ≥ n > 2.5% for SD	5% ≥ n > 0% 2.5% ≥ n > 0% for SD	0% ≥ n > -2.5% 0% ≥ n > -2.5% for SD	≤ -2.5% ≤ -2.5% for SD	10%
5-Year Dollar Change in Fund Balance as % of Revenues	> 25%	25% ≥ n > 10%	10% ≥ n > 0%	0% ≥ n > -10%	-10% ≥ n > -18%	≤ -18%	5%
Cash Balance as % of Revenues	> 25% > 10% for School Districts	25% ≥ n > 10% 10% ≥ n > 5% for SD	10% ≥ n > 5% 5% ≥ n > 2.5% for SD	5% ≥ n > 0% 2.5% ≥ n > 0% for SD	0% ≥ n > -2.5% 0% ≥ n > -2.5% for SD	≤ -2.5% ≤ -2.5% for SD	10%
5-Year Dollar Change in Cash Balance as % of Revenues	> 25%	25% ≥ n > 10%	10% ≥ n > 0%	0% ≥ n > -10%	-10% ≥ n > -18%	≤ -18%	5%
<b>Management (20%)</b>							
Institutional Framework	Very strong legal ability to match resources with spending	Strong legal ability to match resources with spending	Moderate legal ability to match resources with spending	Limited legal ability to match resources with spending	Poor legal ability to match resources with spending	Very poor or no legal ability to match resources with spending	10%
Operating History: 5-Year Average of Operating Revenues / Operating Expenditures	> 1.05x	1.05x ≥ n > 1.02x	1.02x ≥ n > 0.98x	0.98x ≥ n > 0.95x	0.95x ≥ n > 0.92x	≤ 0.92x	10%
<b>Debt/Pensions (20%)</b>							
Net Direct Debt / Full Value	< 0.75%	0.75% ≤ n < 1.75%	1.75% ≤ n < 4%	4% ≤ n < 10%	10% ≤ n < 15%	> 15%	5%
Net Direct Debt / Operating Revenues	< 0.33x	0.33x ≤ n < 0.67x	0.67x ≤ n < 3x	3x ≤ n < 5x	5x ≤ n < 7x	> 7x	5%
3-Year Average of Moody's Adjusted Net Pension Liability / Full Value	< 0.9%	0.9% ≤ n < 2.1%	2.1% ≤ n < 4.8%	4.8% ≤ n < 12%	12% ≤ n < 18%	> 18%	5%
3-Year Average of Moody's Adjusted Net Pension Liability / Operating Revenues	< 0.4x	0.4x ≤ n < 0.8x	0.8x ≤ n < 3.6x	3.6x ≤ n < 6x	6x ≤ n < 8.4x	> 8.4x	5%

# GO Scorecard Guidance

## Adjustment/Notching Factors

Description	Direction
<b>Economy/Tax Base</b>	
Institutional presence	up
Regional economic center	up
Economic concentration	down
Outsized unemployment or poverty levels	down
Other analyst adjustment to Economy/Tax Base factor (specify)	up/down
<b>Finances</b>	
Outsized contingent liability risk	down
Unusually volatile revenue structure	down
Other analyst adjustment to Finances factor (specify)	up/down
<b>Management</b>	
State oversight or support	up/down
Unusually strong or weak budgetary management and planning	up/down
Other analyst adjustment to Management factor (specify)	up/down
<b>Debt/Pensions</b>	
Unusually strong or weak security features	up/down
Unusual risk posed by debt/pension structure	down
History of missed debt service payments	down
Other analyst adjustment to Debt/Pensions factor (specify)	up/down
<b>Other</b>	
Credit event/trend not yet reflected in existing data sets	up/down

# 5

Lease, Appropriation,  
Moral Obligation  
Methodology

# Lease Ratings are “Notched” off the GO Rating

Standard California abatement leases have a “moderate” legal structure

EXHIBIT 5

## Notching Guide for Lease, Annual Appropriation and Moral Obligations

Security Type	Non-Contingent Lease-Backed Obligations	Contingent Lease-Backed and Annual Appropriation Obligations			Moral Obligations			
Essentiality	NA	More		Less	More			Less
Legal Structure	Strong	Moderate	Weak		Strong	Moderate	Weak	
<i>Notches from GO rating:</i>								
Zero	X							
One		X						
Two			X	X	X			
Three						X	X	X

# Examples of More and Less Essential Leased Assets

## Essentiality Categories by Asset/Project Type

### More Essential to Government Operations

Affordable/senior housing

Continuing care centers/nursing homes

Courthouses

Jails

Landfills

Libraries

Parking garages attached to essential facilities

Police and fire stations

Roads, streets, and interchanges

School buildings

Town halls

Water and sewer system facilities

### Less Essential to Government Operations

Animal shelters

Community/senior centers

Convention centers

Golf courses

Hotels

Ice rinks

Marinas

Miscellaneous economic development projects

Parking garages attached to non-essential facilities

Sports stadiums

Theaters and concert halls

Parks and undeveloped land

Note: Not an exhaustive list.

# 6

## Municipal Utility Revenue Debt Methodology

# Municipal Utilities Scorecard Factors

Broad Scorecard Factors	Factor Weighting	Rating Sub-Factor	Sub-factor Weighting
System Characteristics	35%	Asset Condition (Remaining Useful Life)	15.0%
		Service Area Wealth (Median Family Income)	12.5%
		System Size (O&M)	7.5%
Financial Strength	35%	Annual Debt Service Coverage	15.0%
		Days Cash on Hand	12.5%
		Debt to Operating Revenues	7.5%
Management	20%	Rate Management	10.0%
		Regulatory Compliance and Capital Planning	10.0%
Legal Provisions	10%	Rate Covenant	5.0%
		Debt Service Reserve Requirement	5.0%
Total	100%	Total	100%

# 1. System Characteristics (35%)

System Characteristics (35%)	Aaa	Aa	A	Baa	Ba	B and Below
Asset Condition (15%)	Net Fixed Assets/Annual Depreciation : > 75 years	Net Fixed Assets/Annual Depreciation : 75 years ≥ n > 25 years	Net Fixed Assets/Annual Depreciation : 25 years ≥ n > 12 years	Net Fixed Assets/Annual Depreciation : 12 years ≥ n > 9 years	Net Fixed Assets/Annual Depreciation : 9 years ≥ n > 6 years	Net Fixed Assets/Annual Depreciation : ≤ 6 years
Service Area Wealth (12.5%)	> 150% of US median	150% ≥ US median > 90%	90% ≥ US median > 75%	75% ≥ US median > 50%	50% ≥ US median > 40%	≤ 40% of US median
System Size (7.5%)	Water Only / Sewer Only / Water & Sewer / Combined Utility / Solid Waste: O&M > \$70M  Stormwater: O&M > \$15M  Gas or Electric: O&M > \$115M	Water Only / Sewer Only / Water & Sewer / Combined Utility / Solid Waste: \$70M ≥ O&M > \$40M  Stormwater: \$15M ≥ O&M > \$7.5M  Gas or Electric: \$115M ≥ O&M > \$65M	Water Only / Sewer Only / Water & Sewer / Combined Utility / Solid Waste: \$40M ≥ O&M > \$17M  Stormwater: \$7.5M ≥ O&M > \$4M  Gas or Electric: \$65M ≥ O&M > \$30M	Water Only / Sewer Only / Water & Sewer / Combined Utility / Solid Waste: \$17M ≥ O&M > \$10M  Stormwater: \$4M ≥ O&M > \$2M  Gas or Electric: \$30M ≥ O&M > \$15M	Water Only / Sewer Only / Water & Sewer / Combined Utility / Solid Waste: \$10M ≥ O&M > \$5M  Stormwater: \$2M ≥ O&M > \$1M  Gas or Electric: \$15M ≥ O&M > \$8M	Water Only / Sewer Only / Water & Sewer / Combined Utility / Solid Waste: O&M ≤ \$5M  Stormwater: O&M ≤ \$1M  Gas or Electric: O&M ≤ \$8M

## 2. Financial Strength (35%)

Financial Strength (35%)	Aaa	Aa	A	Baa	Ba	B and Below
Annual Debt Service Coverage (15%)	> 2.00x	2.00x ≥ n > 1.70x	1.70x ≥ n > 1.25x	1.25x ≥ n > 1.00x	1.00x ≥ n > 0.70x	≤ 0.70x
Days Cash on Hand (12.5%)	> 250 days	250 days ≥ n > 150 days	150 days ≥ n > 35 days	35 days ≥ n > 15 days	15 days ≥ n > 7 days	≤ 7 days
Debt to Operating Revenues (7.5%)	< 2.00x	2.00x ≤ n < 4.00x	4.00x ≤ n < 7.00x	7.00x ≤ n < 8.00x	8.00x ≤ n < 9.00x	≥ 9.00x

# 3. Management (20%)

Management (20%)	Aaa	Aa	A	Baa	Ba	B and Below
Rate Management (10%)	Excellent rate-setting record; Rates and cost adjustments in 20 days or less	Strong rate-setting record; Rates and cost adjustments in 21 - 50 days; Small and well-defined General Fund transfers governed by policy	Average rate-setting record; Rates and cost adjustments 51 - 80 days; Moderate General Fund transfers governed by policy	Adequate rate-setting record; Rates and cost adjustments 81 - 120 days; Large General Fund transfer not governed by policy	Below average rate-setting record; Sizeable General Fund transfer not governed by policy	Record of insufficiently adjusting rates; Large General Fund transfer not governed by policy
Regulatory Compliance and Capital Planning (10%)	Fully compliant OR proactively addressing compliance issues; Maintains sophisticated and manageable Capital Improvement Plan that addresses more than a 10-year period	Actively addressing minor compliance issues; Maintains comprehensive and manageable 10-year Capital Improvement Plan	Moderate violations with adopted plan to address issues; Maintains manageable 5-year Capital Improvement Plan	Significant compliance violations with limited solutions adopted; Maintains single year Capital Improvement Plan	Not fully addressing compliance issues; Limited or weak capital planning	Not addressing compliance issues; No capital planning

## 4. Legal Provisions (10%)

Legal Provisions (10%)	Aaa	Aa	A	Baa	Ba	B and Below
Rate Covenant (5.0%)	> 1.30x	1.30x ≥ n > 1.20x	1.20x ≥ n > 1.10x	1.10x ≥ n ≥ 1.00x	≤ 1.00x	
Debt Service Reserve Requirement (5.0%)	DSRF funded > MADS	DSRF funded at MADS	DSRF funded at lesser of standard 3-prong test	DSRF funded at less than 3-prong test <b>OR</b> springing DSRF	NO explicit DSRF; <b>OR</b> funded with speculative grade surety	

# Municipal Utility Debt Scorecard Guidance

## Adjustment/Notching Factors

Adjustments/Notching Factors
<b>Factor 1: System Characteristics</b>
Additional service area economic strength or diversity
Significant customer concentration
Revenue-per-Customer greatly over/under regional average
Exposure to weather volatility or extreme conditions
Resource vulnerability (1/3 or greater)
Sizable or insufficient capacity margin
Weak depreciation/reinvestment practices relative to industry norms
Other analyst adjustment to System Characteristics (Specify)
<b>Factor 2: Financial Strength</b>
Debt Service Coverage (Annual or MADS) below key thresholds: Additional Bonds Test and 1.00x coverage
Constrained liquidity position due to oversized transfers
Oversized capital needs
Oversized ANPL relative to debt or significant ARC under-payment
Significant exposure to puttable debt and/or swaps or other unusual debt structure
Other analyst adjustment to Financial Strength factor (Specify)
<b>Factor 3: Legal Provisions</b>
Structural Enhancements/Complexities
Other analyst adjustment to Legal Provisions factor (Specify)
<b>Factor 4: Management</b>
Unusually strong or weak operational or capital planning
Other analyst adjustment to Management factor (Specify)
<b>Other</b>
Credit Event/Trend not yet reflected in existing data set

# Relationship with General Obligation Rating

- » A utility rating will typically be within two notches, up or down, of the local government's GO rating
  
- » A utility rating more than two notches higher than the GO rating can be supported by:
  - Unusually weak GO rating that is driven by factors less relevant to utility strength
  - Non-coterminous service area
  - Closed loop flow of funds
  - Separation of management and governance
  
- » A utility rating more than two notches lower than the GO rating can be supported by:
  - Unusually weak utility rating that is driven by factors less relevant to general government's credit strength
  - Service area that is narrower and less diverse than municipality as whole
  - Low likelihood that the general government would transfer funds to assist the utility
  - Rating triggers tied to GO credit quality in utility financing



# Appendix

# Moody's Default Research

JANUARY 29, 2019

CREDIT POLICY

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## SPECIAL COMMENT

Rate this Research >>

### Analyst Contacts:

NEW YORK	+1.212.553.1653
Anne Van Praagh Managing Director anne.vanpraagh@moodys.com	+1.212.553.3744
Kumar Kanthan Senior Vice President kumar.kanthan@moodys.com	+1.212.553.1428
Sharon Ou Vice President sharon.ou@moodys.com	+1.212.553.4403
Varun Agarwal Vice President varun.agarwal@moodys.com	+1.212.553.4899
Minh Bul AVP-Analyst minh.bul@moodys.com	+1.212.553.7258
Sarah Huang AVP-Analyst sarah.huang@moodys.com	+1.212.553.3894
Yang Liu Analyst yang.liu@moodys.com	+1.212.553.2961
Xiaoshuai Luo Associate Analyst xiaoshuai.luo@moodys.com	+1.212.553.2159

## Guide to Moody's Default Research: January 2019 Update

Moody's Default and Ratings Analytics (DRA) team is responsible for default, transition, and loss severity research for Moody's Investors Service. A selected sample of our research appears below. Except for Monthly Default Reports (which are part of a subscription service) and other selected publications, these reports are available free of charge at [www.moodys.com](http://www.moodys.com). Visitors to the site only need to register to download these articles. If you have any questions, please email: [kumar.kanthan@moodys.com](mailto:kumar.kanthan@moodys.com).

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# Moody's Municipal Default Research

U.S. PUBLIC FINANCE

MOODY'S  
INVESTORS SERVICE

## DATA REPORT

31 July 2018

✓ Rate this Research

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### Contacts

Alfred Medioli +1.212.553.4173  
Senior Vice President/Mgr/RPO  
alfred.mediolli@moody.com

## US Public Finance

### US Municipal Bond Defaults and Recoveries, 1970-2017

This study updates our statistics and observations concerning the default, loss, and rating transition experience of Moody's-rated US municipal bond issuers in 2017, as well as for the historical period since 1970. Key findings include:

- » There were ten Moody's-rated municipal defaults in 2017, with seven related to the [Commonwealth of Puerto Rico](#) (Ca negative). Total debt affected was \$31.15 billion, over 15% greater than the 2016 default volume and the new record for the 48-year study period.
- » The three non-Puerto Rico defaults in 2017 totaled less than \$85 million. These defaults comprise one by a private university and two by a local government district with enterprise exposure.
- » We expect 2018 defaults to be fewer and much smaller in magnitude. These could include several remaining C and Ca-rated Puerto Rico issuers with some \$4.7 billion in outstanding debt.
- » Municipal defaults and bankruptcies have become more common in the last decade but are still rare overall. The five-year municipal default rate since 2008 was 0.18%, compared to 0.09% for the entire study period. In contrast, the five-year global corporate default

# Moody's Municipal Default Research

Exhibit 1  
**Overall Default Frequency Has Increased**  
 Number of Defaults per Calendar Year, 1970-2017

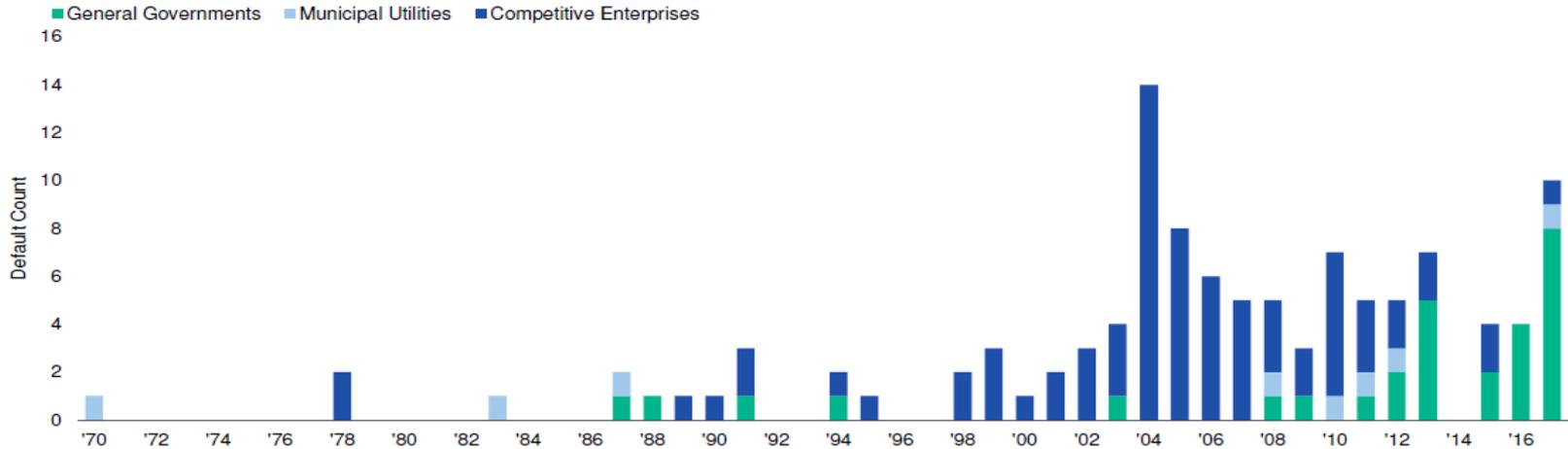
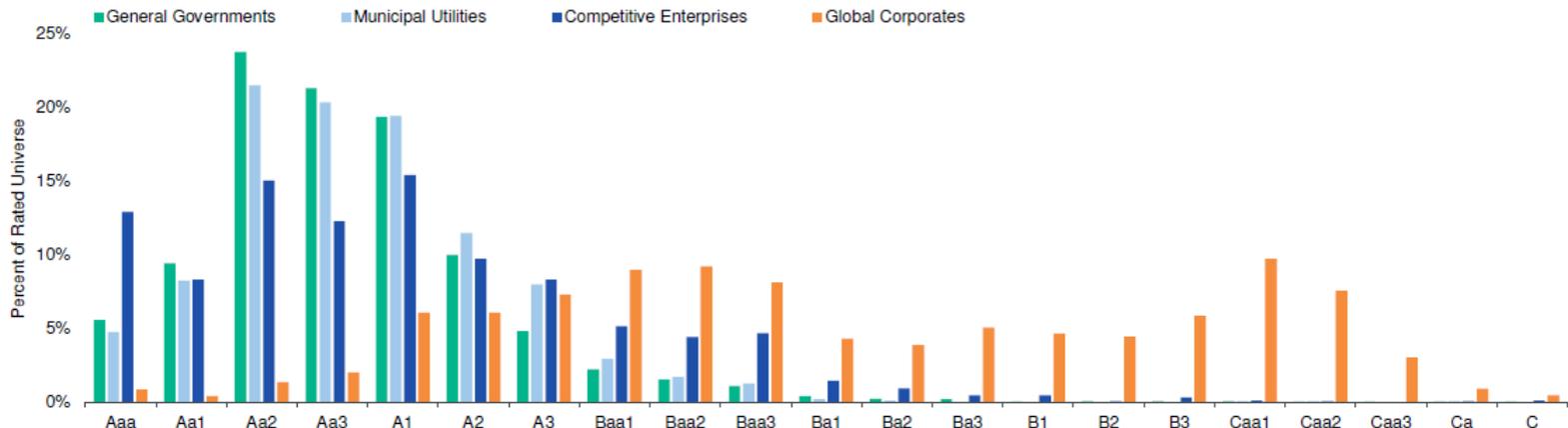


Exhibit 24  
**Most Municipal Ratings Are Distributed In High Investment-Grade**  
 Rating Distributions by Sector: Municipals by Sector vs. Global Corporates, Year End 2017



# Moody's Municipal Default Research

Exhibit 6

## Recent Municipal and Global Corporate Default Rates Converging

Cumulative Default Rates, Average over the Period 2008-2017, Municipals vs. Global Corporates

### Municipals

Rating	Average Cohort Count	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Aaa	1,163	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Aa	8,367	0.00%	0.00%	0.00%	0.00%	0.01%	0.02%	0.03%	0.04%	0.05%	0.07%
A	5,665	0.01%	0.02%	0.03%	0.04%	0.07%	0.10%	0.17%	0.27%	0.38%	0.50%
Baa	842	0.04%	0.09%	0.21%	0.48%	0.83%	1.15%	1.36%	1.64%	1.94%	2.21%
Ba	162	0.08%	0.57%	1.61%	3.00%	4.10%	4.68%	5.32%	7.29%	9.79%	10.85%
B	36	3.50%	9.27%	14.99%	17.46%	19.60%	21.71%	26.07%	26.07%	26.07%	
Caa-C	21	15.35%	28.71%	37.55%	43.71%	48.52%	54.86%	60.79%	66.35%	66.35%	66.35%
Investment-Grade	16,036	0.00%	0.01%	0.02%	0.04%	0.07%	0.10%	0.13%	0.18%	0.23%	0.29%
Speculative-Grade	219	2.05%	4.55%	7.02%	9.00%	10.63%	12.13%	13.86%	15.95%	18.07%	18.99%
All Rated	16,255	0.03%	0.07%	0.10%	0.14%	0.18%	0.21%	0.25%	0.31%	0.37%	0.43%

### Global Corporates

Rating	Average Cohort Count	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Aaa	82	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Aa	452	0.05%	0.11%	0.22%	0.25%	0.33%	0.46%	0.70%	0.88%	1.14%	1.47%
A	1,231	0.13%	0.23%	0.42%	0.63%	0.89%	1.11%	1.23%	1.35%	1.35%	1.35%
Baa	1,527	0.19%	0.34%	0.47%	0.61%	0.73%	0.89%	1.03%	1.17%	1.35%	1.42%
Ba	701	0.57%	1.41%	2.03%	2.98%	4.27%	5.19%	6.15%	7.22%	8.03%	8.50%
B	996	1.97%	4.37%	6.85%	9.58%	12.29%	15.06%	17.74%	20.34%	22.92%	24.42%
Caa-C	994	8.67%	15.14%	20.63%	25.63%	29.57%	32.74%	36.19%	40.30%	43.56%	43.71%
Investment-Grade	3,293	0.15%	0.26%	0.40%	0.55%	0.71%	0.88%	1.03%	1.16%	1.29%	1.39%
Speculative-Grade	2,690	4.03%	7.40%	10.27%	13.04%	15.53%	17.65%	19.76%	21.97%	23.83%	24.60%
All Rated	5,983	1.86%	3.33%	4.54%	5.63%	6.57%	7.36%	8.07%	8.77%	9.34%	9.61%

1. Average CDRs are computed by averaging cohort CDRs for cohorts formed every month starting from January 1, 2008.

2. Historical ratings have been adjusted to be consistent with the Global Rating Scale as described in Appendix F.



**MOODY'S**  
INVESTORS SERVICE

Eric Hoffmann  
Senior Vice President / Manager  
One Front Street, Suite 1900  
San Francisco, CA 94111  
415.274.1702  
[eric.hoffmann@moodys.com](mailto:eric.hoffmann@moodys.com)

[moodys.com](http://moodys.com)

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