



1



2

Agenda

1. Moody's Rating Process and Monitoring Framework
2. GO Methodology and Scorecards
3. Local Government 2019 Outlook
4. Environmental, Social and Governance considerations in ratings
5. Cyber Risk on the Rise
6. Question and Answer

3

1

Moody's Rating Process and Monitoring Framework

4

Moody's Issuer Guide

Moody's
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Guide to Moody's US Municipal Ratings and Rating Process
MOODY'S US PUBLIC FINANCE GROUP

Six steps of the rating process:

1. Assignment of a lead analyst
2. Methodology
3. Analysis
4. Discussion with Moody's
5. Committee review process
6. Publication of the final rating report

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5

5

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

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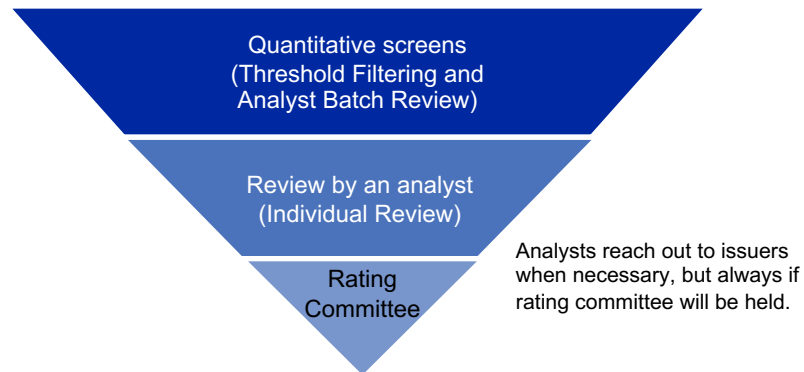
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6

6

US PFG Monitoring Framework

- » We review every rating at least annually to maintain accuracy
- » Surveillance process involves multiple screens
- » Most ratings are deemed appropriate through the various filtering steps
 - However, some do proceed to a rating committee for possible rating action



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7

7

US PFG Monitoring Framework

- » For credits that go to a committee, the rating process is the same for new sales and surveillance
- » We have one combined group responsible for new sales 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 counsels, etc. are welcome to participate in the surveillance process and the Lead Analyst will confirm if an issuer is working with an FA.

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8

8

2

GO Methodology & Scorecards

9

GO Methodology

Factor 1 Economy/Tax Base	Factor 2 Finances	Factor 3 Management	Factor 4 Debt/Pensions
30%	30%	20%	20%

10

GO Scorecard

Factors & Sub-Factors	Weights
Factor 1: Economy/Tax Base	30%
Full Value (market value of taxable property)	10%
Full Value per Capita	10%
Median Family Income	10%
Factor 2: Finances	30%
Fund Balance as % of Operating Revenue	10%
5-Year Dollar Change in Fund Balance as % of Revenues	5%
Cash Balance as % of Revenues	10%
5-Year Dollar Change in Cash Balance as % of Revenues	5%
Factor 3: Management	20%
Institutional Framework	10%
Operating History: 5-Year Average of Operating Revenues / Operating Expenditures	10%
Factor 4: Debt/Pensions	20%
Net Direct Debt / Full Value	5%
Net Direct Debt / Operating Revenue	5%
3-Year Average of Moody's Adjusted Net Pension Liability / Full Value	5%
3-Year Average of Moody's Adjusted Net Pension Liability / Operating Revenues	5%

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11

11

Scorecard Factor 1: Economy/Tax Base

	Very Strong	Strong	Moderate	Weak	Poor	Very Poor	
	Aaa	Aa	A	Baa	Ba	B & Below	Weight
ECONOMY/TAX BASE (30%)							
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%

- » The tax base is the source of most local government revenues
- » Full value: The market value of taxable property accessible to the municipality
- » Full value per capita: scales tax base strength to the number of residents
- » Median Family Income (MFI): important measure of the strength and resiliency of a tax base

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12

12

Scorecard Factor 2: Finances

	Very Strong Aaa	Strong Aa	Moderate A	Weak Baa	Poor Ba	Very Poor B & Below	Weight
FINANCES (30%)							
Fund Balance as % of Revenues	> 30.0% > 25.0% for School Districts	30.0% ≥ n > 15.0% 25.0% ≥ n > 10.0% for SD	15.0% ≥ n > 5.0% 10.0% ≥ n > 2.5% for SD	5.0% ≥ n > 0.0% 2.5% ≥ n > 0.0% for SD	0.0% ≥ n > -2.5% 0.0% ≥ n > -2.5% for SD	≤ -2.5% ≤ -2.5% for SD	10%
5-Year Dollar Change in Fund Balance as % of Revenues	> 25.0%	25.0% ≥ n > 10.0%	10.0% ≥ n > 0.0%	0.0% ≥ n > -10.0%	-10.0% ≥ n > -18.0%	≤ -18.0%	5%
Cash Balance as % of Revenues	> 25.0% > 10.0% for School Districts	25.0% ≥ n > 10.0% 10.0% ≥ n > 5.0% for SD	10.0% ≥ n > 5.0% 5.0% ≥ n > 2.5% for SD	5.0% ≥ n > 0.0% 2.5% ≥ n > 0.0% for SD	0.0% ≥ n > -2.5% 0.0% ≥ n > -2.5% for SD	≤ -2.5% ≤ -2.5% for SD	10%
5-Year Dollar Change in Cash Balance as % of Revenues	> 25.0%	25.0% ≥ n > 10.0%	10.0% ≥ n > 0.0%	0.0% ≥ n > -10.0%	-10.0% ≥ n > -18.0%	≤ -18.0%	5%

- » Fund Balance (10%) – the financial resources available in the short term
- » Cash Balance (10%) – the paramount liquid resource available; excludes accruals
- » 5-yr. \$ Change in Fund Balance and Cash Balance as % of Revs (each 5%)
 - Incorporated to capture trend information; avoids overweighting point-in-time data
 - The focus here is on whether financial reserves and liquidity are increasing in step with budgetary growth

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13

Scorecard Factor 3: Management

	Very Strong Aaa	Strong Aa	Moderate A	Weak Baa	Poor Ba	Very Poor B & Below	Weight
MANAGEMENT (20%)							
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%

- » Institutional Framework
 - Focuses on issuers' legal ability to match revenues with expenditures based on their legal apparatus
 - Standard inputs determined for each state/sector combination; revisited annually for possible updates
- » Operating History
 - Measures the degree that an issuer has demonstrated the practical ability and willingness to match revenues with expenditures
 - Input: Five-year average of the ratio of operating revenues to operating expenditures

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14

Scorecard Factor 4: Debt/Pensions

	Very Strong	Strong	Moderate	Weak	Poor	Very Poor	
	Aaa	Aa	A	Baa	Ba	B & Below	Weight
DEBT/PENSIONS (20%)							
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%

- » Debt: Measures the magnitude of debt obligations relative to resources (using the tax base as a proxy) and operations (using operating revenues as a proxy)
- » Pensions: Utilize Moody's adjusted net pension liability metrics

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15

15

Scorecard Notching Factors

Adjustments/Notching Factors	
<u>Description</u>	<u>Direction</u>
Economy/Tax Base	
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
Finances	
Outsized contingent liability risk	down
Unusually volatile revenue structure	down
Other analyst adjustment to Finances factor (specify)	up/down
Management	
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
Debt/Pensions	
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
Other	
Credit event/trend not yet reflected in existing data sets	up/down

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16

16

Local Gov't Scorecard Publication in Credit Opinions

Why are we including scorecards in Credit Opinions

- » To provide additional detail regarding our rating process
- » Other rating groups including corporate finance, project and infrastructure finance and financial institutions groups already publish scorecards

What does the published scorecard include

- » Scorecard has a "Scorecard-Indicated Outcome" and an "Assigned Rating"
- » Scorecard-Indicated Outcome incorporates all rating factor inputs and analyst adjustments
- » Assigned Rating reflects the published rating that appears on www.moodys.com
- » Notching considerations/analyst adjustments appear under the rating factors (economy, finance, management and debt) on the scorecard and are denoted as "up" or "down"

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17

Local Gov't Scorecard Publication in Credit Opinions

What is the difference between Scorecard-Indicated Outcome and Assigned Rating

- » The scorecard's purpose is not to definitively determine the rating, but rather to provide a standard platform for which to analyze and compare local government credits
- » Reasons for Score-Card Indicated Outcomes that differ from Assigned Rating
 - In some circumstances, one factor may be weighed more heavily in the final determination of the rating than in the scorecard
 - The scorecard may not consider expectations for future performance which can differ from past performance
 - Score may not capture certain quantitative or qualitative factors which are important to individual rating determinations
- » Analysts will include a brief explanation of the difference between the Score-Card Indicated Outcome and Assigned Rating if the difference is material (two or more notches)

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18

GO Scorecard Presented in Credit Opinion

Williamson (County of) TN

Rating Factors	Measure	Score
Economy/Tax Base (30%)^[1]		
Tax Base Size: Full Value (in 000s)	\$49,943,754	Aaa
Full Value Per Capita	\$236,405	Aaa
Median Family Income (% of US Median)	163.5%	Aaa
Notching Factors:^[2]		
Regional Economic Center		Up
Finances (30%)		
Fund Balance as a % of Revenues	26.0%	Aa
5-Year Dollar Change in Fund Balance as % of Revenues	3.3%	A
Cash Balance as a % of Revenues	27.1%	Aaa
5-Year Dollar Change in Cash Balance as % of Revenues	6.0%	A
Management (20%)		
Institutional Framework	Aaa	Aaa
Operating History: 5-Year Average of Operating Revenues / Operating Expenditures	1.0x	A
Debt and Pensions (20%)		
Net Direct Debt / Full Value (%)	1.5%	Aa
Net Direct Debt / Operating Revenues (x)	1.4x	A
3-Year Average of Moody's Adjusted Net Pension Liability / Full Value (%)	1.0%	Aa
3-Year Average of Moody's Adjusted Net Pension Liability / Operating Revenues (x)	1.0x	A
Notching Factors:^[2]		
Standardized Adjustments [3]: Unusually strong or weak security features: Secured by statute		Up
Scorecard-Indicated Outcome		Aaa
Assigned Rating		Aaa

[1] Economy measures are based on data from the most recent year available.

[2] Notching Factors are specifically defined in the US Local Government General Obligation Debt methodology dated December 16, 2016.

[3] Standardized adjustments are outlined in the GO Methodology Scorecard Inputs Updated for 2018 publication

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19

General Obligation (GO) Scorecard Review

Purpose and Use of the Scorecard:

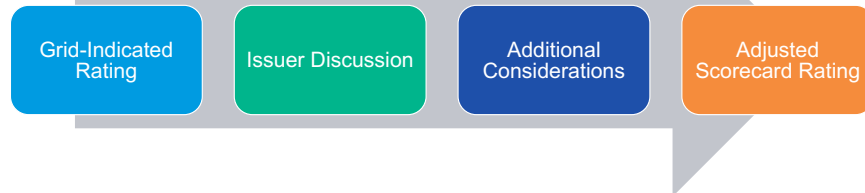
- » The scorecard acts as a starting point for a more thorough and individualistic analysis
- » Captures the key considerations that correspond to particular rating categories
- » Not an exhaustive list of factors that we consider in every local government rating
- » Each subfactor is a quantitative metric that are scored an initial grid

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20

Additional Information Can Lead to Adjusted Scorecard Ratings



- » Issuer discussions will inform whether there are any additional considerations → the adjusted scorecard rating
- » Rating committee ultimately determines the adjusted “below-the-line adjustments” based on information provided by the issuer
- » The final rating may differ from the adjusted scorecard rating

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21

3

US Local Governments 2019 Outlook

22

Local government

Outlook remains stable with tax revenue to grow modestly

- » Property tax revenue will grow modestly (2%-3%) in 2019
- » Total revenue will grow moderately in 2019, helping manage increasing expenses
- » Healthy fund balances support stability
- » Most local governments continue to handle challenges well, though a small percentage face acute difficulties

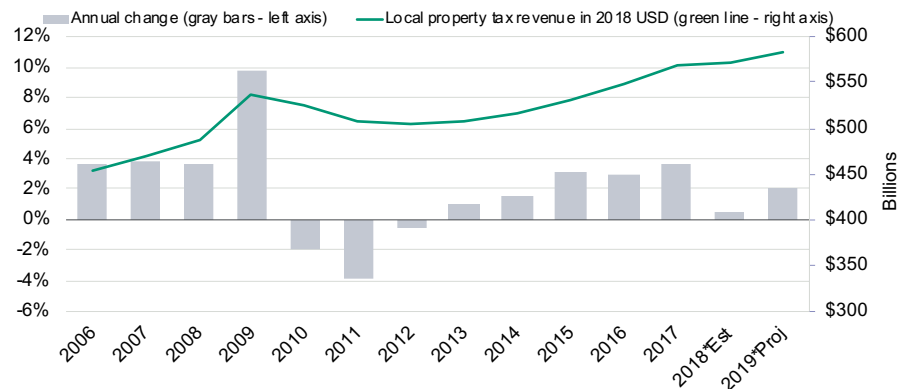
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23

Local government

Property tax revenue growth of 2%-3% expected in 2019



*2018 includes estimates for second half of year, 2019 is projected

Sources: US Census Bureau, Moody's Investors Service

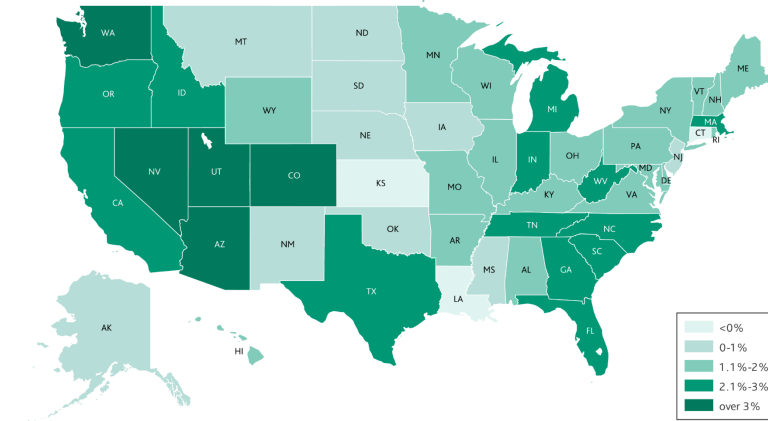
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24

Local government

2017 GDP growth strongest in West and Southeast, signaling stronger property tax growth in those regions for 2019



Sources: US Bureau of Economic Analysis, Moody's Investors Service

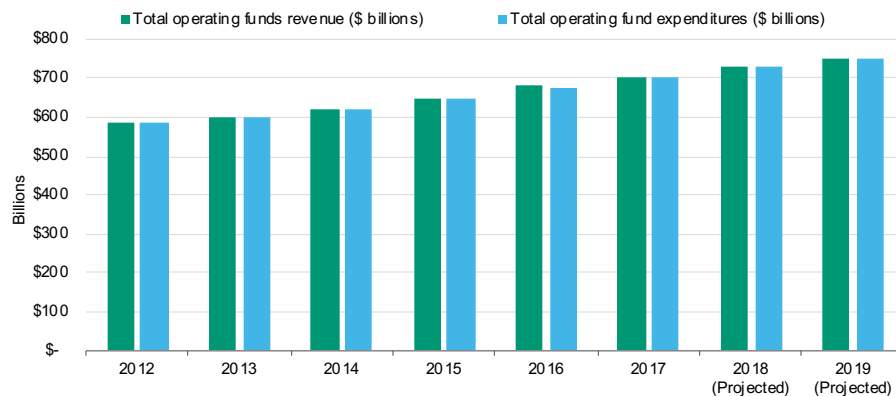
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25

Local government

Total revenue will grow moderately (3%), helping local governments manage increasing expenses



Includes local governments with complete operating fund data available for 2012-17, excluding New York City and Washington, DC.

Sources: Moody's Investors Service

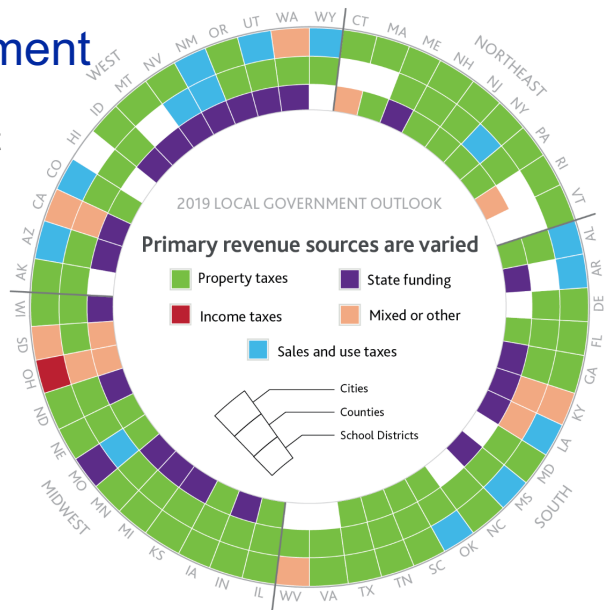
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26

Local government

Property taxes remain the dominant revenue source, but other revenue sources also drive our expectations for stable conditions



Source: Moody's Investors Service

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27

27

Local government

Most local governments continue to handle challenges well, though a small percentage face compounding pressures

- » Growing pension costs
- » Uncertain or weak state funding
- » Exposure to federal policy changes, including tax reform and escalating trade tensions
- » Climate risks
- » Aging or declining populations

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28

28

Local government

2019 outlook remains stable with tax revenue to grow modestly

NEGATIVE

What could change outlook to negative

- » Property tax revenue growth below 2%
- » Revenue growth outpaced by rising fixed costs or increased leverage
- » Deteriorating economic conditions, rising unemployment, falling home values

STABLE

Drivers of the stable outlook

- » Property tax revenue to grow a modest 2%-3%
- » Total operating revenue to increase by approximately 3%, helping manage expenses
- » Healthy fund balances, providing a buffer against an economic slowdown or even recession

POSITIVE

What could change outlook to positive

- » Property tax revenue growth above 4%
- » Lower fixed costs and reduced debt and pension leverage
- » Improving economic conditions likely to boost local government revenue

This outlook represents our forward-looking view on credit conditions in the sector over the next 12-18 months. This sectorwide outlook, however, does not imply the likelihood or direction of rating actions for individual issuers.

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29

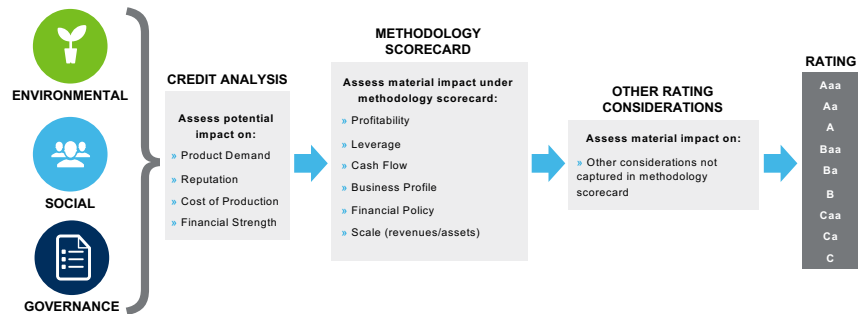
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Environmental, Social and Governmental Risks in Credit Ratings

30

Ratings capture ESG considerations with material credit implications

Illustrative example of how ESG considerations are incorporated into our corporate credit ratings



Source: Moody's Investors Service

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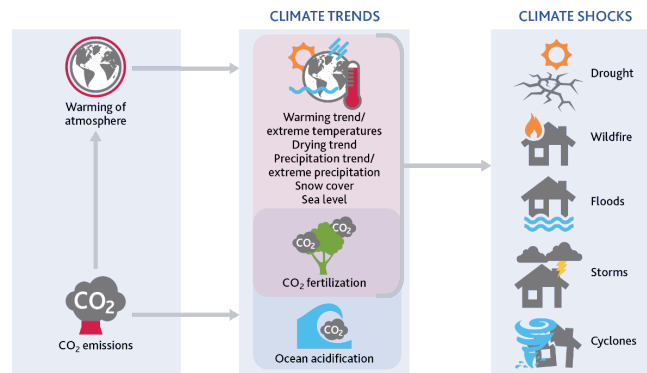
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Environmental
factors

32

Physical Effects Manifest as Climate Trends and Climate Shocks

Credit implications of climate trends and shocks will vary depending on time frame and magnitude of impact



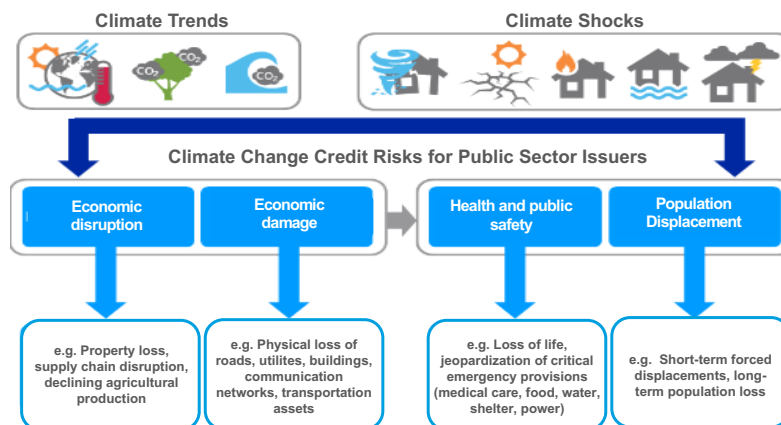
Source: Moody's Investors Service, Intergovernmental Panel on Climate Change

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33

We identify the primary public sector issuer credit risks of climate change as:



Source: Moody's Investors Service

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34

Local, state and federal tools for immediate response and long-term recovery enhance resilience to credit risks of climate shocks

- » The availability of resources at multiple layers of government is an important element that broadens the response capabilities of local issuers and their ability to mitigate credit impacts.
- » State governments monitor and evaluate the effectiveness of local response efforts and, if needed, provide both immediate response and long-term recovery assistance.
- » Under FEMA, the federal government coordinates the provision of essential emergency response services through a variety of federal agencies. These services include, among others, transportation, communications, public works and engineering, mass care, food, energy, and search and rescue.

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35

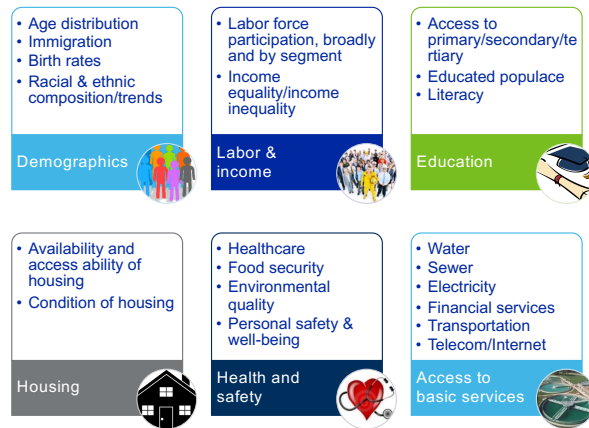


Social factors

36

Six broad social factors with representative subcomponents

Each broad factor could have multiple additional subcomponents

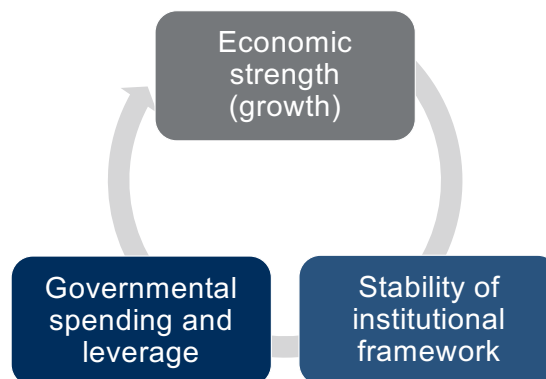


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37

Social factors affect credit in 3 primary ways



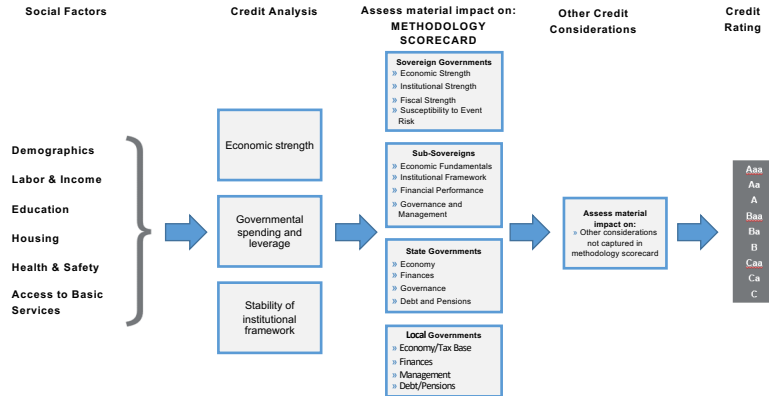
Source: Moody's Investors Service

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38

Social considerations impact governmental analysis via multiple channels



Source: Moody's Investors Service

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39

39

5

Cyber Risk on the Rise

40

Key messages



We view cyber risk as event risk and see a rising tide;

digitization, greater intersection of supply chains, connectivity and access to data are creating new vulnerabilities for governments and businesses



Our assessments consider the financial impact of an attack that could lead to weakened credit profile;

these primarily derive from reputational impacts and/or disruption of core business processes



13 sectors assessed as high or medium-high risk;

common attributes include significant reliance on technology / data; limited ability to fall back on manual processes; represent critical global infrastructure

Cyber risk is event risk and tide is rising

- » Digitization, greater intersection of supply chains, connectivity and access to data are creating new vulnerabilities for governments and businesses
- » Attacker sophistication increasing; defense baselines need to rise as a result
 - Attacker ecosystem has evolved; blurred lines between nation states and cyber criminals
 - Talent gap creates further pressure on defense
- » Financial impact of individual events has reached billions

Attacks are underreported

- » Although reporting frameworks for cyber risk events have improved in recent years, they continue to focus on data disclosure, often with a focus on privacy
- » Attacks that cause disruption are underreported as a result, with only the largest attacks becoming public through media coverage vs. disclosure rules
- » Disruption has more potential impact than typical disclosure events

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43

Cyber risk assessment framework

Cyber risk exposure measured relative to two key factors

- » We have assessed cyber risk at the sector level along two lines:
 1. **Vulnerability** to some form of cyber attack; and,
 2. Reputational and operational **impact** of an attack
- » Process included assessment of relative risk within and across sector groupings
- » These assessments only consider mitigation that would uniformly benefit the entire sector or individual issuers equally
 - e.g. monopolies, supply chain diversity, manual back-up processes, customer stickiness
- » Our assessments consider the overall financial impact of an attack that could lead to weakened credit profile

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44

Results

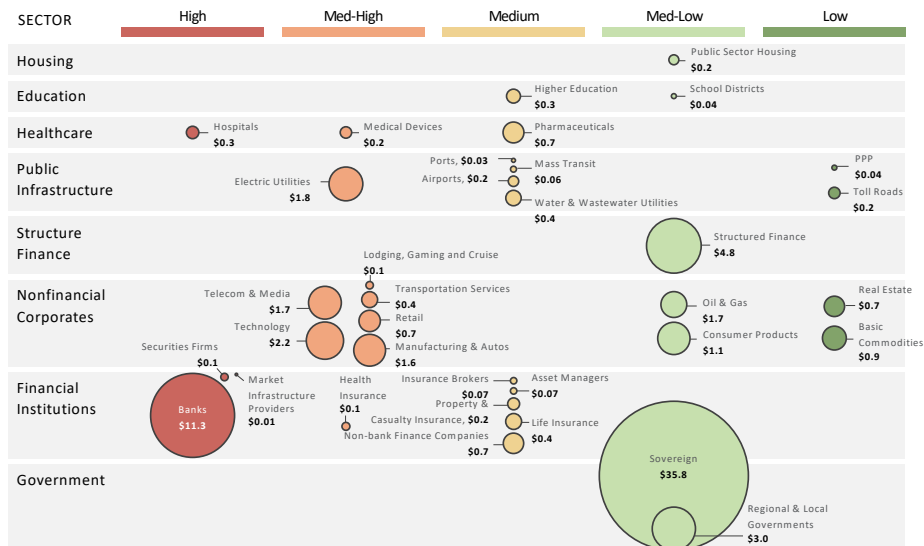
- » Assessed four sectors as having high overall risk; account for outstanding rated debt of ~\$12 trillion.
 - Highest risk sectors rely on data and technology, are highly interconnected and have limited ability to revert to manual processes
 - Sectors at the lower end of our assessment have limited reliance on technology / data; offset impact through the ability to use manual processes in case of business disruption, less sensitive to brand / reputation issues
- » We will continue to expand this framework to incorporate deeper views on issuers' cyber risk profiles and management
 - As cyber risk evolves, we will continue to engage in dialogue with issuers, focusing first on higher-risk sectors
 - Plan to publish updates to the framework through 2019 along with sector-specific papers

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45

Cyber risk levels and Moody's-rated debt



Source: Moody's Investors Service

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46

11 public finance sectors assessed, 2 fall in elevated risk categories

Hospitals are amongst those most at risk, followed by electric utilities

Sector	Vulnerability	Impact	Overall	Rated Debt (in \$ billions)
Hospitals	HIGH	HIGH	HIGH	250
Electric Utilities*	HIGH	MEDIUM	MEDIUM-HIGH	1,824
Higher Education	HIGH	LOW	MEDIUM	310
Airports	MEDIUM	MEDIUM	MEDIUM	174
Ports	MEDIUM	MEDIUM	MEDIUM	28
Mass Transit	MEDIUM	MEDIUM	MEDIUM	58
Water and Waste Water Util.*	MEDIUM	MEDIUM	MEDIUM	375
Regional and Local Gvt	MEDIUM	MEDIUM	MEDIUM-LOW	3,008
School District	MEDIUM	LOW	MEDIUM-LOW	41
Toll Roads	LOW	LOW	LOW	217
PPP	LOW	LOW	LOW	41

* Includes investor privately-owned utilities

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47

6

Q&A

48

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Access is everything™

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49

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