MOODY'S
INVESTORS SERVICE

DATA REPORT
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US Public Finance

US municipal bond defaults and recoveries, 1970-2022

This study updates our findings concerning the default, loss and rating transition experience of Moody's-rated US municipal bond issuers in 2022 and since 1970. Key findings include:

» **Only one default in 2022 as majority of municipal sector remains resilient.** A student housing project exhausted reserves following multiple years of draws. While certain pockets saw strain, overall the municipal sector continued to benefit from robust liquidity following the injection of federal aid and relatively strong and stable revenue performance.

» **Municipal defaults remain rare but highest among competitive enterprises.** The average five-year cumulative default rate (CDR) has been stable or has fallen for the municipal sector overall and for each subsector over the past five years. The average five-year CDR since 2013 for the municipal sector overall is 0.08%, consistent with the entire study since 1970. The competitive enterprises subset of the municipal sector has the highest five-year CDR at 0.15% since 2013 and 0.35% for the entire study. This is nevertheless still very low in contrast to the average five-year global corporate CDRs of 7.8% since 2013 and 6.9% since 1970.

» **Municipal ratings and corporate ratings moved in different directions as municipal sector generally continued to see ratings drift up.** In 2022, the one-year rating drift was 2 notches per 100 credits for municipals as upgrades again outpaced downgrades while the rating drift for global corporates was -9 notches per 100 credits. However within the municipal sector, rating drift returned negative for competitive enterprises in 2022 after a year of generally positive drift.

» **Municipal ratings have successfully differentiated defaulters from non-defaulters.** The five-year average defaulter position was 97% for municipals and 84% for global corporates.

» **Municipal credits continue to remain highly rated.** The median rating of municipal issuers is Aa3, compared to Baa3 for global corporates.

A data supplement, US municipal bond defaults and recoveries, 1970-2022 — Excel supplement, was published along with this study.

Introduction

This study analyzes the performance of Moody's municipal ratings and their consistency with ratings for global corporates (both nonfinancial and financial corporates). It covers public underlying ratings for all US public finance issuers, including US state and local governments, municipal utilities, not-for-profit hospitals, housing agencies, colleges and universities, and other municipal issuers with long-term debt ratings. It also includes certain municipal infrastructure and project finance credits tracked in parallel in our infrastructure default study. For more information regarding the definitions of the various statistics and the methodology used, please see Appendix A. Our analysis evaluates the municipal sector overall and as three subsets — general governments, municipal utilities, and competitive enterprises, detailed in Appendix B. Default rates incorporating the better of an obligor's underlying and enhanced ratings[1] are in Appendix C. Insured and enhanced ratings reflecting support from letter of credit arrangements are excluded.

The US public finance sector is notable for infrequent rated defaults[2] and extraordinary stability throughout the study period, but it has steadily, if slowly, evolved in fundamental ways.[3] There is a growing evidence that legal security, while important in recovery, is a weak shield against default when credit fundamentals are poor. Another challenge confronting the sector is pension and retirement healthcare leverage which has driven increased fixed costs attributed to pension contributions as well as heightened exposures to equity markets and demographic shifts.

In our 2019 study, released several months after the initial widespread shutdowns in response to the COVID-19 virus, we noted that disease has always been a disruptive element in the history of municipalities, but that the real unprecedented event was the widespread quarantines and the associated economic shutdowns. As we anticipated, there have been lingering effects with downstream credit consequences including escalating inflation and the acceleration of trends for remote work and learning. Potential longer term effects for K-12, higher education and the mass transit sector bear watching, as does changes in municipal revenue structures from shifts in commercial real estate or other consumer preferences.

Nearly all of the municipal sectors' crises are different in causation and character, ranging from the debt-driven defaults and repudiations of state debt in the 1840s, to the liquidity-driven and relatively short-lived defaults of the Great Depression.[4] Ultimately, the character of public finance will be shaped by the sector's ability to accommodate shifts in economic trends and social behaviors given its long-standing tendency to defer addressing gradually increasing risks, while continuing to provide government services.

An important observation from the 53-year study period in this report is that any one default may only reflect the idiosyncrasies of that individual credit and may not represent a general sector trend. This particularly applies to the long period up to 2008, during which general government defaults were exceedingly rare. Other observed defaults may be tightly clustered with credit events within a specific subsector that have common underlying drivers, such as the elevated incidence of multi-family housing defaults between 2003 and 2008. Idiosyncratic or not, defaults and severe credit stress still provide useful insight for credit analysis and judgment.

Updates to data set and methodology

In each new annual default study, we often make slight adjustments to our data set and methodology to more accurately measure the performance of our municipal ratings. For example, we may discover historical defaults or obtain new recovery information, leading to minor changes in the performance statistics presented. The latest findings supersede those from previous studies.

2022 highlights

Only one new default in 2022 with majority of municipal sector showing resilience

With only one default in 2022, the municipal sector continues to reflect its strength and resilience to the effects of economic and behavioral shifts driven by the pandemic or responses to it. As noted in our last few studies, municipal credits generally benefitted from a combination of strong reserves going into 2020, proactive debt and budget management, direct federal aid and market support. The injection of federal aid has improved some credits' liquidity in substantial ways.

The one default in 2022 was NCCD — College Station Properties LLC, TX (Caa2 negative), a Texas A&M University student housing project. While under construction, numerous additional housing projects were completed in more favorable proximity to campus so the project opened with only 54% occupancy even at lower price points. As a result, the project steadily depleted all its liquidity beginning in 2018, finally exhausting it ahead of the July 1, 2022, payment. Occupancy eventually improved and has remained relatively high even over the past several years, but rents are still well below underwritten levels and producing insufficient revenue.

What perhaps is noteworthy about the one default is that is it not directly pandemic related. We have yet to observe a default in the our rated municipal sector that can be tied directly to the pandemic. Even in our research of the entire municipal market, defaults since 2020 have often occurred for entities that were previously struggling, though with some exceptions. Special districts and senior living are the two sectors that have evidenced the most strain since the pandemic, not surprising for these risky sectors. We observed 16 delinquencies in the senior living sector attributed to the pandemic and one for special districts.[5]

More often, the impact of the pandemic and related economic shutdowns materialized in draws on debt service reserve funds or other reserves, even in our rated universe. Some revenue streams, particularly tourism based, saw sharp declines but also rapid recoveries. Many credits that needed reserves to meet debt service quickly rebounded with revenue now sufficient to cover debt service.

The ripple effects of the pandemic driven shutdowns continue to unfold as the sector faces a slowing economy, higher interest rate environment and high inflation. The long term credit implications will depend on how the sector responds to these challenges, particularly given the significant liquidity position of many issuers following the influx of federal aid.

While default activity has been low over the last several years, there are a few additional points worth highlighting regarding the trend in default rates, continued developments in default recoveries and defaults related to natural disasters:

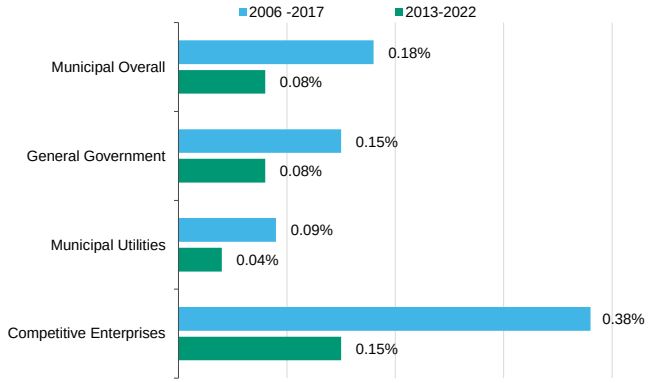
Trend in default rates:

With only two defaults since Puerto Rico, the municipal sector overall default rate for the most recent 10 years has returned to the default rate for the entire study. The municipal sector and subsector default rates have fallen since their most recent peak in 2017, both when considering the most recent 10 years and the entire study period (see exhibits 1 and 2).

Exhibit 1

Recent municipal default rates have fallen overall and for each subsector...

5 Year cumulative default rates, average over the 10 year period specified

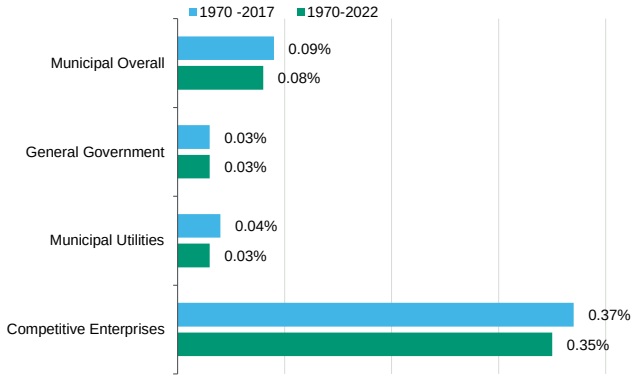


Source: Moody's Investors Service

Exhibit 2

...yet have remained broadly stable over the entire study period

5 Year cumulative default rates, average over the period specified



Source: Moody's Investors Service

While the recent default rate for the municipal sector overall is comparable with the average rate observed for the entire study period, the general government and municipal utilities default rates still remain a bit higher than the average rate for the entire study period, highlighting the impact of Puerto Rico.

By contrast, the default rate for competitive enterprises for the most recent 10 years is below that of the entire study period, reflecting the decline in competitive enterprise defaults since the various housing defaults in the early to mid 2000s. Competitive enterprises nevertheless remain the municipal subsector with the highest default rate.

Default recoveries:

While many of the defaulted Puerto Rico credits resolved in March 2022, some continue to be litigated. The Puerto Rico defaults comprise by far the largest volume default by a rated US municipal credit family and many of the largest creditors have sought to litigate their claims. The still emerging court rulings and settlements will influence future municipal bankruptcies; the history of the litigation and recoveries or the Commonwealth's debts is detailed in the various case studies in Appendix D and in our 2020 and 2021 reports. The Puerto Rico story is broadly a reminder of the power of credit fundamentals, such as leverage, operational balance and economic capacity, over ostensible security features written on paper. While legal security will influence recovery, credit fundamentals drive defaults. A few notable updates since our last study:

» In March 2023, the bankruptcy judge ruled that bondholders only had a claim to funds they were explicitly granted a lien on rather than all revenue of the system, marking the latest instance when security features designed to protect a revenue bond have not held up. The ruling further highlights our view that the fundamental credit quality of a state or local government will always be a paramount credit consideration for revenue bonds it issues.

» Recovery for Puerto Rico Electric Power Authority's (PREPA) is still pending as litigation and PROMESA proceedings remain ongoing. The latest fiscal plan filed by the Puerto Rico Oversight Board in June 2023, cuts the amount of anticipated issuance of new PREPA bonds to satisfy claims by more than half compared to the prior plan. The plan guarantees a minimum 12.5% recovery for non-settling bondholders plus contingent value instruments. The plan has yet to be confirmed and the scheduled hearings regarding the plan of adjustment were recently suspended.

» The bankruptcy court confirmed Puerto Rico Highways and Transportation Authority's (PRHTA) plan of adjustment in October 2022, and it was fully executed in December 2022 with the issuance of new bonds. Similar to other Puerto Rico credits, recovery was derived from a combination of cash, new bonds and contingent value instruments and varied significantly by pledge and lien. We estimate recovery for the 1968 resolution bonds, to which all gas taxes, certain motor vehicle license fees and toll revenues were pledged, at 67% from the cash distribution and new money bonds, adjusted for time value of money. For the 1998 resolution senior lien bonds, which carried a limited pledge of excise taxes plus certain toll revenues and excess revenues of the 1968 bonds, we estimate recovery at 20%. The 1998 resolution subordinate lien bondholders did not receive any cash distributions or new bonds, driving a 0% recovery. All three groups of bondholders may receive additional funds through the clawback contingent value instruments based on economic performance.

In 2022, we also saw the recovery of a 2011 default by the Santa Rosa Bridge Authority. Toll revenue had incrementally reduced the outstanding amounts over time but litigation ultimately resulted in the Florida Department of Transportation making a full settlement payment of $134 million in June 2022 on the outstanding principal plus unpaid and accreted interest. The settlement covered the entire claim but the claim did not include interest accrued on unpaid interest, resulting in our recovery calculation of 92%.

Defaults related to natural disasters:

As we have noted in past reports, we have yet to see a rated default due to a natural disasters. The California Statewide Communities Development Authority (CSCDA) pension obligation bond pool financing Series 2007 A-2 (Baa3) had heightened exposure to potential default when its largest participant (current share approximately 39%), the small town of Paradise, suffered near complete destruction with substantial loss of life in the late 2018 wildfires. Still, Paradise has consistently made its scheduled bond payments through insurance settlements and state backfill of lost property tax revenue.

In contrast, the unrated debt issued by the Successor Agency to the Paradise Redevelopment Agency and backed by a tax increment pledge defaulted on June 1, 2023. The project area's property values declined significantly following the fires in 2018. While the agency similarly received state backfill funding, those funds were nearly exhausted as of December 2022. Property values remain below the base year, and no incremental revenues are being generated. The outcome for the obligation owed to the CSCDA compared to the Successor Agency highlights how the breadth of the pledge can drive a meaningfully different outcome.

Municipal default and bankruptcy: recent trends and observations

Municipal bankruptcy remains unpredictable in outcome

While there has been only one new rated bankruptcy since Puerto Rico, the more frequent bankruptcy occurrence over the past two decades suggests political incentives for municipal bankruptcy may also be shifting, particularly given the pattern of favorable outcomes for pensions. One significant lesson is that bankruptcy poses unpredictable risks for bondholders during the proceeding because such cases are rare and most are settled before adjudication; consequently, there is very little binding legal precedent.

We have also seen bankruptcy used strategically in public finance and not necessarily end in default. The Archdiocese of New Orleans' bankruptcy filing on May 1, 2020 and a July 1 default (ongoing, though interest payments have resumed) was the only Moody's-rated default in that year but is as an example of an apparently preemptive or defensive filing (see case study for more detail). This case was similar to other credits such as the Boy Scouts of America, the utility company Pacific Gas & Electric and nearly 20% of all US Catholic dioceses that filed for bankruptcy to protect themselves from litigation. By contrast, in 2017, Gainesville Hospital District, TX (Baa2 stable) filed bankruptcy as a tactical measure to restructure its pensions, though no bond default ensued.[6]

One conclusion is that credit ratios and liquidity indicators may not be reliable predictors of credit stress when an issuer faces litigation or has another motive for a strategic bankruptcy filing. Issuers with a strong balance sheet may still choose to enter bankruptcy to preserve their assets. Given the diverse types of issuers in the municipal sector, each may have very different strategic self-interest.

Nominally unique bond types within a single municipal credit family can be strongly correlated to one another, particularly in stress

Different municipal entities are linked through overlapping debt and shared economies and tax bases but governance within a single credit family across general, enterprise and component debt types is a critical factor. This connection has become more apparent in recent years.

An important observation is that when a government reaches service insolvency and can no longer maintain essential services without deleveraging or extraordinary support, the entire credit family is at risk, regardless of pledge. Puerto Rico, Detroit and Jefferson County, AL (A3 stable) are among the most salient examples. The credit stress affecting the family can be broad-based or stem from a single operation.

Pensions and related annual fixed charges can become a critical driver of service insolvency within a credit family: it is now very apparent that if an issuer cannot afford to fund pensions, it very likely cannot afford to pay its debt, regardless of the pledge. Pension challenges were a primary driver of the bankruptcy filing of Chester, PA (unrated) in 2022, which creates some uncertainty over Chester Water Authority's (Aa2) efforts to privatize – the city shares governance of the authority with two counties.

Pledge still matters, but may not always shield against loss in bankruptcy or default, as pensions probably come first

The evidence from the municipal bankruptcies to date suggests that a bond pledge does not necessarily prevent default. Credit fundamentals are what matters most. However, a legal pledge can be critical in recovery by providing bondholders a stronger seat at the restructuring table. The stronger the pledge, the better the negotiating position as the bankruptcy settlement proceeds, with an enhanced likelihood of maximizing recovery. The case of Puerto Rico PRIFA port-related bonds (case study #85) is an excellent example.

Some municipal defaults and bankruptcies have resulted in higher recoveries for pension claims than for any bond, regardless of pledge. There are several significant examples where municipal bonds, although secured by formal legal pledges of revenue, were displaced in bankruptcy, receivership or simple default in favor of pensions that have no such formal pledge or revenue claim. This will be tested again in the unrated Chester, PA, bankruptcy where pensions are by far the largest liability.

Nonrated municipal delinquencies, reserve draws and financial difficulties highlight additional credit trends

The US municipal debt market exceeds the scope of Moody's rated universe, which we estimate covers about a third of municipal bond issuers but a substantially larger proportion of outstanding debt. Allowing for identification of credit trends that may not be present by observing rated debt alone, we have published an ongoing quarterly report and annual summary to provide insight into material credit events for municipal bond issuers both rated and unrated by Moody's.[7] Disclosures reveal that much of the risk in the US municipal debt market after Puerto Rico's defaults lurks in two sectors: senior living and local government special districts. These two sectors represented nearly 60% of the 191 missed payments we observed in 2022, with Puerto Rico representing much of the remainder.

Senior living projects face constant competition for new residents and pressure to spend to keep their facilities up to date. While local government special districts are a large and fragmented sector, many of the missed payments are by districts whose bonds are paid from a very narrow revenue source, such as the sales tax generated at one shopping center. Other drivers of special district delinquencies include the closure of a single property whose taxes were pledged to the bonds and issuance of debt in anticipation of unrealized development.

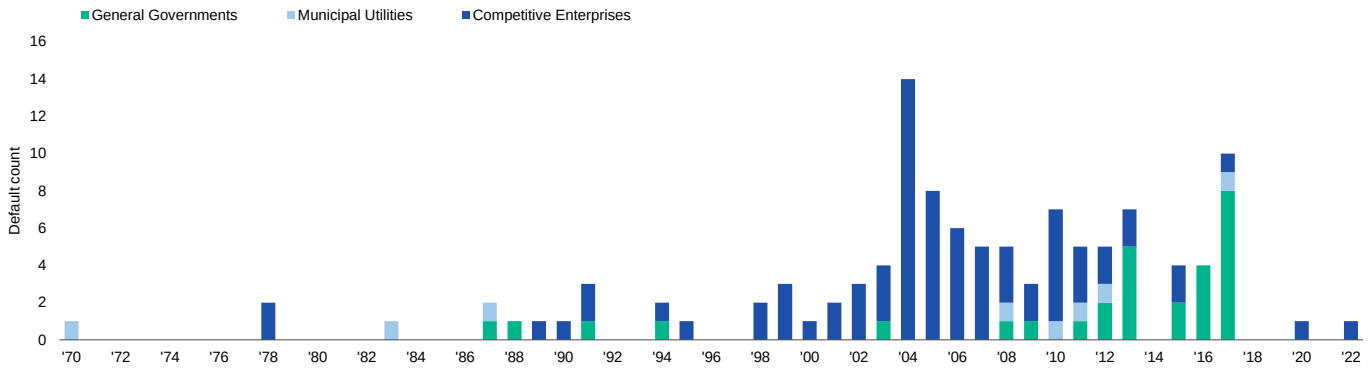
Municipal defaults have increased in the last 15 years, but are still very low compared to global corporates

Municipal defaults are rare, especially compared to global corporates. The pace of municipal defaults accelerated leading up to and in the wake of the Great Recession, as demonstrated in Exhibit 3, but have fallen since Puerto Rico's defaults. Fifty-seven of the 115 defaults since 1970 have occurred since 2007 and have increasingly included general governments. Twenty-four of the 29 general government defaults since 1970 have occurred since 2007.

Exhibit 3

Overall default frequency is low since Puerto Rico

Number of defaults per calendar year, 1970-2022



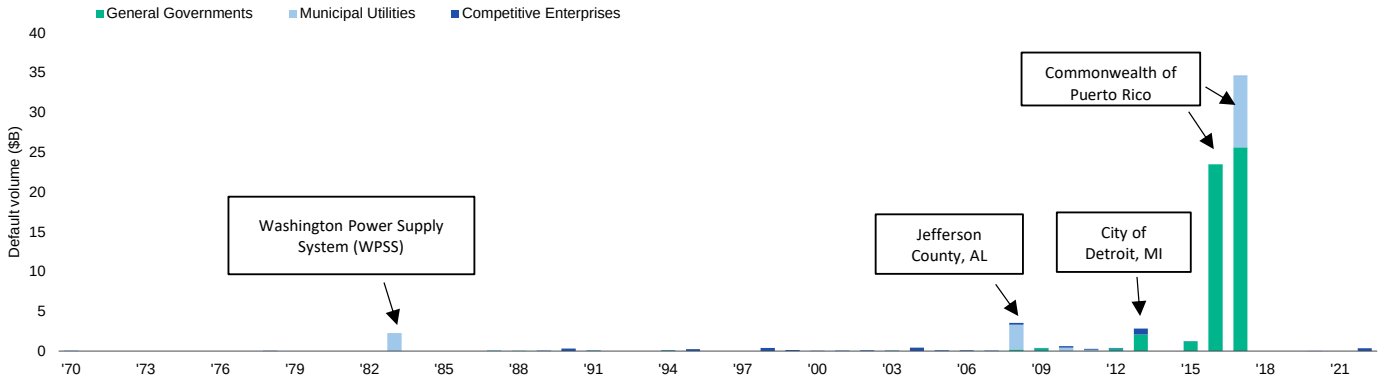
Source: Moody's Investors Service

Default volumes have also grown since 2007. The $2.25 billion default of the Washington Public Power Supply System Projects 4 & 5 in 1983 was the largest municipal default for 25 years until it was eclipsed by Jefferson County, AL, in 2008, roughly matched by Detroit in 2013 and now dwarfed by the confluence of Puerto Rico defaults in 2016 and 2017 (Exhibit 4). Notably, since Puerto Rico, default volume has been very low.

Exhibit 4

Default volume is driven by large general governments and utilities

Default amount by sector per calendar year (billion $)



Source: Moody's Investors Service

Exhibit 3 and 4 reveal a sharp difference between the count of default events and dollar volume. While competitive enterprises made up just over two-thirds of rated defaults, the underlying projects being financed were relatively small. The 2004-2008 housing defaults, for instance, concerned small-scale, standalone rental project financings, nearly all of which have now recovered. Conversely, general governments accounted for just over a quarter of the rated defaults since 1970 but nearly three quarters of the total default volume. Municipal utilities accounted for 7% of defaults but 20.9% of the total default volume (Exhibit 5).

Exhibit 5

Competitive enterprises comprise the majority of municipal defaults but general government defaults dominate volume

Defaults by sector, 1970-2022

Purpose	Number of defaults	Percentage	Default volume (million USD)	Default volume as %
City	8	7.0%	2,684	3.7%
County	5	4.4%	444	0.6%
K-12 public school district	2	1.8%	10	0.0%
Special district	3	2.6%	99	0.1%
State governments	11	9.6%	50,082	69.4%
GENERAL GOVERNMENTS	**29**	**25.4%**	**53,318**	**73.9%**
Electric utility	3	2.6%	11,343	15.7%
Mass transit	1	0.9%	439	0.6%
Toll facility	2	1.7%	216	0.3%
Water/sewer utility	2	1.7%	3,109	4.3%
MUNICIPAL UTILITIES	**8**	**7.0%**	**15,107**	**20.9%**
Charter school	2	1.7%	28	0.0%
Higher education	2	1.7%	82	0.1%
Hospitals & health service providers	23	20.0%	2,455	3.4%
Hotel	2	1.7%	139	0.2%
Housing	46	40.0%	898	1.2%
Not-for-profit	2	1.7%	86	0.1%
Private K-12	1	0.9%	10	0.0%
COMPETITIVE ENTERPRISES	**78**	**67.8%**	**3,699**	**5.1%**
TOTAL	**115**	**100.0%**	**72,124**	**100.0%**

Source: Moody's Investors Service

General government defaults have been rare even in troubled economic times but can affect a large dollar volume of debt when they occur, as in Puerto Rico and Detroit exemplify. This is atypical of corporate defaults, which are usually spread across many issuers. The infrequency of general government defaults further reflects a defining feature of state and local governments: these are distinctly political entities whose decisions may not primarily be driven by financial and economic considerations. They have the unique advantage of de-linked revenues and expenditures, and consequently, they are often able to "kick the can down the road" and forestall a point of crisis and even continue to add large amounts of debt past the point of economic viability — again, unlike a corporate credit. Both Detroit and Puerto Rico issued additional debt while their distress was deepening. Had they not, and defaulted earlier, defaulted debt recoveries might have been better.

Default rates

Exhibit 6 shows that municipal credits had lower or equal average cumulative default rates (CDR) across all horizons and rating categories over the entire study period compared to global corporates. The overall municipal default rate over a five-year horizon was very low at 0.08%. For speculative-grade (SG) municipal issuers, the five-year CDR of 4.63% was close to one fourth of that for speculative-grade rated corporates at 18.71%, although it should be noted that the average corporate rating level is significantly lower within the speculative-grade category. Appendix C shows additional analysis related to CDRs including 1) CDRs over one through 20 year horizons and CDRs calculated using the better of underlying and enhanced ratings. It also shows CDRs calculated removing the recent Puerto Rico defaults from the data set to assess their materiality to the overall default rates and find that their impact has been modest.

Exhibit 6

Municipal default rates lower than global corporates for all broad categories

Cumulative default rates, average over the period 1970-2022, municipal compared to global corporate issuers

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	993	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Aa	6,944	0.00%	0.00%	0.00%	0.01%	0.01%	0.01%	0.01%	0.02%	0.02%	0.02%
A	4,844	0.00%	0.01%	0.02%	0.02%	0.03%	0.04%	0.06%	0.07%	0.08%	0.10%
Baa	690	0.03%	0.10%	0.20%	0.33%	0.44%	0.58%	0.71%	0.83%	0.94%	1.05%
Ba	114	0.22%	0.62%	1.01%	1.45%	1.83%	2.11%	2.44%	2.77%	3.06%	3.31%
B	23	2.62%	5.18%	7.69%	9.73%	11.74%	13.12%	14.07%	14.77%	15.55%	16.65%
Caa-C	11	8.29%	13.15%	16.24%	17.89%	19.01%	20.19%	21.08%	22.06%	22.99%	23.58%
Investment-grade	13,471	0.00%	0.01%	0.02%	0.03%	0.04%	0.05%	0.06%	0.07%	0.08%	0.09%
Speculative-grade	149	1.19%	2.25%	3.16%	3.94%	4.63%	5.14%	5.61%	6.03%	6.44%	6.84%
All rated	13,619	0.02%	0.03%	0.05%	0.07%	0.08%	0.10%	0.11%	0.13%	0.14%	0.15%

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	103	0.00%	0.01%	0.01%	0.03%	0.08%	0.13%	0.18%	0.23%	0.29%	0.34%
Aa	408	0.02%	0.05%	0.10%	0.18%	0.28%	0.38%	0.49%	0.59%	0.67%	0.75%
A	909	0.05%	0.14%	0.30%	0.46%	0.66%	0.89%	1.13%	1.38%	1.64%	1.90%
Baa	910	0.17%	0.42%	0.74%	1.11%	1.47%	1.86%	2.23%	2.66%	3.14%	3.64%
Ba	479	0.91%	2.46%	4.24%	6.11%	7.94%	9.66%	11.22%	12.72%	14.23%	15.82%
B	584	3.23%	7.70%	12.33%	16.61%	20.49%	23.95%	27.07%	29.84%	32.41%	34.66%
Caa-C	401	9.01%	16.16%	22.31%	27.63%	32.31%	36.29%	39.67%	42.76%	45.58%	47.92%
Investment-grade	2,330	0.09%	0.23%	0.42%	0.64%	0.87%	1.12%	1.37%	1.65%	1.93%	2.23%
Speculative-grade	1,464	4.03%	8.15%	12.06%	15.58%	18.71%	21.45%	23.83%	25.97%	27.97%	29.81%
All rated	3,794	1.58%	3.15%	4.59%	5.85%	6.94%	7.88%	8.68%	9.40%	10.09%	10.72%

Historical ratings have been adjusted to be consistent with the global rating scale as described in Appendix G.
Source: Moody's Investors Service

Each of the three broad municipal subsectors exhibits somewhat unique default profiles with general governments and municipal utilities being most similar (Exhibit 7). Defaults were exceedingly rare for both sectors, each with a five-year aggregate CDR of 0.03%. The five-year overall CDR for competitive enterprises was higher at 0.35%, but still low compared to the five-year CDR for global corporates of 6.94%.

Exhibit 7

Cumulative default rates are generally higher for competitive enterprises

Cumulative default rates, averaged over the period 1970-2022, general governments vs. municipal utilities vs. competitive enterprises

General Governments

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	387	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Aa	5,585	0.00%	0.00%	0.00%	0.01%	0.01%	0.01%	0.01%	0.02%	0.02%	0.02%
A	3,305	0.00%	0.01%	0.01%	0.01%	0.02%	0.03%	0.04%	0.05%	0.06%	0.07%
Baa	314	0.02%	0.03%	0.07%	0.15%	0.23%	0.30%	0.34%	0.39%	0.43%	0.48%
Ba	60	0.06%	0.26%	0.49%	0.66%	0.76%	0.77%	0.77%	0.77%	0.77%	0.77%
B	10	0.73%	1.46%	2.13%	2.38%	2.43%	2.43%	2.43%	2.43%	2.43%	2.43%
Caa-C	4	9.03%	15.47%	18.81%	19.79%	20.14%	20.14%	20.14%	20.14%	20.14%	20.14%
Investment-grade	9,592	0.00%	0.00%	0.01%	0.01%	0.02%	0.02%	0.03%	0.04%	0.04%	0.05%
Speculative-grade	73	0.53%	1.05%	1.47%	1.68%	1.78%	1.78%	1.78%	1.78%	1.78%	1.78%
All rated	9,665	0.01%	0.01%	0.02%	0.02%	0.03%	0.04%	0.04%	0.05%	0.06%	0.06%

Municipal Utilities

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	48	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Aa	850	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
A	811	0.00%	0.01%	0.01%	0.02%	0.03%	0.04%	0.05%	0.06%	0.07%	0.09%
Baa	106	0.01%	0.01%	0.01%	0.02%	0.05%	0.09%	0.12%	0.16%	0.20%	0.21%
Ba	12	0.00%	0.00%	0.00%	0.29%	0.51%	0.51%	0.51%	0.51%	0.51%	0.51%
B	3	0.10%	1.36%	4.13%	5.88%	7.49%	9.21%	11.14%	13.30%	15.90%	19.48%
Caa-C	3	3.71%	6.80%	8.88%	8.88%	8.88%	8.88%	8.88%	8.88%	8.88%	8.88%
Investment-grade	1,815	0.00%	0.00%	0.01%	0.01%	0.01%	0.02%	0.03%	0.04%	0.04%	0.05%
Speculative-grade	15	0.53%	1.10%	1.70%	2.12%	2.47%	2.69%	2.94%	3.22%	3.56%	3.97%
All rated	1,831	0.01%	0.01%	0.02%	0.03%	0.03%	0.04%	0.05%	0.06%	0.07%	0.08%

Competitive Enterprises

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	557	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Aa	509	0.00%	0.01%	0.01%	0.02%	0.02%	0.03%	0.03%	0.04%	0.05%	0.05%
A	728	0.00%	0.02%	0.05%	0.07%	0.09%	0.11%	0.14%	0.17%	0.20%	0.23%
Baa	269	0.06%	0.23%	0.44%	0.65%	0.84%	1.09%	1.35%	1.58%	1.80%	1.99%
Ba	42	0.52%	1.34%	2.10%	3.07%	4.03%	4.95%	6.13%	7.34%	8.47%	9.54%
B	15	4.59%	8.96%	13.13%	16.94%	21.05%	23.86%	25.70%	26.94%	28.40%	30.71%
Caa-C	8	9.58%	14.27%	17.69%	20.65%	22.97%	25.79%	28.08%	30.74%	33.31%	34.95%
Investment-grade	2,063	0.01%	0.04%	0.08%	0.11%	0.14%	0.18%	0.22%	0.26%	0.30%	0.33%
Speculative-grade	60	2.19%	4.08%	5.78%	7.51%	9.24%	10.72%	12.13%	13.46%	14.79%	16.15%
All rated	2,123	0.07%	0.15%	0.22%	0.29%	0.35%	0.42%	0.48%	0.54%	0.59%	0.64%

Historical ratings have been adjusted to be consistent with the global rating scale as described in Appendix G.
Source: Moody's Investors Service

Although default rates for the municipal sector have increased in the last two decades, especially for lower rating categories, low default rates for the last several years have modestly reduced average cumulative default rates. For example, the five-year speculative-grade CDR over the period 2013-2022 was 3.97% compared to 4.63% for the entire study period and compared to 18.71% for global corporates over the same time (Exhibit 8). The overall incidence of municipal default has been well below that of global corporates. The 5-year overall CDR was only 0.08% for municipals compared to 7.81% for corporates.

Exhibit 8

Recent municipal and global corporate investment grade default rates converging, at shorter horizons

Cumulative default rates, average over the period 2013-2022, municipal vs. global corporate issuers

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	827	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Aa	7,148	0.00%	0.00%	0.00%	0.00%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
A	4,962	0.00%	0.00%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
Baa	869	0.03%	0.06%	0.14%	0.27%	0.37%	0.41%	0.47%	0.48%	0.48%	0.48%
Ba	164	0.05%	0.27%	0.70%	1.01%	1.03%	1.03%	1.03%	1.03%	1.03%	1.03%
B	30	0.98%	2.36%	4.52%	5.35%	6.05%	6.05%	6.05%	6.05%	6.05%	6.05%
Caa-C	21	10.11%	19.18%	24.86%	26.31%	26.76%	26.76%	26.76%	26.76%	26.76%	26.76%
Investment-grade	13,807	0.00%	0.01%	0.01%	0.02%	0.03%	0.03%	0.03%	0.04%	0.04%	0.04%
Speculative-grade	215	1.09%	2.24%	3.34%	3.82%	3.97%	3.97%	3.97%	3.97%	3.97%	3.97%
All rated	14,022	0.02%	0.04%	0.06%	0.07%	0.08%	0.08%	0.09%	0.09%	0.09%	0.09%

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	55	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Aa	300	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
A	1,275	0.02%	0.04%	0.05%	0.06%	0.09%	0.13%	0.16%	0.17%	0.21%	0.24%
Baa	1,773	0.11%	0.25%	0.47%	0.71%	0.98%	1.27%	1.58%	2.16%	2.96%	3.52%
Ba	772	0.56%	1.54%	2.77%	4.03%	5.69%	7.38%	9.49%	11.51%	14.19%	16.99%
B	1,002	1.67%	4.69%	8.25%	11.88%	15.21%	18.55%	22.18%	26.09%	30.60%	32.52%
Caa-C	1,375	6.63%	12.65%	18.39%	23.62%	28.41%	32.89%	36.78%	39.76%	42.44%	45.63%
Investment-grade	3,403	0.06%	0.14%	0.26%	0.39%	0.53%	0.70%	0.86%	1.16%	1.56%	1.85%
Speculative-grade	3,150	3.54%	7.25%	10.99%	14.47%	17.71%	20.80%	23.91%	26.84%	30.16%	32.53%
All rated	6,553	1.69%	3.39%	5.04%	6.50%	7.81%	9.00%	10.15%	11.28%	12.58%	13.48%

Source: Moody's Investors Service

The average five-year speculative-grade CDR has been comparable across municipal sectors over the past decade (Exhibit 9). General governments now have the highest five-year speculative-grade CDR at 4.58% followed by competitive enterprises at 3.36% and municipal utilities at 3.02%. This is a significant change compared to the whole study period where general governments had the lowest speculative-grade CDR. During the entire study period, competitive enterprises still have an overall higher aggregate cumulative default rate than general governments and municipal utilities, over a 10-year horizon.

Exhibit 9

Recent aggregate cumulative default rates still low for all sectors

Cumulative default rates, average over the period 2013-2022, general governments vs. municipal utilities vs. competitive enterprises

General Governments

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	549	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Aa	5,525	0.00%	0.00%	0.00%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
A	3,488	0.00%	0.01%	0.01%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%
Baa	458	0.03%	0.07%	0.17%	0.38%	0.52%	0.52%	0.52%	0.52%	0.52%	0.52%
Ba	91	0.09%	0.48%	1.24%	1.68%	1.68%	1.68%	1.68%	1.68%	1.68%	1.68%
B	14	1.07%	2.77%	4.89%	4.89%	4.89%	4.89%	4.89%	4.89%	4.89%	4.89%
Caa-C	9	15.30%	26.97%	32.69%	32.69%	32.69%	32.69%	32.69%	32.69%	32.69%	32.69%
Investment-grade	10,020	0.00%	0.00%	0.01%	0.02%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%
Speculative-grade	114	1.43%	2.90%	4.23%	4.58%	4.58%	4.58%	4.58%	4.58%	4.58%	4.58%
All rated	10,133	0.02%	0.03%	0.05%	0.07%	0.08%	0.08%	0.08%	0.08%	0.08%	0.08%

Municipal Utilities

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	78	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Aa	1,010	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
A	812	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Baa	117	0.00%	0.00%	0.00%	0.10%	0.22%	0.22%	0.22%	0.22%	0.22%	0.22%
Ba	12	0.00%	0.00%	0.00%	0.61%	0.61%	0.61%	0.61%	0.61%	0.61%	0.61%
B	4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Caa-C	3	4.71%	10.53%	17.82%	17.82%	17.82%	17.82%				
Investment-grade	2,017	0.00%	0.00%	0.00%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
Speculative-grade	16	0.71%	1.55%	2.55%	3.02%	3.02%	3.02%	3.02%	3.02%	3.02%	3.02%
All rated	2,033	0.01%	0.01%	0.02%	0.03%	0.04%	0.04%	0.04%	0.04%	0.04%	0.04%

Competitive Enterprises

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	200	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Aa	613	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
A	663	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Baa	294	0.03%	0.08%	0.13%	0.18%	0.20%	0.32%	0.49%	0.51%	0.51%	0.51%
Ba	61	0.00%	0.00%	0.00%	0.00%	0.06%	0.06%	0.06%	0.06%	0.06%	0.06%
B	14	1.00%	2.21%	4.80%	6.92%	8.67%	8.67%	8.67%	8.67%	8.67%	8.67%
Caa-C	9	5.89%	12.42%	17.10%	21.53%	22.84%	22.84%	22.84%	22.84%	22.84%	22.84%
Investment-grade	1,771	0.01%	0.01%	0.02%	0.03%	0.03%	0.05%	0.07%	0.08%	0.08%	0.08%
Speculative-grade	85	0.71%	1.44%	2.22%	2.91%	3.36%	3.36%	3.36%	3.36%	3.36%	3.36%
All rated	1,855	0.04%	0.07%	0.11%	0.14%	0.15%	0.17%	0.19%	0.19%	0.19%	0.19%

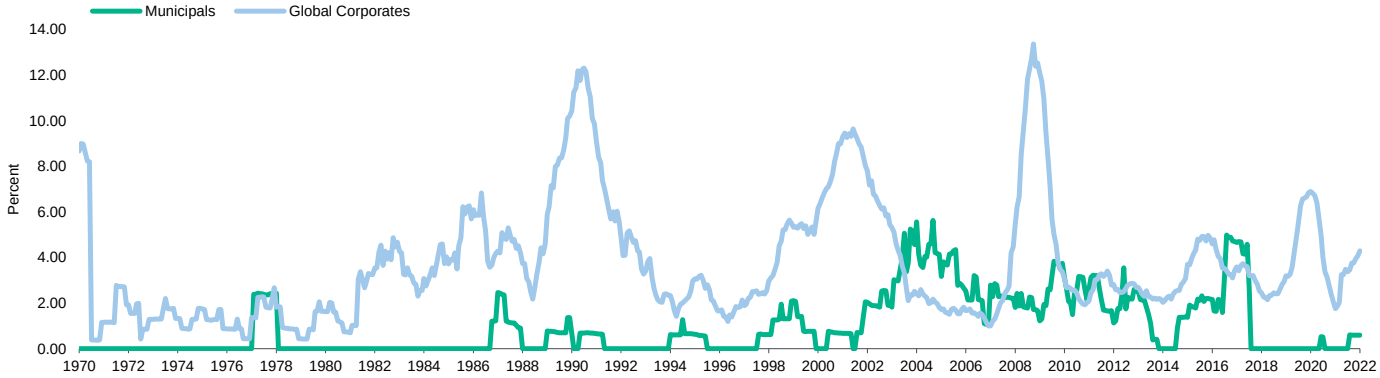
Source: Moody's Investors Service

Default rates for SG municipal credits since 2003 have generally been higher than those over the full study period, approximating or even exceeding the global SG corporate CDR at times (Exhibit 10). This reflects the wave of housing defaults between 2003 and 2008 and the relatively stressed post-recession period. The one-year SG municipal default rate for the cohort formed on January 1, 2022, was low at 0.6% with only 1 default in 2022. The average one-year SG municipal default rate since 1970 is 1.0%.

Exhibit 10

Municipal speculative-grade default rates have approximated speculative-grade corporate default rates since 2010, but are starting to diverge

Trailing twelve-month speculative-grade default rates



Source: Moody's Investors Service

Ratings stability

Ongoing sector stabilization pre-coronavirus, with long-term challenges and greater stress at the margin

Overall, the credit quality of the municipal sector had stabilized a decade after the Great Recession, further aided by accelerated economic recovery and growth across many parts of the US over the two years leading into 2020. While growth has been more varied over the past two years in part driven by the effects of coronavirus related shutdowns, the influx of liquidity and federal stimulus support of the overall economy has kept the credit quality in the sector strong and relatively stable.

The top panel of Exhibit 11 shows that there were fewer rating changes in 2022 than in prior years. Rating volatility fell to 6 notches per 100 credits in 2022 from 11 notches per 100 credits in 2021. Compared to rating volatility for global corporates, rating volatility for municipals has been significantly lower.

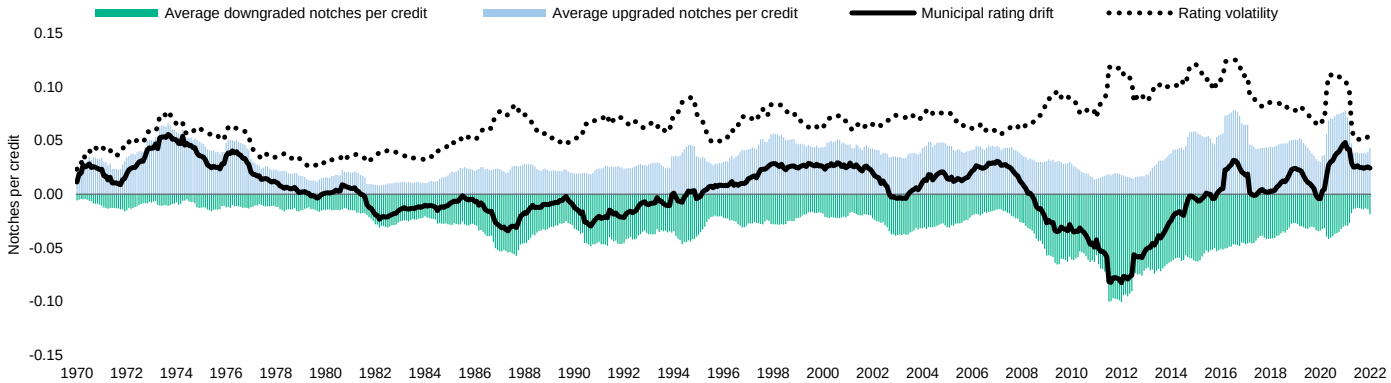
In 2022, there were more rating upgrades than rating downgrades, reflected in a ratings drift of 2.4 notches per 100 credits.[8] Rating drift has generally been flat or positive since late 2015. This trend reversed a sustained period of negative drift since mid-2008, particularly in 2012 when rating drift bottomed out at -8.2 notches per 100 credits.

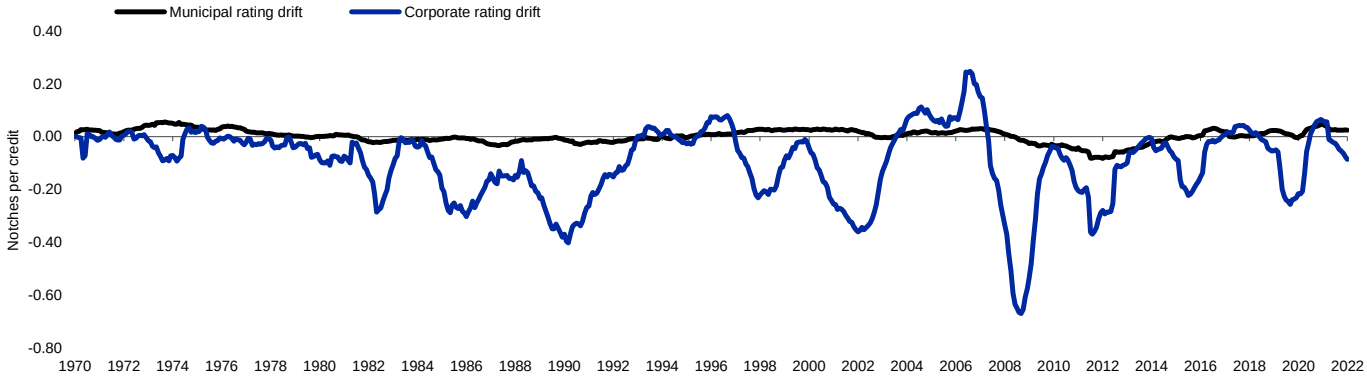
The bottom panel of Exhibit 11 plots municipal rating drift alongside corporate rating drift. In 2022, while municipal rating drift was nearly 2.4 notches per 100 credits, corporate rating drift was -8.7 notches per 100 credits, continuing to reflect the relative resilience of municipals during the virus-related crisis. Over the study period municipal rating drift has been very small in absolute terms when compared to corporate rating drift, highlighting the relative stability of municipal credit quality over the longer term.

Exhibit 11

Volatility still high, drift remains positive and above corporate drift

Top panel: One year drift and volatility ratios of US municipal issuers, 1970-2022; Bottom panel: One-year drift, US municipal issuers vs. global corporate issuers, 1970-2022





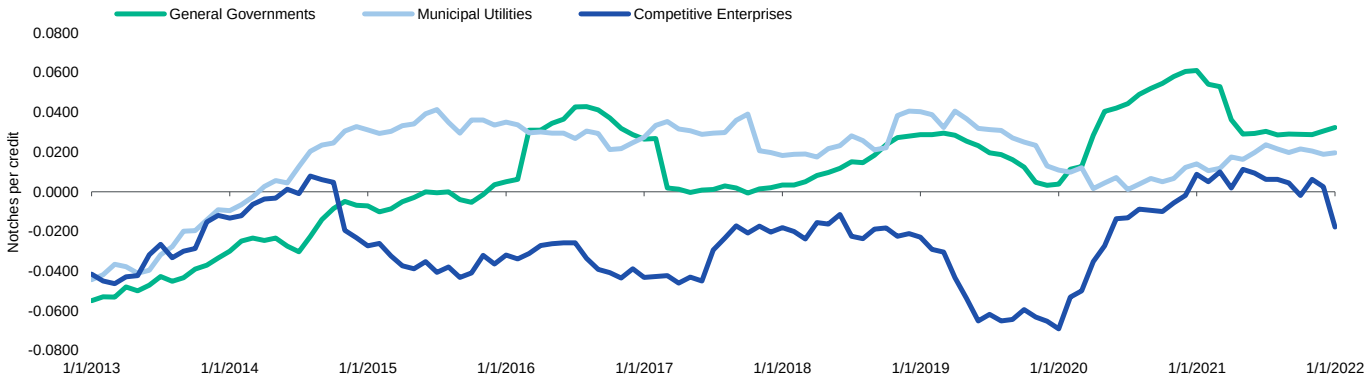
Source: Moody's Investors Service

Exhibit 12 provides a comparison of the rating drift for each municipal sector over the past 10 years, highlighting the effects of the recession and subsequent recovery. Credit quality for municipal utilities and general governments has now rebounded and appears to be mildly improving. The credit quality for competitive enterprises has generally deteriorated over the past 10 years, but since the bottom in 2020, it has been on an upward trajectory and was briefly positive in 2021 before returning to a negative drift in 2022.

Exhibit 12

Municipal sectors reacted differently after the Great Recession

Rating drift summary, 2013-2022, general governments vs. municipal utilities vs. competitive enterprises



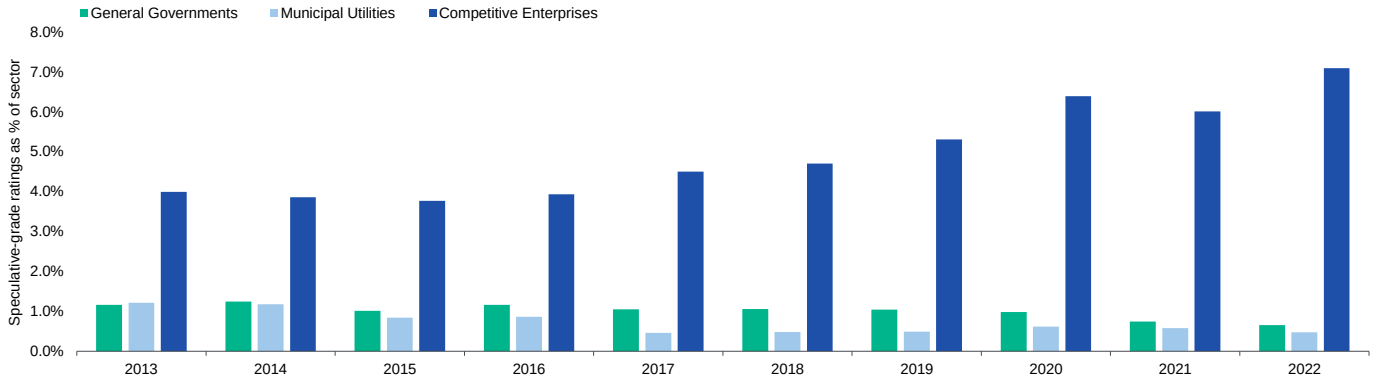
Source: Moody's Investors Service

Stressed general governments have less resilience, less margin or appetite to tax further and a weaker position to weather challenges but currently represent a small percentage of the sector. Exhibit 13 shows that 1.2% of general government ratings were rated SG at the end of 2013. This percentage decreased to 0.7% by the end of 2022. Municipal utilities was the lowest among the three sectors with 0.5% of credits rated SG at the end of 2022, down from 1.2% at the end of 2013. Competitive enterprises retained a higher percentage of stressed credits with 7.1% of credits rated SG at the end of 2022, up from 4.0% at the end of 2013.

Exhibit 13

Competitive enterprise speculative-grade credits growing

Percentage of speculative-grade ratings by sector, 2013-2022



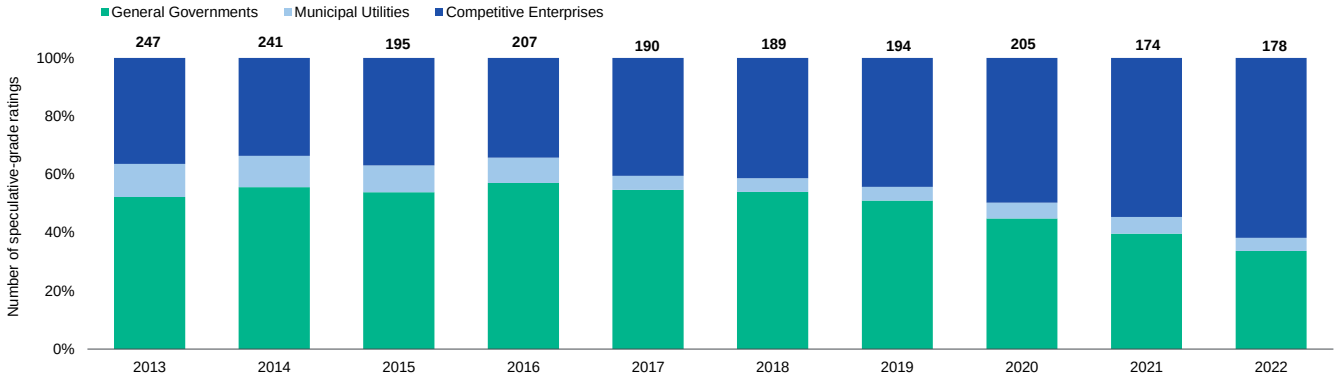
Source: Moody's Investors Service

Exhibit 14 shows that the competitive enterprises share of all municipal SG credits has grown considerably, to 62% by the end of 2022 from 36% at the end of 2013. The general governments share of SG credits fell to 34% by the end of 2022 from 52% at the end of 2012. This trend may also reflect the significant shrinkage of both the general governments and municipal utility sectors since 2012. There were 178 SG municipal credits at year-end 2022 compared to 247 at year-end 2013.

Exhibit 14

General government share of municipal speculative grade universe has fallen in the past decade

Share of all speculative-grade ratings by sector, 2013-2022



Source: Moody's Investors Service

Municipal credit quality has been stable over the study period

US public finance ratings were more stable and transitioned less frequently than global corporates for the period 1970-2022 (Exhibit 15). Municipal credits are typically very strong and their rating distribution is substantially skewed toward the investment-grade, where ratings tend to be more stable.

Exhibit 15

Municipal ratings transition less frequently than global corporates

Average one-year rating transition rates, 1970-2022, municipal compared to global corporate issuers

From/To:	Average cohort count	Aaa	Aa	A	Baa	Ba	B	Caa-C	Withdrawn	Default
Municipals										
Aaa	993	94.89%	1.17%	0.10%	0.03%	0.01%	0.00%	0.00%	3.80%	0.00%
Aa	6,944	0.32%	94.62%	1.02%	0.02%	0.01%	0.00%	0.00%	4.01%	0.00%
A	4,844	0.03%	1.87%	92.62%	0.61%	0.12%	0.01%	0.00%	4.73%	0.00%
Baa	690	0.02%	0.08%	3.51%	89.29%	1.68%	0.20%	0.04%	5.15%	0.03%
Ba	114	0.03%	0.20%	1.94%	4.93%	80.58%	2.72%	0.60%	8.79%	0.21%
B	23	0.00%	0.23%	0.85%	0.96%	5.73%	75.51%	5.51%	8.69%	2.50%
Caa-C	11	0.00%	0.00%	0.63%	0.22%	1.38%	2.79%	73.07%	14.26%	7.64%

From/To:	Average cohort count	Aaa	Aa	A	Baa	Ba	B	Caa-C	Withdrawn	Default
Global Corporates										
Aaa	103	87.97%	7.58%	0.57%	0.07%	0.02%	0.00%	0.00%	3.80%	0.00%
Aa	408	0.75%	85.61%	8.26%	0.40%	0.06%	0.03%	0.02%	4.84%	0.02%
A	909	0.05%	2.38%	87.50%	4.95%	0.42%	0.09%	0.04%	4.53%	0.05%
Baa	910	0.03%	0.12%	3.70%	86.77%	3.33%	0.60%	0.14%	5.15%	0.16%
Ba	479	0.01%	0.03%	0.37%	5.89%	76.83%	6.80%	0.80%	8.43%	0.85%
B	584	0.01%	0.02%	0.12%	0.40%	4.76%	73.81%	7.17%	10.70%	3.02%
Caa-C	401	0.00%	0.01%	0.02%	0.06%	0.25%	5.51%	71.05%	14.67%	8.44%

Historical ratings have been adjusted to be consistent with the global rating scale as described in Appendix G.
Source: Moody's Investors Service

Transition rates were mostly comparable in investment-grade rating categories for each municipal sector (Exhibit 16). Competitive enterprises, which lack taxation and monopoly powers, often have more negative rating movement than their municipal counterparts in SG categories. For example, Ba- and B-rated general governments and municipal utilities were more likely to transition to higher rating categories one-year later than to transition to lower rating categories while the reverse is true for competitive enterprises. Governments are often able to manage financial stress because the delinked nature of their revenues and expenditures allows them to recover and rebalance while utilities are often able to raise revenues for their typically monopolistic and essential services.

Exhibit 16

Transition rates comparable across individual municipal sectors, particularly for IG rating categories

Average one-year rating transition rates, 1970-2022, general governments vs. municipal utilities vs. competitive enterprises

From/To:	Average cohort count	Aaa	Aa	A	Baa	Ba	B	Caa-C	Withdrawn	Default
General Governments										
Aaa	387	95.01%	2.13%	0.03%	0.01%	0.00%	0.00%	0.00%	2.81%	0.00%
Aa	5,585	0.29%	94.85%	1.00%	0.01%	0.01%	0.00%	0.00%	3.84%	0.00%
A	3,305	0.01%	2.00%	92.67%	0.45%	0.13%	0.01%	0.00%	4.73%	0.00%
Baa	314	0.00%	0.06%	4.28%	89.22%	1.28%	0.13%	0.02%	4.99%	0.02%
Ba	60	0.05%	0.33%	3.14%	5.68%	81.43%	1.06%	0.41%	7.84%	0.06%
B	10	0.00%	0.56%	1.02%	1.07%	5.84%	81.84%	2.75%	6.22%	0.71%
Caa-C	4	0.00%	0.00%	0.98%	0.62%	1.35%	4.81%	74.44%	9.11%	8.69%

From/To:	Average cohort count	Aaa	Aa	A	Baa	Ba	B	Caa-C	Withdrawn	Default
Municipal Utilities										
Aaa	48	92.52%	1.83%	0.22%	0.06%	0.00%	0.00%	0.00%	5.36%	0.00%
Aa	850	0.25%	94.20%	0.96%	0.02%	0.02%	0.00%	0.01%	4.55%	0.00%
A	811	0.02%	1.47%	92.98%	0.44%	0.07%	0.00%	0.00%	5.00%	0.00%
Baa	106	0.00%	0.07%	3.78%	89.60%	0.77%	0.14%	0.04%	5.59%	0.01%
Ba	12	0.00%	0.06%	2.04%	4.85%	82.23%	2.29%	0.57%	7.95%	0.00%
B	3	0.00%	0.00%	1.64%	5.47%	8.67%	70.26%	5.84%	8.03%	0.09%
Caa-C	3	0.00%	0.00%	1.04%	0.00%	2.09%	0.89%	84.43%	7.97%	3.58%

From/To:	Average cohort count	Aaa	Aa	A	Baa	Ba	B	Caa-C	Withdrawn	Default
Competitive Enterprises										
Aaa	557	95.01%	0.45%	0.14%	0.05%	0.01%	0.00%	0.00%	4.35%	0.00%
Aa	509	0.83%	92.79%	1.27%	0.06%	0.03%	0.00%	0.00%	5.02%	0.00%
A	728	0.14%	1.68%	92.03%	1.48%	0.15%	0.04%	0.01%	4.46%	0.00%
Baa	269	0.05%	0.10%	2.51%	89.24%	2.51%	0.30%	0.06%	5.17%	0.06%
Ba	42	0.02%	0.06%	0.18%	3.87%	78.90%	5.21%	0.88%	10.38%	0.49%
B	15	0.00%	0.00%	0.59%	0.21%	5.21%	71.13%	7.72%	10.81%	4.32%
Caa-C	8	0.00%	0.00%	0.31%	0.10%	1.14%	2.44%	68.43%	19.05%	8.52%

Historical ratings have been adjusted to be consistent with the global rating scale as described in Appendix G.
Source: Moody's Investors Service

Rating volatility, as reflected in the off-diagonal elements of the rating transition matrices, has increased for municipals following the Great Recession (Exhibit 17). Since 2013, 92.8% of Aaa municipal entities maintained a Aaa rating at the end of a one-year period, down from 94.9% over the longer study period. More striking is the heightened volatility rates for lower-rated municipal entities, which reflect less predictable behavior under stress.

Exhibit 17 also shows that municipals have generally demonstrated less stability than like-rated global corporates over the last 10 years though notably municipal withdrawal rates over the last 10 years have been higher than the entire study. As discussed in our prior

analysis of rating drift, municipal transitions over the past decade have more commonly been to higher rating categories. Over the same period, each of the subsectors typically saw less stability (Exhibit 18) compared to the entire study period (Exhibit 16), particularly for credits rated Baa and below.

Exhibit 17

Overall municipal transition rates increased in the last decade

Average one-year rating transition rates, 2013-2022, municipal vs. global corporate issuers

From/To:	Average cohort count	Aaa	Aa	A	Baa	Ba	B	Caa-C	Withdrawn	Default
Municipals										
Aaa	827	92.83%	1.29%	0.04%	0.00%	0.00%	0.00%	0.00%	5.85%	0.00%
Aa	7,148	0.36%	92.93%	1.11%	0.01%	0.00%	0.00%	0.00%	5.58%	0.00%
A	4,962	0.02%	2.53%	89.80%	1.04%	0.05%	0.01%	0.00%	6.56%	0.00%
Baa	869	0.00%	0.09%	4.94%	85.35%	2.29%	0.29%	0.07%	6.93%	0.03%
Ba	164	0.04%	0.07%	1.00%	9.11%	73.89%	2.70%	1.08%	12.09%	0.04%
B	30	0.00%	0.00%	0.06%	1.63%	10.98%	61.10%	8.50%	16.81%	0.92%
Caa-C	21	0.00%	0.00%	0.31%	0.00%	0.45%	4.54%	66.92%	18.74%	9.04%

From/To:	Average cohort count	Aaa	Aa	A	Baa	Ba	B	Caa-C	Withdrawn	Default
Global Corporates										
Aaa	55	94.92%	1.68%	0.30%	0.00%	0.00%	0.00%	0.00%	3.10%	0.00%
Aa	300	0.04%	90.05%	6.74%	0.04%	0.00%	0.00%	0.00%	3.13%	0.00%
A	1,275	0.01%	1.70%	91.18%	3.53%	0.06%	0.01%	0.00%	3.49%	0.02%
Baa	1,773	0.00%	0.02%	2.63%	89.95%	2.46%	0.27%	0.03%	4.55%	0.09%
Ba	772	0.00%	0.00%	0.05%	4.88%	79.18%	5.92%	0.68%	8.82%	0.48%
B	1,002	0.00%	0.00%	0.01%	0.24%	4.60%	74.53%	8.08%	11.04%	1.50%
Caa-C	1,375	0.00%	0.01%	0.00%	0.01%	0.08%	4.34%	75.18%	14.16%	6.22%

Source: Moody's Investors Service

Exhibit 18

Transition rates generally increased for each municipal sector over the last 10 years

Average one-year rating transition rates, 2013-2022, general governments vs. municipal utilities vs. competitive enterprises

From/To:	Average cohort count	Aaa	Aa	A	Baa	Ba	B	Caa-C	Withdrawn	Default
General Governments										
Aaa	549	95.49%	1.48%	0.00%	0.00%	0.00%	0.00%	0.00%	3.03%	0.00%
Aa	5,525	0.41%	93.28%	1.14%	0.02%	0.00%	0.00%	0.00%	5.15%	0.00%
A	3,488	0.01%	2.89%	89.51%	0.96%	0.06%	0.01%	0.00%	6.55%	0.00%
Baa	458	0.00%	0.07%	6.52%	84.57%	2.21%	0.32%	0.08%	6.20%	0.04%
Ba	91	0.07%	0.00%	1.68%	12.45%	70.22%	1.95%	1.21%	12.34%	0.08%
B	14	0.00%	0.00%	0.13%	3.46%	12.35%	64.51%	7.91%	10.59%	1.05%
Caa-C	9	0.00%	0.00%	0.70%	0.00%	0.20%	6.93%	66.77%	10.64%	14.76%

From/To:	Average cohort count	Aaa	Aa	A	Baa	Ba	B	Caa-C	Withdrawn	Default
Municipal Utilities										
Aaa	78	93.54%	0.72%	0.00%	0.00%	0.00%	0.00%	0.00%	5.74%	0.00%
Aa	1,010	0.26%	92.23%	0.97%	0.00%	0.00%	0.00%	0.00%	6.54%	0.00%
A	812	0.00%	2.06%	89.78%	0.66%	0.01%	0.00%	0.00%	7.50%	0.00%
Baa	117	0.00%	0.09%	5.33%	85.64%	0.95%	0.24%	0.09%	7.66%	0.00%
Ba	12	0.00%	0.00%	0.91%	12.92%	71.53%	1.36%	1.81%	11.48%	0.00%
B	4	0.00%	0.00%	0.00%	0.00%	45.11%	30.43%	13.04%	11.41%	0.00%
Caa-C	3	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	85.71%	9.65%	4.63%

From/To:	Average cohort count	Aaa	Aa	A	Baa	Ba	B	Caa-C	Withdrawn	Default
Competitive Enterprises										
Aaa	200	85.24%	0.99%	0.16%	0.00%	0.00%	0.00%	0.00%	13.61%	0.00%
Aa	613	0.15%	90.90%	1.10%	0.00%	0.00%	0.00%	0.00%	7.85%	0.00%
A	663	0.08%	1.23%	91.33%	1.90%	0.03%	0.01%	0.00%	5.42%	0.00%
Baa	294	0.00%	0.11%	2.35%	86.46%	2.96%	0.27%	0.05%	7.77%	0.03%
Ba	61	0.00%	0.18%	0.00%	3.42%	79.75%	4.07%	0.75%	11.83%	0.00%
B	14	0.00%	0.00%	0.00%	0.00%	5.56%	61.38%	8.54%	23.61%	0.91%
Caa-C	9	0.00%	0.00%	0.00%	0.00%	0.81%	3.33%	62.16%	29.26%	4.44%

Source: Moody's Investors Service

We observe several trends that have emerged in the municipal sector since 2013. First, withdrawal rates increased while new issuance activity was more limited. One driver of this, particularly for Aaa-rated competitive enterprises, which had a withdrawal rate of 13.61%, was the reduction in housing sector ratings due to refundings or redemptions as transactions that began with the 2006 housing boom reached their ten-year call period, followed by limited new issuance activity. Rating withdrawals were also high in other municipal sectors, particularly in lower rating categories.

Second, lower-rated municipal entities, particularly general governments, often behave less predictably and are subject to political factors that can quickly move their credit quality up or down, exposing them more to stresses that developed following the recession. For example, a general government with less immediate flexibility may wait until a problem reaches a crisis level before finding the political will to resolve its challenges. Such political factors are typically not present for corporate issuers. Thus, even stressed governments have many tools to defer the tipping point of service insolvency as long as possible.

Ratings accuracy

Municipal ratings have a high degree of accuracy

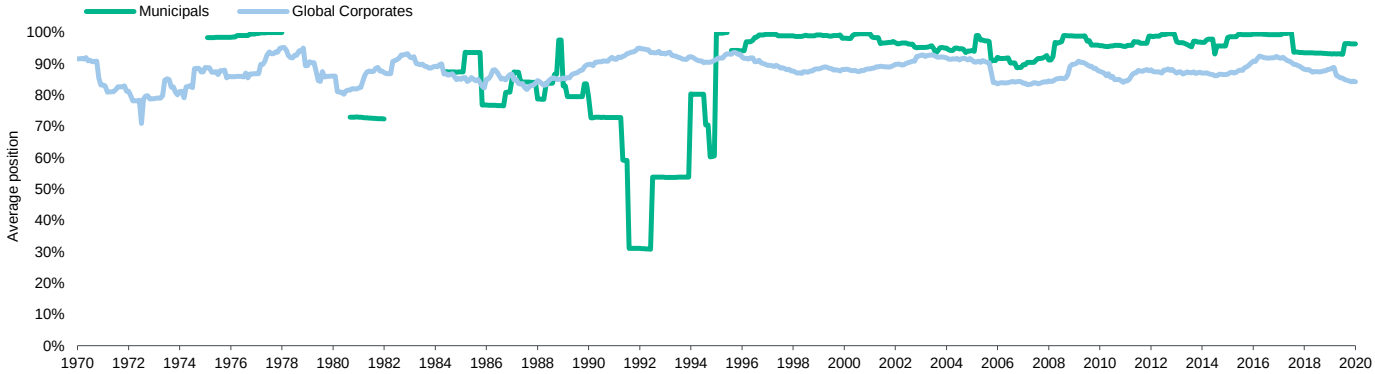
Municipal ratings generally have a high level of accuracy in differentiating defaulters from non-defaulters, as measured by the average defaulter position (AP).

Exhibit 19 shows three-year APs over time for both US municipals and global corporates.[9] Since the mid-1990s, the AP for US municipals has been high both in an absolute sense, as well as in comparison to the AP for global corporates. For example, for the cohort formed on January 1, 2020, the three-year AP was 96% for municipals and 84% for global corporates.

Exhibit 19

Municipal ratings have successfully differentiated defaulters from non-defaulters over a three-year horizon

Three-year average default position of US municipal issuers vs. global corporate issuers, 1970-2022



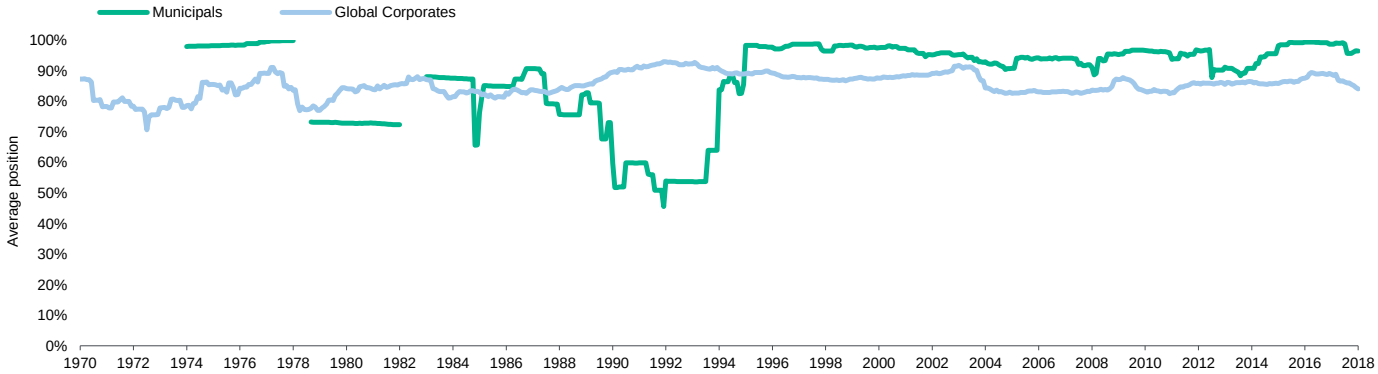
Three defaulted credits are not reflected in this exhibit because they were not rated as of any cohort dates (i.e., month starts) within three year before defaulting. Chesapeake Bay Bridge and Tunnel District, VA was rated by Dun & Bradstreet at the time of its default. The rating for Washington Power Supply System, WA was withdrawn more than one year before default. Delaware Valley Obligated Group, PA only started being rated a few weeks before default and was not rated as of any cohort date before defaulting.
Source: Moody's Investors Service

Exhibit 20 shows five-year APs over time for both US municipals and global corporates. Similar to our finding from Exhibit 19, we observe that since the mid-1990s, municipal ratings have had more ordinal power than global corporate ratings over a five-year horizon. The five-year AP for cohorts formed on January 1, 2018 was 97% and 84% for municipal and global corporate issuers, respectively.

Exhibit 20

Municipal ratings have successfully differentiated defaulters from non-defaulters over a five-year horizon

Five-year average default position of US municipal issuers vs. global corporate issuers, 1970-2022



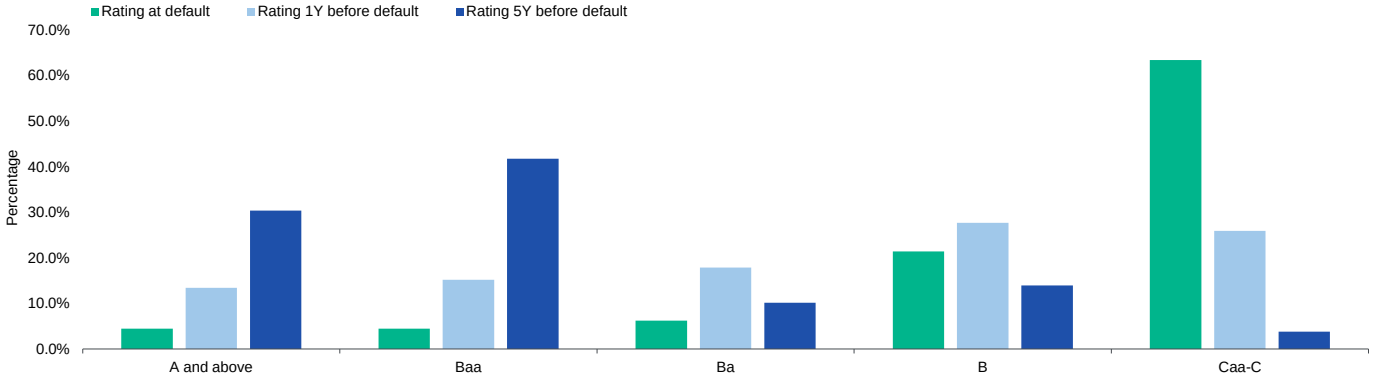
Three defaulted credits are not reflected in this exhibit because they were not rated as of any cohort dates (i.e., month starts) within five years before defaulting. Chesapeake Bay Bridge and Tunnel District, VA; Delaware Valley Obligated Group, PA; and Dallas County Schools, TX.
Source: Moody's Investors Service

Exhibit 21 shows that in the 53-year study period, 91% of all municipal defaults had SG ratings at the time of default, but only 71% had SG ratings one year before default. In contrast, 95% of all global corporate defaults had SG ratings one year before default.

Exhibit 21

Municipal ratings are generally Caa-C at default

Ratings at or before default for US municipals, 1970-2022



Source: Moody's Investors Service

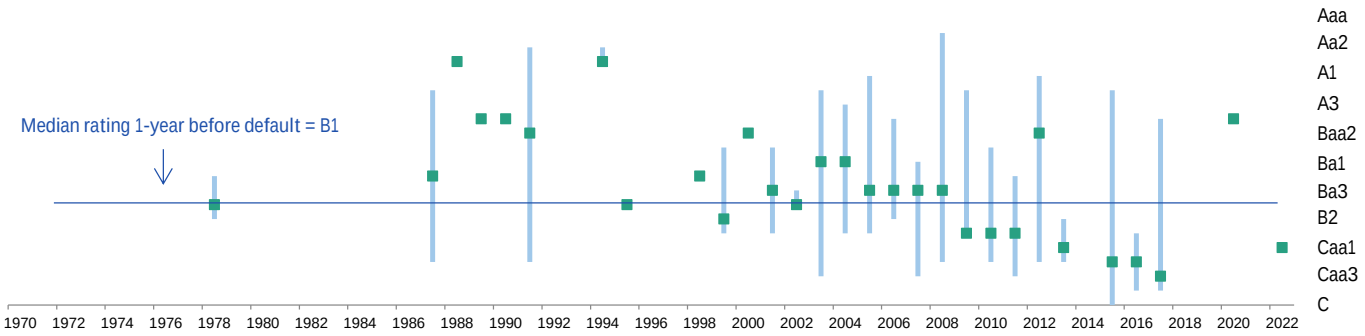
Over the entire study period, the median rating one year before default for municipals was B1 (Exhibit 22), while the median rating five years before default was Baa2. For global corporates over the same time, the median rating one-year before default was B3, while the median rating five years before default was B1.

There were several highly rated idiosyncratic defaults in the 1980s and 1990s, including Baldwin County (1988), Polk County (1991), and Orange County (1994), which were rated Aa3, Aa2 and Aa3, respectively, one year before default. Also, in July 1994 a multi-family transaction by the Connecticut Housing Authority defaulted and was rated Aa2 one-year before default. This was the only default by any rated state housing authority. (See Appendix D for case studies on these defaults).

Exhibit 22

Median ratings one-year before default broadly accurate, but idiosyncratic outliers persist

Rating one-year before default



1. Green dots indicate the median rating one-year before default in each calendar year. Vertical blue lines show the range of the highest and lowest ratings held one year before the default.
2. Three defaulted credits are not reflected in this exhibit because they were not rated as of any cohort dates (i.e., month starts) within one year before defaulting. Chesapeake Bay Bridge and Tunnel District, VA was rated by Dun & Bradstreet at the time of its default. The ratings for Washington Power Supply System, WA and Downtown Hospital, TN were withdrawn before default.

Source: Moody's Investors Service

Recovery rates

Average issuer-weighted recoveries on Moody's-rated municipal bonds since 1970 have been about 67%, which is higher than the issuer-weighted average 47.1% ultimate recovery rate for senior unsecured bonds of North American corporate issuers since 1987.[10] Municipal recovery rates, however, have been highly variable across individual bonds, with some recovering 100% and others receiving as little as 0%. Recoveries are lower on a weighted average dollar basis, about 52%, particularly given large recent general governments defaults which recovered less. In many instances recoveries played out over a long amount of time or are still being realized, as is the case for the Puerto Rico recoveries that included contingent value instruments

For recent general government defaults, which have been relatively small in number but sizable by volume, recovery has been lower in some cases and closer to the recovery for global corporate defaults. Pensions have played a prominent role in this trend due to instances in which there was no loss or considerably less loss than for bondholders. Other post-employment benefits (OPEBs, or retiree health benefits), have often been in a first-loss position in these situations. When these benefits are cut sharply, they set up a political argument that retirees have already been hurt enough, strengthening the argument to protect pensions.

There have been several instances where debt issued to fund pensions has been impaired such as Stockton, CA, San Bernardino, CA and most significantly to date in Detroit; Puerto Rico has now followed the same pattern, with results for bondholders and pensioners very similar to Detroit, MI. Only in the Central Falls, RI bankruptcy were bondholders favored over pensioners, suffering neither impairment nor default. Central Falls is an unusual case; there is at least some argument that Rhode Island's actions to help drive the Central Falls settlement were strategically aimed at averting a larger and more damaging crisis across several cities in the state. We have separately noted the strategic bankruptcy of Gainesville Hospital District, which neither impaired debt nor pensions (which were terminated going forward after full funding).

The examples of several idiosyncratic defaults by highly rated entities in late 1980s and early 1990s had high recoveries. For example, Baldwin County (1988), Polk County (1991), and Orange County (1994) were all rated in the Aa range one year before default and all had recoveries of 100%. That such defaults were idiosyncratic and short-lived is perhaps emblematic of the broadly supportive credit environment for US general governments at the time — a paradigm that appears to have now shifted. The other two defaults in this cluster, Metropolitan Hospital (1989) and City of Choate-Symmes Hospitals (1990), were both rated Baa1 one year before default and had recovery rates of 60% or higher.

Housing sector defaults and recoveries: A saga of unique circumstances

Most of the defaults in the housing sector — 18 of the total 31 project financings — involved bond financings for standalone, uninsured multifamily properties generally issued between 1999 and 2002. The lower financing costs of this tax-exempt bond financing constituted the sole form of subsidy for these projects, which were geared to low- and moderate-income tenants and priced at below market rental rates. Although the properties were older, with limited amenities and 'curb appeal', they had historically experienced strong occupancy levels such that their lower rent levels would continue to make them attractive to low- and moderate-income tenants.

By 2003, however, the single family market began heating up with low mortgage interest rates and easier homeownership credit conditions for first-time buyers, which put unusual pressure on the multifamily rental market. With local rental rates dropping at all properties, including newer market rate properties, the rent advantage of the older affordable properties deteriorated and vacancy levels grew as tenants either opted to live in higher quality properties or buy single family homes. The resulting higher vacancy rates and limited ability to raise rents sufficient to cover expenses caused the financial position of these properties to deteriorate, often rapidly. With limited outside resources to mitigate the weakened financial position, 12 of the 18 projects defaulted between 2003 and 2008. The multifamily properties that were sold after default in this period experienced senior bond recoveries averaging over 65%.

Since 2008, however, as the rental housing market has improved with the return of renters, the result has been that full recovery upon the sale of the property is not unusual, which has driven average recovery rates to over 75%.

Exhibit 23

Recovery rates generally high for municipal credits

Recovery rates for defaulted municipal issuers, 1970-2022

#	Defaulted obligor	Default date	Municipal sector	Purpose	Security class	Seniority	Ultimate recovery	Underlying Rating at default	Underlying Rating 1-year before default	Underlying Rating 5-year before default	Debt affected (million USD)
1	Chesapeake Bay Bridge and Tunnel District	7/1/1970	Municipal Utilities	toll facility	Revenue: Government Enterprise	Senior	100%	#N/A	#N/A	#N/A	100.00
2	Midlands Community Hospital	1/1/1978	Competitive Enterprises	hospitals & health service providers	Revenue: Government Enterprise	Senior	85%-100%	Caa2	Ba2	#N/A	21.70
3	Hilton Head Hospital	1/1/1978	Competitive Enterprises	hospitals & health service providers	Revenue: Government Enterprise	Senior	85%-100%	Ca	B2	#N/A	11.00
4	Washington Power Supply System	8/1/1983	Municipal Utilities	electric utility	Revenue: Government Enterprise	Senior	40%	#N/A	#N/A	A1	2,250.00
5	Belfield (City of)	4/1/1987	General Governments	City	General Obligation	Senior	55% of principal	Ba2	A2	#N/A	1.90
6	Vanceburg (City of)	12/1/1987	Municipal Utilities	electric utility	Revenue: Government Enterprise	Senior	100%	Caa2	Caa2	A2	137.04
7	Baldwin County	10/1/1988	General Governments	County	General Obligation Limited Tax	Senior	100%	Aa3	Aa3	#N/A	8.00
8	Metropolitan Hospital	12/1/1989	Competitive Enterprises	hospitals & health service providers	Revenue: Government Enterprise	Senior	64%	Caa2	Baa1	Baa1	63.20
9	Choate (City of) –Symmes Hospitals	1/1/1990	Competitive Enterprises	hospitals & health service providers	Revenue: Government Enterprise	Senior	61%	Caa2	Baa1	Baa1	320.00
10	Northwest General Hospital	4/1/1991	Competitive Enterprises	hospitals & health service providers	Revenue: Government Enterprise	Senior	33%	C	Caa2	Ba2	4.80
11	Downtown Hospital Association	8/1/1991	Competitive Enterprises	hospitals & health service providers	Revenue: Government Enterprise	Senior	100% of principal and 50% of interest	#N/A	Baa2	Baa2	2.20
12	Polk County	12/1/1991	General Governments	County	Lease Rental	Senior	100%	Aa3	Aa2	#N/A	39.00
13	Connecticut Housing Authority	7/1/1994	Competitive Enterprises	housing	Mortgage: Multi-Family: Credit Enhanced	Senior	Unknown	Ca	Aa2	Aa2	4.80
14	Orange County	12/6/1994	General Governments	County	Lease Rental	Senior	100%	Aa2	Aa3	Aa2	110.00
15	Michigan Health Care Corporation	6/1/1995	Competitive Enterprises	hospitals & health service providers	Revenue: Government Enterprise	Senior	24% - 54%	Caa2	B1	Ba2	262.00
16	Graduate Health System (via AHERF)	7/21/1998	Competitive Enterprises	hospitals & health service providers	Revenue: Government Enterprise	Senior	41.5 % (expected)	Caa1	Ba2	Baa1	200.00
17	Delaware Valley Obligated Group (via AHERF)	7/21/1998	Competitive Enterprises	hospitals & health service providers	Revenue: Government Enterprise	Senior	unknown	B3	#N/A	#N/A	200.00
18	Boston Regional Medical Center	2/1/1999	Competitive Enterprises	hospitals & health service providers	Revenue: Government Enterprise	Senior	20%	Caa2	B2	Baa2	30.00
19	Greater Southeast Healthcare System	5/27/1999	Competitive Enterprises	hospitals & health service providers	Revenue: Government Enterprise	Senior	Less than 50%	Caa3	Baa3	Baa3	46.00
20	Tarrant Housing Finance Corporation	11/15/1999	Competitive Enterprises	housing	Mortgage: Single-Family: Whole Loans	Senior	Unknown	Caa3	B3	Ba2	37.23
21	Marine Military Academy	5/1/2000	Competitive Enterprises	private K-12	Revenue: Government Enterprise	Senior	100% of principal	Baa2	Baa2	#N/A	10.40
22	Citizens' General Hospital	1/1/2001	Competitive Enterprises	hospitals & health service providers	Revenue: Government Enterprise	Senior	100%	Baa3	Baa3	Baa1	30.00
23	Genesee Hospital	5/1/2001	Competitive Enterprises	hospitals & health service providers	Revenue: Government Enterprise	Senior	Undisclosed	Caa2	B3	B1	32.50
24	Erie County Hospital Authority / Metro Health Center	7/1/2002	Competitive Enterprises	hospitals & health service providers	Revenue: Government Enterprise	Senior	21%	B1	B1	B1	9.00
25	Nebraska Investment Finance Authority / Yorkshire Development Project	10/1/2002	Competitive Enterprises	housing	Mortgage: Multi-Family: Subsidized	Senior	100% of principal	B1	B1	A2	1.50

#	Defaulted obligor	Default date	Municipal sector	Purpose	Security class	Seniority	Ultimate recovery	Underlying Rating at default	Underlying Rating 1-year before default	Underlying Rating 5-year before default	Debt affected (million USD)
26	St. Francis Medical Center	11/1/2002	Competitive Enterprises	hospitals & health service providers	Revenue: Government Enterprise	Senior	Less than 100% for the uninsured bonds	B3	Ba3	A3	79.00
27	Indianapolis Econ Dev Authority / The Meadows (aka Phoenix Project)	7/1/2003	Competitive Enterprises	housing	Mortgage: Multi-Family: Subsidized	Senior	4%	Caa3	Caa3	B2	3.60
28	Lakeview Apartments	7/1/2003	Competitive Enterprises	housing	Mortgage	Subordinate	1%	B1	Baa3	#N/A	1.50
28		7/1/2003	Competitive Enterprises	housing	Mortgage	Junior Subordinate	3%	B3	Ba1	#N/A	3.13
28		1/1/2005	Competitive Enterprises	housing	Mortgage	Senior	8%	Caa2	B3	#N/A	22.64
29	Cicero Local Development Corporation	11/1/2003	General Governments	City	Lease Rental	Subordinate	10% of principal	Ba2	A2	#N/A	15.30
30	Tarrant County Housing Finance Corporation—Fair Oaks Apartments	1/1/2004	Competitive Enterprises	housing	Mortgage	Junior Subordinate	2%	Caa2	Ba3	#N/A	1.10
30		1/1/2004	Competitive Enterprises	housing	Mortgage	Senior	70%	B1	A3	#N/A	6.69
30		1/1/2004	Competitive Enterprises	housing	Mortgage	Subordinate	1%	Caa1	Baa3	#N/A	0.77
31	Mercy Hospital and Medical Center	1/2/2004	Competitive Enterprises	hospitals & health service providers	Revenue: Government Enterprise	Senior	100%	B2	B2	Baa1	63.00
32	National Benevolent Association	2/16/2004	Competitive Enterprises	hospitals & health service providers	Revenue: Government Enterprise	Senior	100%	Ca	Baa3	Baa1	153.00
33	Magnolia Apartments	5/1/2004	Competitive Enterprises	housing	Mortgage	Senior	67% recovery on senior series and 0% on unrated subordinate series	Caa1	Ba1	#N/A	10.10
34	Westridge Apartments	6/1/2004	Competitive Enterprises	housing	Mortgage	Subordinate	0%	Caa1	Ba1	#N/A	0.47
34		6/1/2005	Competitive Enterprises	housing	Mortgage	Senior	60%	Caa1	Ba3	#N/A	5.23
35	Fort Worth Osteopathic Hospital	8/1/2004	Competitive Enterprises	hospitals & health service providers	Revenue: Government Enterprise	Senior	21% for the uninsured series	Baa3	Baa3	Baa2	79.70
36	Bay Club at Mesa Cove	9/1/2004	Competitive Enterprises	housing	Mortgage	Subordinate	35.4% of principal	Caa2	B3	#N/A	1.87
36		9/1/2005	Competitive Enterprises	housing	Mortgage	Senior	Insured bonds paid in full by MBIA	B3	B1	#N/A	19.95
37	Riverbend Apartments	9/15/2004	Competitive Enterprises	housing	Mortgage	Junior Subordinate	94%	B2	Ba1	#N/A	0.65
37		9/15/2004	Competitive Enterprises	housing	Mortgage	Senior	100%	Ba1	A3	#N/A	12.56
37		9/15/2004	Competitive Enterprises	housing	Mortgage	Subordinate	94%	B1	Baa3	#N/A	1.28
38	Crossroads Apartments	12/31/2004	Competitive Enterprises	housing	Mortgage: Multi-Family: Unenhanced	Senior	The senior series was paid by bond insurance policy and proceeds from	B1	Ba2	#N/A	14.15
38		12/31/2004	Competitive Enterprises	housing	Mortgage: Multi-Family: Unenhanced	Subordinate	0%	Ca	B3	#N/A	1.51
39	Legacy at Anderson	2/1/2005	Competitive Enterprises	housing	Mortgage	Senior	86% recovery on senior series and 89% on taxable series	A1	A1	#N/A	8.95
40	Park at Wells Branch Apartments	6/1/2005	Competitive Enterprises	housing	Mortgage: Multi-Family: Unenhanced	Subordinate	100%	Caa1	Ba3	#N/A	1.33
41	Ashton Place and Woodstock Apartments	8/1/2005	Competitive Enterprises	housing	Mortgage	Senior	86%	B2	Baa3	#N/A	9.01

#	Defaulted obligor	Default date	Municipal sector	Purpose	Security class	Seniority	Ultimate recovery	Underlying Rating at default	Underlying Rating 1-year before default	Underlying Rating 5-year before default	Debt affected (million USD)
41		8/1/2005	Competitive Enterprises	housing	Mortgage	Subordinate	2%	Ca	Ba2	#N/A	1.02
41		8/1/2005	Competitive Enterprises	housing	Mortgage	Junior Subordinate	0%	C	B2	#N/A	1.03
42	River Falls Project	1/1/2006	Competitive Enterprises	housing	Mortgage	Senior	100%	Ba3	Ba2	A3	17.10
42		1/1/2006	Competitive Enterprises	housing	Mortgage	Subordinate	100%	B3	B1	Baa3	2.05
43	Lee County Industrial Development Authority / Legacy at Lehigh Project	6/1/2006	Competitive Enterprises	housing	Mortgage	Senior	100%	B2	B2	#N/A	8.12
44	Cameron Crossing Project I & II / Greenville Housing Finance LLC	6/1/2006	Competitive Enterprises	housing	Mortgage	Senior	85% of principal	B2	B2	#N/A	14.36
45	Canterbury/3 Fountains/River Falls/Puckett Place	9/1/2006	Competitive Enterprises	housing	Mortgage: Multi-Family: Unenhanced	Senior	36% of principal	Ca	Ba2	Baa3	24.16
46	Forum Health	9/1/2006	Competitive Enterprises	hospitals & health service providers	Revenue: Government Enterprise	Senior	100%	Ba2	Baa1	A1	24.16
47	Jefferson Commons at the Ballpark	1/1/2007	Competitive Enterprises	housing	Mortgage: Multi-Family: Unenhanced	Subordinate	Less than 1%	Caa2	Ba3	Baa3	2.37
47		1/1/2009	Competitive Enterprises	housing	Mortgage: Multi-Family: Unenhanced	Senior	Unknown	Caa3	B3	Baa3	31.35
48	Tampa Home Mortgage Series 1983 A	4/1/2007	Competitive Enterprises	housing	Mortgage: Single-Family: Whole Loans	Senior	37%	Caa3	Caa3	Caa1	2.72
49	Sankofa Shule (A Michigan Public School Academy)	12/1/2007	Competitive Enterprises	charter school	Lease Rental	Senior	5% of principal and accrued interest (expected)	Ca	Caa3	B3	2.45
50	Nob Hill Apartments	12/1/2007	Competitive Enterprises	housing	Mortgage: Multi-Family: Unenhanced	Senior	100%	Ba3	Ba1	A3	11.93
50		12/1/2007	Competitive Enterprises	housing	Mortgage: Multi-Family: Unenhanced	Subordinate	100%	B1	Ba3	Baa3	1.13
51	North Oakland Medical Center	2/1/2008	Competitive Enterprises	hospitals & health service providers	Revenue: Government Enterprise	Senior	11%	B3	Ba3	Ba1	38.00
52	Jefferson (County of) Sewer Enterprise	4/1/2008	Municipal Utilities	water/sewer utility	Revenue: Government Enterprise	Senior	54%	Caa3	A1	A1	3,107.50
53	Jefferson (County of)	9/15/2008	General Governments	County	General Obligation Limited Tax	Senior	88%	Ba3	Aa1	Aa2	208.40
54	Fullerton Village at DePaul University	12/1/2008	Competitive Enterprises	housing	Revenue: Government Enterprise	Senior	100%	C	B3	#N/A	72.23
55	St. Louis Industrial Development Authority / St. Louis Convention Center Hotel Project	12/15/2008	Competitive Enterprises	Hotel	Revenue: Government Enterprise	Senior	34%	Caa2	Caa2	Baa3	98.00
56	Harrisburg (City of)	6/1/2009	General Governments	City	General Obligation	Senior	75%	A2	A2	A2	353.00
57	Lower Bucks Hospital	12/15/2009	Competitive Enterprises	hospitals & health service providers	Revenue: Government Enterprise	Senior	33%	Caa3	B3	B2	24.90
58	Las Vegas Monorail	1/13/2010	Municipal Utilities	mass transit	Revenue: Government Enterprise	Senior	2%	Ca	Caa2	Baa3	439.00
59	The Waters at Northern Hills Apartments	2/1/2010	Competitive Enterprises	housing	Mortgage: Multi-Family: Unenhanced	Subordinate	100%	Ca	B3	Baa3	0.21
60	Honey Creek Apartments	4/1/2010	Competitive Enterprises	housing	Mortgage: Multi-Family: Unenhanced	Subordinate	100%	Ca	B3	Baa3	1.21
61	AOH—Golf Villas, Rivermill, Village Square Apartments	6/1/2010	Competitive Enterprises	housing	Mortgage: Multi-Family: Unenhanced	Subordinate	0%	Caa1	Caa1	Baa3	0.94
61		6/1/2011	Competitive Enterprises	housing	Mortgage: Multi-Family: Unenhanced	Senior	75%	Caa3	B2	Baa2	14.14

#	Defaulted obligor	Default date	Municipal sector	Purpose	Security class	Seniority	Ultimate recovery	Underlying Rating at default	Underlying Rating 1-year before default	Underlying Rating 5-year before default	Debt affected (million USD)
62	Whispering Palms Apartments	7/1/2010	Competitive Enterprises	housing	Mortgage: Multi-Family: Unenhanced	Senior	100%	Caa1	B1	B1	5.00
63	Knight's Circle and The Pointe at Central at University of Central Florida	10/1/2010	Competitive Enterprises	housing	Revenue: Government Enterprise	Senior	100%	Caa3	Baa3	Baa3	137.00
64	Rutland Place Apartments	11/1/2010	Competitive Enterprises	housing	Mortgage: Multi-Family: Unenhanced	Senior	73.6% of principal	Caa1	Caa1	B3	11.18
65	Boston Industrial Development Finance Authority / Crosstown Center Project	5/24/2011	Competitive Enterprises	Hotel	Revenue: Government Enterprise	Senior	96%	Caa3	Caa3	Ba3	41.00
66	Santa Rosa Bay Bridge Authority	7/1/2011	Municipal Utilities	toll facility	Revenue: Government Enterprise	Senior	92%	Ca	B3	B1	115.90
67	Charitable Leadership Foundation	7/1/2011	Competitive Enterprises	Not-for-Profit	Revenue: Government Enterprise	Senior	Pending; 50% maximum recovery anticipated	Ca	Caa1	Baa3	48.20
68	Southern California Logistics Airport Authority / the City of Victor Valley and Victorville Economic Development Authority	12/1/2011	General Governments	Special District	Tax Allocation/Tax Increment	Subordinate	97%	B1	Ba2	#N/A	51.00
69	Kidspeace, Inc	1/15/2012	Competitive Enterprises	hospitals & health service providers	Revenue: Government Enterprise	Senior	9.3% for principal and accrued interest; excludes any value for new bonds	Caa2	Caa2	B2	51.30
70	Wenatchee (City of)	6/1/2012	General Governments	City	General Obligation Limited Tax	Senior	100%	B2	A1	A1	9.30
71	Stockton (City of)	6/28/2012	General Governments	City	Lease Rental	Senior	50%	Caa3	Baa2	A1	302.01
72	American Opportunity for Housing-Colinas, LLC	7/1/2012	Competitive Enterprises	housing	Mortgage: Multi-Family: Unenhanced	Subordinate	100%	Caa2	B3	B1	27.26
73	Oakdale (City of) Sewer Enterprise	8/31/2012	Municipal Utilities	water/sewer utility	Revenue: Government Enterprise	Senior	94%	Baa1	A3	A1	1.60
74	Jefferson (County of)	1/1/2013	General Governments	County	Lease Rental	Senior	100%	Ca	Caa2	Aa2	78.40
75	West Penn Allegheny Health System	4/30/2013	Competitive Enterprises	hospitals & health service providers	Revenue: Government Enterprise	Senior	85%	Ca	Caa1	Ba3	710.00
76	Pontiac City School District	5/1/2013	General Governments	K-12 public school district	General Obligation Limited Tax	Senior	100%	B2	B2	A1	1.40
77	Detroit (City of)	6/14/2013	General Governments	City	Lease Rental	Senior	12%	Caa3	B2	Baa1	1,450.00
78	Detroit (City of)	7/18/2013	General Governments	City	General Obligation	Senior	73%	Caa3	B3	Baa1	391.00
79	Detroit (City of)	7/18/2013	General Governments	City	General Obligation Limited Tax	Senior	42%	Ca	Caa1	Ba1	161.00
80	Detroit Academy of Arts and Sciences	10/1/2013	Competitive Enterprises	charter school	Revenue: Government Enterprise	Senior	49%	Caa2	Caa2	Ba1	25.50
81	Cook County-single family mortgage revenue bonds	7/1/2015	Competitive Enterprises	housing	Mortgage: Single-Family: Whole Loans	Senior	15%	C	C	C	0.13
82	Dowling College	7/20/2015	Competitive Enterprises	higher education	Revenue: Government Enterprise	Senior	18%	Ca	Ca	B1	47.00
83	Puerto Rico Public Finance Corporation	8/3/2015	General Governments	state governments	Lease Rental	Senior	estimated less than 5%	Ca	B3	Baa1	1,197.00
84	Cardinal Local School District	12/1/2015	General Governments	K-12 public school district	General Obligation	Senior	100%	Baa2	A2	Aa3	8.30
85	Puerto Rico Infrastructure Financing Authority (PRIFA)	1/1/2016	General Governments	state governments	Special Tax: Non-Sales/Non-	Senior	estimated 9%	Ca	B3	A3	1,643.00
86	Puerto Rico Government Development Bank	5/1/2016	General Governments	state governments	General Obligation	Senior	Pending	Ca	Caa1	A3	4,126.00

#	Defaulted obligor	Default date	Municipal sector	Purpose	Security class	Seniority	Ultimate recovery	Underlying Rating at default	Underlying Rating 1-year before default	Underlying Rating 5-year before default	Debt affected (million USD)
87	Puerto Rico (General Obligation and GO Guarantee)	7/1/2016	General Governments	state governments	General Obligation	Senior	estimated 53%	Caa3	Caa2	A3	17,649.00
88	Puerto Rico Highway and Transportation Authority (PRHTA) (subordinate lien)	7/1/2016	General Governments	state governments	Special Tax: Transportation-Related	Subordinate	estimated 0%	Ca	Ca	Baa1	55.10
89	Birmingham-Southern College, AL	3/23/2017	Competitive Enterprises	higher education	Revenue: Government Enterprise	Senior	63%	B3	B3	Caa2	34.70
90	Dallas County Schools, TX (GO LT)	6/1/2017	General Governments	Special District	General Obligation Limited Tax	Senior	96%	B3	Baa1	Aa1	44.70
91	Dallas County Schools, TX (Promissory Notes)	6/1/2017	General Governments	Special District	Non-Ad Valorem Tax Obligation	Senior	0%	Ca	Ba3	#N/A	3.20
92	Puerto Rico Sales Tax Financing Corporation (COFINA) Senior Lien	6/1/2017	General Governments	state governments	Special Tax: Sales	Senior	82%	Caa3	Caa3	Aa2	7,666.00
93	Puerto Rico Sales Tax Financing Corporation (COFINA) Junior Lien	6/1/2017	General Governments	state governments	Special Tax: Sales	Subordinate	50%	Ca	Ca	A1	9,914.00
94	Puerto Rico Industrial Development Company (PRIDCO)	7/3/2017	General Governments	state governments	Revenue: Government Enterprise	Senior	39%	Ca	Caa3	Baa2	156.00
95	Puerto Rico Electric Power Authority (PREPA)	7/3/2017	Municipal Utilities	electric utility	Revenue: Government Enterprise	Senior	Pending	Caa3	Caa3	Baa1	8,956.00
96	Puerto Rico Employees Retirement System (PRERS)	7/3/2017	General Governments	state governments	Revenue: Government Enterprise	Senior	estimated 10%	C	Ca	Baa1	3,156.00
97	Puerto Rico Highway and Transportation Authority (PRHTA) (1968 and 1998 senior)	7/3/2017	General Governments	state governments	Special Tax: Transportation-Related	Senior	estimated 67% for 1968 resolution, 20% for 1998 resolution senior bonds	C	Ca	Baa1	4,133.90
98	Puerto Rico Convention Center District Authority	7/3/2017	General Governments	state governments	Revenue: Government Enterprise	Senior	estimated 19%	C	Ca	Baa1	386.00
99	Archdiocese of New Orleans	7/1/2020	Competitive Enterprises	Not-for-Profit	Revenue: Government Enterprise	Senior	Pending	B1	Baa1	#N/A	38.00
100	NCCD - College Station Properties LLC, TX	7/1/2022	Competitive Enterprises	Housing	Mortgage: Multi-Family: Unenhanced	Senior	Pending	Caa2	Caa1	Baa3	341.64

	Municipal Universe	General Governments	Municipal Utilities	Competitive Enterprises
Estimated volume-weighted average recovery	52%	51%	48%	67%
Estimated issuer-weighted average recovery	67%	66%	69%	66%
Estimated issuer-weighted median recovery	75%	75%	92%	75%

1. Dun & Bradstreet rated Chesapeake Bay Bridge and Tunnel District at the time of default. The ratings of the issuer's debt were migrated into Moody's portfolio of ratings around 1972.
2. Ratings were withdrawn on Washington Power Supply System a year and half before default. Similarly, the ratings on Downtown Hospital Association were withdrawn a month before default.
3. Rating histories are adjusted for the recalibration to the global scale (see Appendix G for more details). In instances where more than one debt with the same financing purpose, security class and seniority designation exist at a given point in time for a given obligor, we choose the median rating to represent that credit's rating (see Appendix A for details on methodology).
4. n/a indicates no Moody's rating at the time.
5. Estimated average and median recoveries are over the recoveries of the most senior debt across all defaults for which we have recovery information.
6. For purposes of this study, California pension obligation bonds and certificates of participation are categorized as "lease rental" because they are secured by a general fund pledge, which analytically we view as more similar to a lease rental pledge than to a limited or unlimited general revenue pledge.
7. For certain Puerto Rico recoveries, the estimated recovery is based on time-value adjusted cash recovery; potential additional recovery could occur from Contingent Value Instruments, which are dependent upon economic growth.
8. Estimated Average Recovery is calculated as final recoveries to date, not including defaults where recoveries are still pending.

Source: Moody's Investors Service

Appendix

Appendix A: Definitions and methodology

Moody's definition of default

Our definition of default is applicable only to debt or debtlike obligations. For details, please refer to Moody's Rating Symbols and Definitions.

Cumulative default rates

Cumulative default rates (CDRs) are calculated by grouping credits by their rating on a particular date into cohorts and then tracking their performance over time. Cohorts are formed at monthly frequencies and then averaged over a year. For example, if a credit is rated Aaa on January 1, 2014 it would be grouped into a cohort of other credits rated Aaa on that date, regardless of its original rating.

Transition and volatility metrics

A rating transition matrix summarizes the cumulative changes – upgrades, downgrades, withdrawals and defaults – in credit ratings over a given period for a fixed cohort of credits. In this study we report matrices for one-year time horizon, reflecting only net changes. For example, if a Aaa-rated bond was downgraded and then promptly upgraded back to Aaa during a 12 month interval, this reversal will not be captured.

Each cell shows the percentage of credits that held rating X (specified by the row) at the beginning of the period and rating Y (specified by the column) at the end of the period. The matrices also include columns showing the fraction of credits that defaulted or had their ratings withdrawn. The largest values in the average one-year transition matrix are typically the diagonal elements, which show the percentage of ratings that remained the same at the end of the study period. Cells left of the diagonal reflect net upgrades while cells to the right of the diagonal reflect net downgrades (notwithstanding withdrawals and defaults).

Volatility metrics measure the incidence, magnitude and direction of rating changes. Rating volatility measures the *gross* average number of notches a credit changes over the horizon, in this case one year. It is defined as the average upgraded notches per credit *plus* the average downgraded notches per credit.

Rating drift measures the *net* average number of notches a credit's rating moved over the study period. It is defined as the average upgraded notches per credit *minus* the average downgraded notches per credit.

Accuracy metrics

Rating accuracy metrics measure the relative or ordinal accuracy of a rating. The average defaulter position (AP) measures the ordinal power of Moody's ratings and is an indicator of how well we rank-ordered default risk across our rated universe. The AP is defined for a cohort of ratings. A given credit's position is defined as the share of all credits rated better than it at the cohort formation date, assuming each credit occupies the midpoint of its rating category. The AP is the average of the positions of the defaulted credits.

A more powerful rating system will have lower-rated defaults and higher rated non-defaults, meaning the average position of defaulters should be high. AP is bounded between 0% and 100%, with 100% indicating perfect sorting power, 50% indicating no power and 0% indicating perfectly negative power.

Recovery rates

Ultimate recovery rates are calculated, whenever possible and to the extent data is available, as the discounted recovery rate based on the value creditors actually received at the resolution of the default relative to what they should have contractually received, inclusive of any accrued interest. Recovery rates do not include payments received from insurance providers or other types of guaranty.

For more information on definitions of the various transition and volatility metrics, accuracy metrics, cumulative default rates and recovery rates considered in this report, please see Glossary of Moody's Rating Performance Metrics.

Methodology

This study covers public underlying ratings for all public finance issuers, including US state and local governments, municipal utilities, not-for-profit hospitals, housing agencies, colleges and universities, as well as other municipal issuers with long-term debt ratings. It

also includes certain infrastructure and project finance credits that are tracked in parallel in our infrastructure default study. Insured, enhanced and structured finance (e.g., letter of credit-backed) ratings are excluded. Refunded ratings are also excluded.

Our unit of analysis throughout this study is a "credit." It refers to a rating for a distinct obligor, purpose, security and seniority designation. As such, multiple credits may exist for an obligor at a given moment in time. The municipal sector is highly disaggregated. Municipal issuers may issue separately secured debt with differing seniority for multiple financing purposes and each may have a distinct default probability and expected recovery rate in the event of default. In these cases, each security may have a distinct rating. For example, the Dormitory Authority of New York sells bonds for both hospitals and universities, purposes that have different default probabilities. Because these projects may have a different financial performance, the bonds backed by the incoming revenues may have different degrees of credit risk and hence receive different ratings.

In instances where more than one debt for the same obligor with the same financing purpose, security class and seniority designation exist at a given point in time, we choose the median rating to represent that obligor's rating for the specific financing purpose and security class. In case the median rating lies in between two assigned ratings but is itself not an assigned rating, we choose the worse of the two assigned ratings to represent the rating of the obligor at that point in time.

The recalibration of municipal ratings to the global rating scale, which took place between April and May 2010, lies within the study window. Moody's recalibrated its long-term US municipal ratings to its global rating scale to achieve comparability of ratings across asset classes, so that now a given rating symbol for different sectors and regions should have similar average credit risk relative to global peers measured over long periods of time. Before the recalibration, Moody's municipal ratings emphasized the ordinal ranking of credit risk within the municipal sector only and were not intended to be comparable to global corporate ratings, for example.

When calibrated to the global rating scale, most state and local government long-term municipal ratings were increased by up to three notches. These new rating assignments did not reflect an improvement in credit risk, but simply a rescaling of that risk, analogous to changing a temperature report from Fahrenheit to Celsius. Consequently, for the purposes of this study, the recalibration is not reflected as an "upgrade" in any of the credit metrics presented. Instead, historical ratings were adjusted to the new scale to "smooth over" the recalibration (Appendix G provides additional details on our methodology for recalibrating the historical data set to the global rating scale).

We have also smoothed the rating refinements of the late 1990s in our rating volatility and drift exhibits to more accurately reflect credit-based changes. Beginning in 1997, Moody's introduced 2s and 3s to our municipal alphanumeric ratings (until this point, for example, municipal ratings in the A range were either "A1" or "A"). The addition of 2s and 3s were previously reflected as upgrades and downgrades, and appeared as increased rating volatility. Since these changes reflect a change in Moody's published scale and not a change in underlying credit quality, they have been smoothed for the purpose of measuring rating volatility. This was achieved by extending the refined rating back to date of the rating assignment immediately before the refinement date.

Appendix B: Overview of rated US public finance sector

The US public finance sector is highly disaggregated, both by type of issuer and by legal pledge, particularly compared to global corporate issuers and sub-sovereigns outside the US. For the purposes of this study, we have grouped our rated public finance universe into three broad types of fundamental credits: general governments, municipal utilities and competitive enterprises.

General Governments: This group is primarily comprised of state (including US Territories) and local governments (cities, counties, K-12 public school districts). It also includes a wide variety of special districts for discrete services such as fire, parks and libraries, as well as tax-backed hospital and community college districts. These entities generally share the common purpose of providing essential public services and often have a monopoly over their service area. Unlike commercial and enterprise entities, they can sharply reduce spending in the short term without undue effect on their revenues or debt payments, simply because tax revenues are delinked from the provision of any one service. Capital and maintenance expenditures can be deferred without immediate consequence.

Most general government debt is secured by an issuer's full faith and credit taxing power, often referred to as a general obligation (GO) pledge. Bonds backed by a general government's operating funds without a specific pledge, including leases, appropriations and moral obligations are also included as are bonds backed by a pledge of specific tax revenue such as income, sales, gasoline or hotel taxes.

Municipal Utilities: Municipal utilities are public enterprises providing essential services with a monopoly or near-monopoly. This includes environmental utilities (water, sewer, solid waste), power utilities (electric distribution and generation, gas), and transportation utilities (airports, parking, toll roads, mass transit, ports). Unlike general governments, these entities do not have broad taxing power. Revenues are instead derived from customer charges, and their debt is typically secured by a gross or net pledge of that revenue.

Competitive Enterprises: This group includes revenue bonds for not-for-profit enterprises providing an important public function like housing, higher education or healthcare but in a competitive environment. It also includes project financings with relatively high enterprise risk, such as deals backed by revenues from sports or convention facilities or startup transportation ventures. While typically riskier than general governments or municipal utilities, the Moody's-rated universe reflects a degree of issuer self-selection, boosting average credit quality. It includes, for example, private universities with strong endowments and well-managed state housing authorities with large mortgage pools. Speculative-grade competitive enterprises may perform more like corporates, driven by the loss of pricing power or markets.

Summary of the public finance rated universe

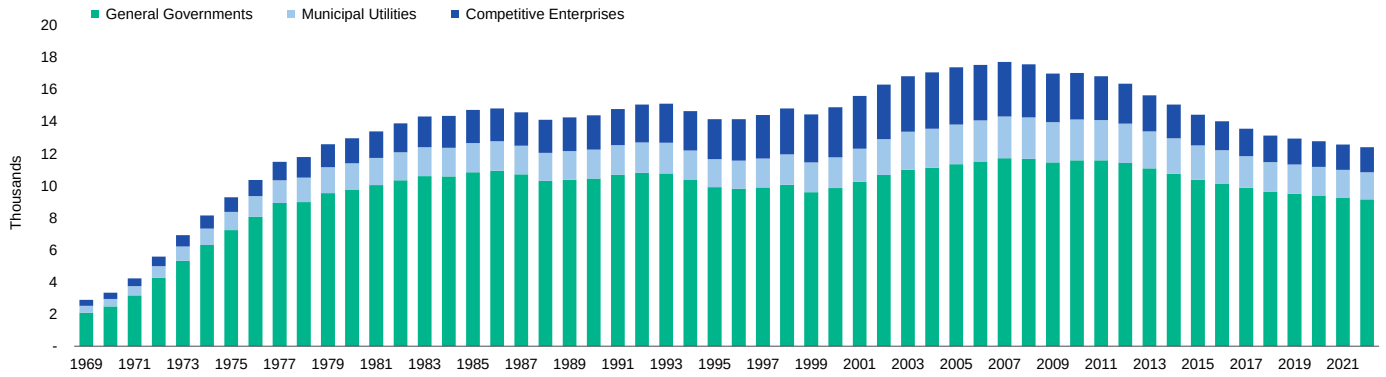
Moody's maintained approximately 12,400 fundamental underlying US public finance ratings at the end of 2022 (Exhibit 24).[11] General governments made up the vast majority of those ratings (74%, or about 9,150 ratings). Municipal utilities and competitive enterprises each comprised about 12-13% of the rated universe.

The number of rated credits by subsector peaked in 2007 at about 17,720 and has fallen almost every year since. Competitive enterprises declined the most at 54%, while general governments and municipal utilities fell 22% and 35%, respectively.

Exhibit 24

General governments comprise the majority of Moody's municipal ratings

Number of US municipal ratings by sector, year-end



Source: Moody's Investors Service

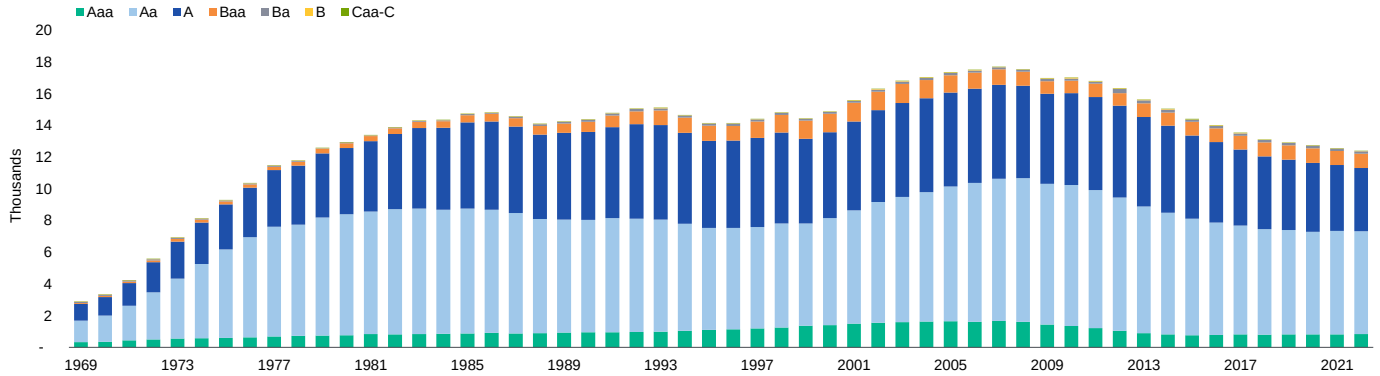
Exhibit 25 shows the distribution of the rated universe since 1970. The municipal sector is highly rated overall. About 91% of all Moody's-rated municipal credits were rated in the A category or higher as of the end of 2022.

The median rating for US municipal credits was Aa3 at the end of 2022. This is a testament to the broad stability and high credit quality of the sector and it stands in sharp contrast to global corporates, which have a median rating of Baa3 at the end of 2022. The median ratings by individual municipal sector were Aa3 for general governments, Aa3 for municipal utilities and A1 for competitive enterprises.

Exhibit 25

Municipal sector is highly rated: Typically rated A and above

Municipal rating counts by broad rating category, year-end



Source: Moody's Investors Service

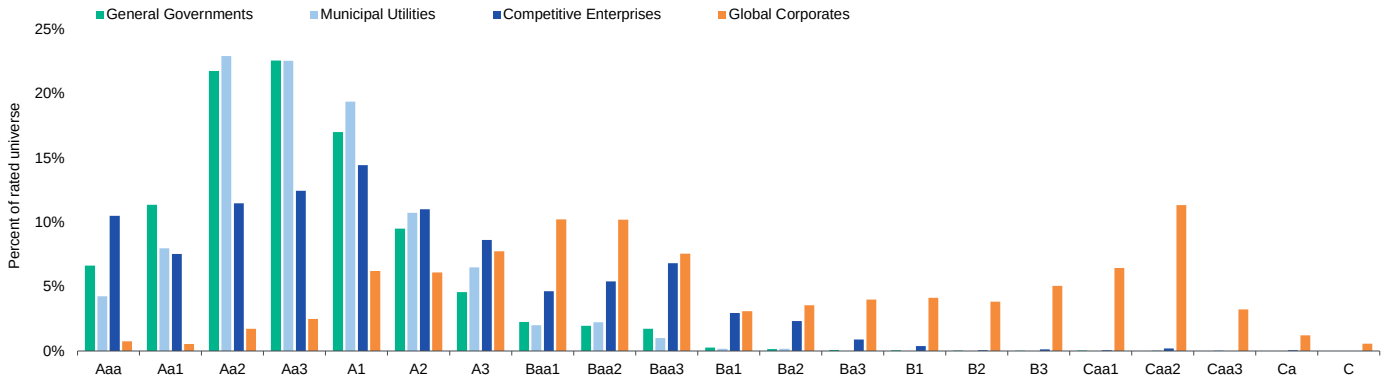
Only about 1.4% of all public sector credits were rated below Baa3 (the market's investment-grade threshold) at year-end 2022, compared to 46% of global corporate credits as shown in Exhibit 26. SG ratings have been about 1.2% of all municipal ratings historically, but were as high as 3.5% in 1969.

It is important to emphasize that the average rating level is much lower for corporates: nearly half of global corporates are rated Ba1 or lower, compared to less than 2% for municipals. A similar disparity occurs at the other end of the rating scale, where nearly 60% of municipals occupy the Aa and Aaa rating levels, compared to 5.5% for global corporates.

Exhibit 26

Most municipal ratings are distributed in high investment-grade

Rating distributions by sector: Municipal issuers by sector compared toglobal corporate issuers, year-end 2022



Source: Moody's Investors Service

Appendix C: Additional cumulative default rates (CDR) analysis

Cumulative default rates comparison between municipal and corporate issuers for 1- to 20-year horizons

Exhibit 27 shows CDRs for municipals and global corporates over a one through 20 year horizon.

Exhibit 27

Cumulative default rates, average over the period from 1970 to 2022, municipal issuers vs. global corporate issuers (1- to 20-year horizons)

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	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Aaa	1,000	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Aa	6,961	0.00%	0.00%	0.00%	0.01%	0.01%	0.01%	0.01%	0.02%	0.02%	0.02%	0.02%	0.03%	0.03%	0.03%	0.03%	0.04%	0.04%	0.04%	0.04%	0.04%
A	4,865	0.00%	0.01%	0.02%	0.02%	0.03%	0.04%	0.06%	0.07%	0.09%	0.10%	0.12%	0.13%	0.14%	0.15%	0.16%	0.18%	0.20%	0.21%	0.23%	0.25%
Baa	681	0.03%	0.11%	0.21%	0.34%	0.47%	0.61%	0.74%	0.86%	0.98%	1.09%	1.18%	1.28%	1.36%	1.42%	1.49%	1.56%	1.62%	1.69%	1.77%	1.86%
Ba	112	0.23%	0.65%	1.06%	1.53%	1.93%	2.22%	2.57%	2.91%	3.21%	3.48%	3.79%	4.16%	4.49%	4.69%	4.86%	5.04%	5.27%	5.57%	5.82%	6.09%
B	24	2.70%	5.34%	7.89%	9.89%	11.91%	13.36%	14.35%	15.09%	15.92%	17.08%	17.81%	18.18%	18.60%	19.06%	19.58%	19.67%	19.67%	19.67%	19.67%	19.67%
Caa-C	11	8.51%	13.40%	16.55%	18.30%	19.49%	20.72%	21.64%	22.66%	23.63%	24.24%	24.90%	25.20%	25.20%	25.20%	25.20%	25.20%	25.20%	25.20%	25.20%	25.20%
Investment-grade	13,506	0.00%	0.01%	0.02%	0.03%	0.04%	0.05%	0.06%	0.07%	0.09%	0.10%	0.11%	0.11%	0.12%	0.13%	0.14%	0.15%	0.16%	0.16%	0.17%	0.18%
Speculative-grade	147	1.24%	2.33%	3.28%	4.08%	4.78%	5.32%	5.81%	6.25%	6.68%	7.10%	7.49%	7.86%	8.17%	8.40%	8.60%	8.75%	8.93%	9.17%	9.37%	9.59%
All rated	13,653	0.02%	0.03%	0.05%	0.07%	0.08%	0.10%	0.12%	0.13%	0.14%	0.16%	0.17%	0.18%	0.19%	0.20%	0.21%	0.22%	0.23%	0.24%	0.25%	0.26%

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	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Aaa	105	0.00%	0.01%	0.01%	0.03%	0.08%	0.13%	0.18%	0.24%	0.29%	0.35%	0.42%	0.48%	0.55%	0.59%	0.63%	0.67%	0.72%	0.73%	0.73%	0.73%
Aa	411	0.02%	0.06%	0.10%	0.19%	0.29%	0.40%	0.51%	0.60%	0.69%	0.77%	0.87%	0.98%	1.11%	1.21%	1.29%	1.38%	1.49%	1.63%	1.83%	2.03%
A	893	0.05%	0.15%	0.32%	0.49%	0.71%	0.95%	1.20%	1.48%	1.75%	2.04%	2.32%	2.59%	2.87%	3.15%	3.47%	3.79%	4.13%	4.49%	4.82%	5.17%
Baa	871	0.15%	0.39%	0.69%	1.06%	1.43%	1.83%	2.22%	2.64%	3.11%	3.61%	4.13%	4.68%	5.24%	5.82%	6.38%	6.97%	7.53%	8.06%	8.53%	9.01%
Ba	467	0.85%	2.34%	4.05%	5.90%	7.66%	9.33%	10.83%	12.28%	13.76%	15.30%	16.76%	18.26%	19.65%	20.95%	22.30%	23.64%	24.83%	25.90%	26.98%	27.78%
B	571	3.24%	7.75%	12.45%	16.74%	20.62%	24.02%	27.04%	29.71%	32.18%	34.34%	36.20%	37.93%	39.62%	41.38%	42.97%	44.48%	45.82%	47.11%	48.30%	49.56%
Caa-C	357	9.91%	17.72%	24.38%	30.16%	35.20%	39.41%	42.96%	46.13%	48.96%	51.23%	53.12%	54.25%	55.18%	55.67%	56.23%	56.95%	57.55%	58.16%	58.85%	59.49%
Investment-grade	2,281	0.08%	0.22%	0.41%	0.62%	0.86%	1.13%	1.39%	1.66%	1.95%	2.24%	2.55%	2.86%	3.17%	3.49%	3.81%	4.13%	4.46%	4.79%	5.10%	5.42%
Speculative-grade	1,395	4.13%	8.33%	12.30%	15.86%	18.99%	21.68%	24.00%	26.05%	27.98%	29.74%	31.31%	32.77%	34.15%	35.48%	36.77%	38.03%	39.15%	40.16%	41.16%	42.01%
All rated	3,676	1.59%	3.16%	4.60%	5.85%	6.92%	7.84%	8.62%	9.32%	9.97%	10.58%	11.14%	11.67%	12.18%	12.67%	13.15%	13.63%	14.08%	14.50%	14.91%	15.29%

Historical ratings have been adjusted to be consistent with the global rating scale as described in Appendix G.

Source: Moody's Investors Service

Cumulative default rates for underlying-only municipal credits versus better of underlying and enhanced municipal credits since post-recalibration

The statistics presented thus far in the study have only pertained to public underlying municipal ratings. Public underlying ratings reflect the creditworthiness on a standalone basis, in the absence of any credit support provided by a state credit enhancement program or any insurance or wrap from a financial guarantor. But many US municipal or other public sector bonds typically include credit enhancement programs. Public enhanced ratings provide an opinion on the creditworthiness of a third-party credit or a support provider such as state aid intercept programs. The idea is that these enhancements lower the borrowing costs for public entities and increase their marketability simply by providing another layer of security, in addition to the credit quality of the underlying obligation.

Exhibit 28 shows the average cumulative default rates for the better of underlying and enhanced municipal ratings vis-à-vis underlying-only municipal ratings since post-recalibration. The default rates have been comparable across all broad rating categories and time horizons.

Exhibit 28

Cumulative default rates by broad rating category for underlying-only municipals and better of underlying and enhanced municipals have been comparable since post-recalibration

Cumulative default rates, average over the post-recalibration period since October 2010, municipal "better of underlying and enhanced" issuers vs. municipal issuers

Municipals "best of underlying and enhanced"

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	1,337	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Aa	8,047	0.00%	0.00%	0.00%	0.01%	0.01%	0.02%	0.02%	0.02%	0.02%	0.02%
A	4,187	0.00%	0.01%	0.01%	0.02%	0.03%	0.05%	0.07%	0.07%	0.07%	0.07%
Baa	739	0.05%	0.08%	0.16%	0.33%	0.56%	0.77%	0.86%	0.86%	0.86%	0.86%
Ba	143	0.06%	0.43%	0.96%	1.25%	1.27%	1.27%	1.27%	1.27%	1.27%	1.27%
B	31	1.93%	4.24%	7.06%	7.91%	9.12%	9.12%	9.69%	9.69%	9.69%	9.69%
Caa-C	20	11.62%	20.79%	26.35%	29.39%	31.99%	34.30%	34.30%	34.30%	34.30%	34.30%
Investment-Grade	14,310	0.00%	0.01%	0.01%	0.03%	0.04%	0.06%	0.07%	0.07%	0.07%	0.07%
Speculative-Grade	194	1.47%	2.97%	4.33%	4.96%	5.41%	5.60%	5.70%	5.70%	5.70%	5.70%
All Rated	14,504	0.02%	0.04%	0.06%	0.08%	0.10%	0.12%	0.13%	0.13%	0.13%	0.13%

Municipals (underlying only)

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	908	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Aa	7,463	0.00%	0.00%	0.00%	0.00%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
A	5,136	0.00%	0.01%	0.01%	0.02%	0.03%	0.04%	0.06%	0.06%	0.06%	0.06%
Baa	858	0.04%	0.07%	0.14%	0.31%	0.53%	0.71%	0.78%	0.78%	0.78%	0.78%
Ba	163	0.05%	0.38%	0.87%	1.12%	1.13%	1.13%	1.16%	1.16%	1.16%	1.16%
B	32	1.82%	4.00%	6.67%	7.51%	8.70%	8.70%	9.24%	9.24%	9.24%	9.24%
Caa-C	21	11.09%	19.81%	25.19%	28.15%	30.89%	33.24%	33.24%	33.24%	33.24%	33.24%
Investment-Grade	14,365	0.00%	0.01%	0.01%	0.03%	0.04%	0.06%	0.07%	0.07%	0.07%	0.07%
Speculative-Grade	216	1.33%	2.66%	3.89%	4.46%	4.87%	5.04%	5.15%	5.15%	5.15%	5.15%
All Rated	14,581	0.02%	0.04%	0.06%	0.08%	0.10%	0.12%	0.13%	0.13%	0.13%	0.13%

Source: Moody's Investors Service

Impact of Puerto Rico defaults on municipal CDRs has been modest, but not immaterial

The Puerto Rico defaults represent the largest default volume by a rated US municipal credit family. Exhibit 29 highlights that Puerto Rico had a modest impact on the CDR statistics in this study given the analysis is issuer-rated and not volume-weighted. The five-year SG CDR when including Puerto Rico was 4.63% compared to 4.14% after excluding Puerto Rico.

Exhibit 29

Cumulative default rates by broad rating category for speculative-grade municipal credits with Puerto Rico have been higher than those without Puerto Rico over the study period

Cumulative default rates, average over the period 1970-2022, municipal issuers excluding Puerto Rico vs. all municipal issuers

Municipals excl. Puerto Rico

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	991	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Aa	6,939	0.00%	0.00%	0.00%	0.01%	0.01%	0.01%	0.01%	0.01%	0.02%	0.02%
A	4,835	0.00%	0.01%	0.02%	0.02%	0.03%	0.04%	0.05%	0.05%	0.06%	0.07%
Baa	686	0.03%	0.10%	0.19%	0.29%	0.37%	0.48%	0.60%	0.70%	0.80%	0.88%
Ba	113	0.22%	0.59%	0.91%	1.30%	1.68%	1.96%	2.30%	2.63%	2.92%	3.17%
B	23	2.58%	4.99%	7.33%	9.37%	11.40%	12.79%	13.75%	14.44%	15.23%	16.33%
Caa-C	10	6.89%	10.23%	12.56%	14.38%	15.61%	16.87%	17.81%	18.83%	19.80%	20.42%
Investment-grade	13,451	0.00%	0.01%	0.02%	0.03%	0.03%	0.04%	0.05%	0.06%	0.07%	0.07%
Speculative-grade	147	1.05%	1.93%	2.70%	3.45%	4.14%	4.66%	5.13%	5.56%	5.97%	6.38%
All rated	13,598	0.01%	0.03%	0.04%	0.06%	0.07%	0.08%	0.10%	0.11%	0.12%	0.13%

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	993	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Aa	6,944	0.00%	0.00%	0.00%	0.01%	0.01%	0.01%	0.01%	0.02%	0.02%	0.02%
A	4,844	0.00%	0.01%	0.02%	0.02%	0.03%	0.04%	0.06%	0.07%	0.08%	0.10%
Baa	690	0.03%	0.10%	0.20%	0.33%	0.44%	0.58%	0.71%	0.83%	0.94%	1.05%
Ba	114	0.22%	0.62%	1.01%	1.45%	1.83%	2.11%	2.44%	2.77%	3.06%	3.31%
B	23	2.62%	5.18%	7.69%	9.73%	11.74%	13.12%	14.07%	14.77%	15.55%	16.65%
Caa-C	11	8.29%	13.15%	16.24%	17.89%	19.01%	20.19%	21.08%	22.06%	22.99%	23.58%
Investment-grade	13,471	0.00%	0.01%	0.02%	0.03%	0.04%	0.05%	0.06%	0.07%	0.08%	0.09%
Speculative-grade	149	1.19%	2.25%	3.16%	3.94%	4.63%	5.14%	5.61%	6.03%	6.44%	6.84%
All rated	13,619	0.02%	0.03%	0.05%	0.07%	0.08%	0.10%	0.11%	0.13%	0.14%	0.15%

Historical ratings have been adjusted to be consistent with the global rating scale as described in Appendix G.

Source: Moody's Investors Service

Appendix D: Long-term municipal defaults, in chronological order

The following appendix provides a brief case study for each of the Moody's-rated defaults on long-term municipal bond obligations between 1970 and 2022. The 100 case studies represent 115 distinct defaults by obligor, purpose, security class and seniority.

1. US municipal defaults 1970-1979 (#1-#3)
2. US municipal defaults 1980-1989 (#4-#8)
3. US municipal defaults 1990-1999 (#9-#20)
4. US municipal defaults 2000-2004 (#21-#38)
5. US municipal defaults 2005-2009 (#39-#57)
6. US municipal defaults 2010-2014 (#58-#80)
7. US municipal defaults 2015-2022 (#81-#100)

US municipal defaults 1970-1979 (#1-#3)

1) Chesapeake Bay Bridge & Tunnel District, VA (Baa2 stable)

» CUSIP: 165141A (applied retroactively as bond issue preceded CUSIPs)

» Default date: July 1, 1970

» Obligor: Chesapeake Bay Bridge and Tunnel District

» Issuer: Chesapeake Bay Bridge and Tunnel District

» Defaulted bonds: Series C Third Pledge Revenue Bonds dated July 1, 1960

» Cause of default: Insufficient vehicle toll revenues led to the failure to pay interest on $100 million third lien (interest only) Series C bonds beginning July 1970, six years after project completion in April 1964

» Recovery: Increased traffic and toll revenues linked to the military build up in the region in the late 1970s enabled the District to emerge from default in 1985 by repaying all past due interest. After refilling various reserve accounts, the District began redeeming Series C bonds in 1988.

The Chesapeake Bay Bridge and Tunnel is a classic example of a transportation infrastructure project foiled by overly optimistic toll revenue projections. Conceived of as a permanent replacement for the traditional ferry service between Virginia Beach and the southern tip of Eastern Shore across the mount of Chesapeake Bay, the project's original financial feasibility reflected the assumption that a new highway linking Delaware and Virginia Beach would take long distance north-south traffic from I-95. But the destination attraction proved to be much more limited and local.

The project was authorized by the state of Virginia and bonds were sold in 1956. At the time, the 17.6 mile project was an engineering marvel, comprising two one-mile tunnels in mid Bay linked by 12 miles of two-lane trestle causeways with four man-made islands and two truss bridges; most of the project, including the tunnels, was built using prefabricated components. The bridge-tunnel configuration was necessary to ensure that the Navy's access to the Atlantic from its bases in Hampton Roads would not be blocked. Construction commenced in September 1960 and was finished in April 1964, financed entirely by the $200 million 1960 revenue bond.

The 1960 toll revenue bonds comprised $70 million First Pledge Series A, $30 million Second Pledge Series B and $100 million Third Pledge Series C; the Series C was interest only, without any scheduled amortization and was to be redeemed with excess revenues at the bottom of the funds flow beginning July 1970.

The project risk was hinted at in the bond structure, where the third-lien interest-only Series C bonds comprised half of principal. Ultimately, the Series C bonds were taken out of default by the late 1970 military buildup in Hampton Roads, which led to substantial residential development on the Eastern Shore and the growth of daily commuting traffic over the bridge-tunnel.

2) Midlands Community Hospital, NE

» CUSIP: 803728A

» Default date: January 1978

» Obligor: Midlands Community Hospital

» Issuer: Sarpy County Hospital Authority Number 1

» Defaulted bonds: Series 1973 bonds; approximately $21.7 million of debt affected including parity Series 1976 bonds

» Cause of default: Inability to recruit physicians

» Recovery: 100% of missed principal payments due between January 1978 and January 1982 were paid between nine months and three years late. (Source: Moody's reports).

Doctors Hospital in Omaha, Nebraska was an aging hospital with declining patient usage and outdated equipment. In the 1960s, its board of directors decided to close it and build a new 208-bed replacement called Midlands Community Hospital, located 12 miles from Omaha in the town of Papillion. The ability to recruit physicians from Omaha to practice at Midlands Community was a key factor in the future success of the new facility, but this did not go as planned and the hospital opened with only a few doctors. As a result, utilization fell far below the levels necessary to cover operations and maintenance expenses, as well as debt service. In 1976, a technical default was declared under the legal documents. Debt service reserves were used to make interest payments and a receiver for the hospital was appointed and approved by the District Court. A payment default commenced in 1978. While no interest payments were missed, the principal payments due between January 1978 and January 1982 were paid between nine months and three years late, with the final catch-up payment made September 1, 1992.

3) Hilton Head Hospital, SC

» CUSIP: 074349AH4

» Default date: January 1, 1978

» Obligor: Hilton Head Hospital

» Issuer: Beaufort County

» Defaulted bonds: Revenue Series 1974; approximately $11 million of debt affected

» Cause of default: Over-optimistic feasibility forecasts and low patient utilization levels.

» Recovery: Bonds were redeemed at par plus call premium from the proceeds of the sale of the hospital. (Source: Moody's files).

In 1974, Beaufort County, South Carolina issued $11.2 million of revenue bonds to finance the first healthcare facility on Hilton Head Island. The bonds were to be repaid by the gross revenues of the hospital. The development of healthcare facilities on Hilton Head was considered desirable given the already substantial growth on the island that was expected to continue. The feasibility study for the new hospital accordingly projected high utilization of the proposed 40 acute-care and 40 skilled nursing beds, and indicated that revenues would be sufficient to cover debt service after use of the capitalized interest fund. After construction, however, it became apparent that the growth forecasts for the Island had been overestimated, in part because of the national economic recession of 1974-75. Further, the hospital opened without being adequately staffed in certain areas so that patient flow was lost to hospitals in nearby Savannah, GA. Patient utilization and revenues were thus well below projected levels, financially straining the hospital. In April 1976, the hospital missed payments on a sixth of the upcoming interest due on the bonds. By January 1978, the capitalized interest and reserve funds

had been depleted and the hospital failed to pay the interest payment due on January 1, 1978. The bonds ultimately became current in December 1988, and were called in full in January 1995.

US municipal defaults 1980-1989 (#4-#8)

4) Washington Public Power Supply System, WA (now Energy Northwest; Aa2 stable)

» CUSIP: 939821

» Default date: August 1983

» Obligor: Washington Public Power Supply System (WPPSS)

» Issuer: Washington Public Power Supply System (WPPSS)

» Defaulted bonds: Nuclear Projects 4 & 5; approximately $2.25 billion of debt affected.

» Cause of default: Declining demand for energy, rising construction costs.

» Recovery: Approximately 40% after the settlement of a class action suit in December 1998. (Source: Moody's files).

The WPPSS default was a classic example of the potentially speculative nature of a construction project, where the confluence of cost overruns, schedule delays, design changes and project management errors ultimately led to a bond default. It was also an example of how a nominally strong security pledge can be undercut when a project financing no longer has an economic rationale.

In August 1983, Washington Public Power Supply System (WPPSS) defaulted on $2.25 billion of revenue bonds for Nuclear Projects 4 & 5. WPPSS was organized in 1957 as a municipal corporation that allowed publicly-owned utilities in the Pacific Northwest to jointly build power generation facilities. As part of the Ten-Year Hydro Thermal Power Plan, WPPSS and other Northwest utilities assumed that demand for electricity in the northwest region would double every 10 years beyond the capacity of current power sources. In the early 1970s, WPPSS planned to construct five nuclear generation facilities to meet this forecasted demand. Bonds were sold to finance the cost of the power plants and were to be repaid through participation agreements with numerous municipal and cooperatively-owned electric utilities.

Construction delays and cost overruns on the multiple projects, in part caused by a redesign to meet new safety standards, drove the combined cost of completing the projects to three to four times the original estimate. At the same time, the demand for energy was declining due to energy conservation triggered by high energy bills and a regional economic slowdown. WPPSS abandoned construction on Projects 4 and 5 in January 1982. In January 1983, the WPPSS participants were obligated to begin repaying the debt incurred by the abandoned projects, even though the participants would never see any electricity from them. To repay the debt, the utilities would have had to dramatically increase electricity rates on their customers.

The uproar from the rate increases resulted in legal challenges to the enforceability of the contracts with participants for repayment of the construction and operation costs of Projects 4 and 5 (including repayment of debt service). In 1983, the Washington State Supreme Court ruled that the Washington State public agency participants in Projects 4 and 5 did not have the authority to enter into the Project 4 and 5 participation agreements, rendering void the agreements and the source of revenues to pay debt service. WPPSS became unable to service the debt on the $2.25 billion in bonds issued to finance construction of Projects 4 and 5, thereby precipitating the largest municipal bond payment default in history to that date.

5) Belfield, ND

» CUSIP: 077689C

» Default date: April 1987

» Obligor: Belfield

» Issuer: Belfield

» Defaulted bonds: General Obligation; $1.9 million of debt affected.

» Cause of default: Insufficient property taxes to repay existing debt.

» Recovery: Approximately 55% of principal (Source: Moody's files).

The oil boom of the early 1980s led to a severe housing shortage in portions of North Dakota, as high paying jobs began attracting workers and their families. To help accommodate this influx of new residents, the town of Belfield, North Dakota, issued general obligation bonds to extend roads and water and sewer infrastructure to a tract of land planned for residential development. The bonds were expected to be repaid with taxes collected from the new properties within the development, but were backed by a GO ULT pledge. Within a few years, however, the oil market sharply reversed and the regional economic boom collapsed, as did the population influx. With only three homes built on the Belfield tract, the property taxes generated were insufficient to repay the existing debt. A deficiency levy was subsequently instituted on all properties in Belfield to make up the shortfall, but this levy rose to levels that forced an increasing number of homeowners to abandon their properties or otherwise fail to pay their property taxes. Ultimately, the town council refused to further raise the levy and Belfield defaulted on its outstanding debt.

In July 1991, bondholders agreed to accept a settlement of 55% of principal, with no back interest. The settlement was paid through a combination of the town's deficiency levy and state aid.

6) Vanceburg, KY

» CUSIP: 921547A

» Default date: December 1, 1987

» Obligor: Vanceburg

» Issuer: Vanceburg

» Defaulted bonds: Electric System Revenue Bonds-Greenup Hydro Project Series 1979 and 1984; $137.04 million of debt affected.

» Cause of default: Rising project costs, delays in completion and consequent lawsuit by a key wholesale customer.

» Recovery: Bondholders received par plus accrued interest through May 26, 1988 from the sale of the project. (Source: Moody's files).

Vanceburg issued its electric revenue bonds in 1979 to fund the construction of a new hydroelectric generating plant. The bonds were secured by a lien on revenues of the Vanceburg Electric System, but the bulk of the power produced from the new plant was to be sold to the Hamilton, Ohio Electric Utility, which was Vanceburg's largest electricity customer. The project was plagued by a series of problems including cost overruns, the sitting of the transmission lines that would deliver the power from Greenup to Hamilton and a six-month delay in overall project completion. In 1984, the City of Hamilton filed a lawsuit seeking to have their power sales contract declared null and void, alleging various contract breaches and fraudulent inducement to enter into a contract. The December 1, 1987 default was part of the legal settlement between the towns of Vanceburg and Hamilton, in which Hamilton paid off the Vanceburg bonds and assumed the responsibility for the ongoing plant in May 1988.

7) Baldwin County, AL (Aa1 no outlook)

» CUSIP: 057845A, 057845B

» Default date: October 1, 1988

» Obligor: Baldwin County

» Issuer: Baldwin County

» Defaulted bonds: General Obligation Warrants Series 1984 and 1985; approximately $6 to $8 million of debt affected.

» Cause of default: Diversion of funds to meet operating obligations instead of debt service.

» Recovery: 100% of principal and interest (Source: Moody's reports).

Baldwin County is an example of a general governments with only moderate financial stress unexpectedly prioritizing current operations over the payment of debt service, and then quickly recovering as new funds became available.

On October 1, 1988, Baldwin County defaulted on two series of outstanding General Obligation Warrants. When faced with insufficient funds on hand, officials decided to use available monies to pay for operating expenses instead of scheduled debt service payments. This is similar to what subsequently happened in Cardinal Local School District, OH (Case Study 84). The County carried an "A" rating on the bonds at the time. Moody's dropped the County's rating to "B" that month as a result of the default. With help from trustee AmSouth Bank, County management was able to come up with sufficient funds 15 days later and bondholders received 100% of past due principal and interest.

8) Metropolitan Hospital, PA

» CUSIP: 717826

» Default date: December 1989

» Obligor: Metropolitan Hospital

» Issuer: Philadelphia Hospitals Authority

» Defaulted bonds: Revenue Bonds Series 1976 and 1981; $63.2 million of debt affected.

» Cause of default: Low occupancy rates led to financial distress.

» Recovery: Approximately 64% of par (Source: Moody's files).

The Philadelphia Hospitals Authority bonds were issued to construct Metropolitan Hospital, a new osteopathic facility located in downtown Philadelphia. The hospital began experiencing severe cash flow problems primarily due to low occupancy rates. As a result of the financial stress, the hospital filed for bankruptcy protection on July 11, 1989. In December 1989, funds were not available to meet the debt service payment due, triggering the default.

Settlement disbursements on the defaulted bond commenced December 1991 after the October 29 plan of reorganization was approved, which involved liquidating the hospital's three buildings. Through December 1994, six partial settlement payments were distributed, totaling $40.73 million to bondholders; settlement distributions included interest and partial principal payments ranging from about 25% to 65% of par.

US municipal defaults 1990-1999 (#9-#20)

9) Choate-Symmes Hospitals, MA

» CUSIP: 575850D

» Default date: January 1, 1990

» Obligor: Choate-Symmes Hospitals (City of Choate)

» Issuer: Massachusetts Health and Educational Facilities Authority

» Defaulted bonds: Revenue Bonds Series 1982; $32 million of debt affected.

» Cause of default: Liquidity shortfall triggered by return of over-collected revenues.

» Recovery: Approximately 61% of par (Source: Moody's files).

The 1982 Massachusetts Health and Educational Facilities Authority bonds were issued to help Choate-Symmes modernize its aged plant, thereby remedying code deficiencies, easing capacity constraints and centralizing certain services. The bonds were secured by a mortgage pledge as well as a first lien on gross receipts of the hospitals.

In early 1989, the Massachusetts Rate Setting Commission required that Choate-Symmes refund approximately $5.5 million in over-collected revenue. The hospital was unable to deal with the resulting liquidity loss, leading it to file for bankruptcy protection in October 1989. The liquidity shortfall remained unresolved, and Choate-Symmes failed to make its debt service payment due on January 1, 1990. The hospital emerged from bankruptcy by August 1990 and began partial repayment that October, after the sale of its sister facilities. Bondholders received a combination of cash and replacement bonds equivalent to 61% of original par.

10) Northwest General Hospital, MI

» CUSIP: 594648PW1

» Default date: April 1991

» Obligor: Northwest General Hospital

» Issuer: Michigan State Hospital Finance Authority

» Defaulted bonds: Revenue Bonds Series 1980; $4.8 million of debt affected.

» Cause of default: Inadequate federal reimbursements, decline in admissions and competitive position.

» Recovery: Approximately 33% of par (Source: Moody's files).

In 1980, the Michigan State Hospital Finance Authority issued bonds to construct an addition to Northwest General Hospital, a 104-bed facility located in Detroit. Despite the expansion project, and ongoing financial and managerial support from Botsford General Hospital, an outside organization, Northwest General's financial operations deteriorated throughout the 1980s. The hospital suffered from declining admissions, an inability to recruit admitting physicians, an excess of available beds in the area and inadequate state and federal reimbursements. The facility was eventually closed in September 1990.

Although not legally obligated, the Michigan State Hospital Finance Authority provided funds to make the debt service payment immediately due in October 1990. But with no ongoing operations and no further external support, the bonds defaulted in April 1991.

The trustee made an initial distribution of about $800,000 to bondholders in September 1991 after selling the hospital and its equipment, collecting accounts receivables and using other remaining funds. A final distribution was made December 15, 1993, bringing total recovery to about $1,867 per bond, equivalent to 33% of par.

11) Downtown Hospital Association, TN (dba Downtown General Hospital)

» CUSIP: 162405AL8

» Default date: August 1, 1991

» Obligor: Downtown Hospital Association

» Issuer: Chattanooga Health and Education Facilities Board

» Defaulted bonds: Revenue Series 1975; $2.2 million of debt affected.

» Cause of default: Inability to respond to changing Medicare reimbursement and competitive environments.

» Recovery: All principal and approximately 50% of interest owed (Source: Moody's files).

In 1975, Chattanooga Health and Education Facilities Board issued bonds to finance the construction of Downtown General Hospital, a new 54-bed facility in Chattanooga that replaced an aging hospital of a similar size. The bonds were secured by a first lien on gross revenues of the hospital. By the 1980s several changes in the healthcare industry began to adversely affect smaller hospitals

like Downtown General. The most notable was the introduction of the Medicare Prospective Payment System (PPS) for Medicare reimbursements and the broader shift away from performing exclusively inpatient services. Downtown General handled neither transition well. The move from cost basis to PPS hurt the hospital financially, while its inability to diversify into new service lines rendered it susceptible to competition for outpatient services. As a result, the hospital's average daily population dropped from over 50 to only 14. Beginning in November 1989, the hospital was unable to make its scheduled monthly payments for upcoming debt service. By August 1991, the reserve funds had been fully depleted, triggering a default.

Bondholders agreed to a two-year moratorium on interest payments in the hope that this would allow the hospital time to regain its financial health, but Downtown ultimately put itself up for sale. The hospital was sold by the spring of 1993 and the proceeds enabled the bonds to be called in April 1993.

12) Polk County, IA (Aaa stable)

» CUSIP: 731211A

» Default Date: December 1991

» Obligor: Polk County

» Issuer: Polk County

» Defaulted Bonds: Sports Facility Revenue Bonds, Series 1984; $39 million of debt affected.

» Cause of Default: Bankruptcy court stay of County debt service payments.

» Recovery: Reportedly 100% through proceeds of the 1993 refunding issue. (Sources: Moody's files, Polk County debt filings).

The Polk County default was an early example of the automatic stay preventing debt service payments to municipal bondholders. While the county itself had not filed for bankruptcy and was otherwise willing to make its debt service payments, the 3rd-party racetrack operator, the Racing Association of Central Iowa (RACI), filed for Chapter 11 and the county was caught up in the process.

In 1984, Polk County issued Sports Facility Revenue Bonds to finance track construction at Prairie Meadows racetrack. The bonds were secured by lease payments from RACI and by an unconditional commitment from Polk County, to the extent support was necessary. Racetrack construction was completed in 1989. But the bulk of RACI's operating revenues were dedicated to debt service and it quickly faced cash-flow trouble. The county took steps to curb losses, made operating subsidies to RACI and also advanced funds to the trustee for debt service. Eventually, on November 27, 1991, RACI filed for protection under Chapter 11 of the Bankruptcy Code. Although the county had advanced funds for the upcoming debt service payments, these monies were subjected to the automatic stay under Section 362(a) of the Bankruptcy Code. They were unavailable to make the necessary debt service payment due December 1, 1991.

The bankruptcy court subsequently released sufficient funds to pay debt service on January 10, 1992. In May 1992 Funds were released to accrued interest on the late December 1991 payment, but this left only enough to cover 95% of the debt service due June 1, 1992. The County's appropriation for the December 1992 payment was also delayed. By spring 1993, RACI emerged from bankruptcy. Polk County refunded the defaulted 1984 lease revenue bonds with GO debt in June 1993, which reportedly made whole all of bondholders owed principal, interest and accrued interest.

13) Connecticut Housing Authority, CT

» CUSIP: 207747KS4

» Default date: July 1, 1994

» Obligor: Connecticut Housing Authority

» Issuer: Connecticut Housing Authority

» Defaulted bonds: Mortgage Revenue Bonds (New Haven FHA-Insured Projects, Series 1983); $4.8 million of debt affected.

» Cause of default: Delinquencies and defaults on the loans.

» Recovery: Not available.

Connecticut Housing Authority's Mortgage Revenue Bonds were issued to finance multi-family housing projects in the city of New Haven. The bonds were secured by the underlying mortgage loans that were in turn insured by the Federal Housing Administration (FHA) pursuant to Section 203(k) of the National Housing Act, which cover less than full value. The housing projects performed poorly. Loan delinquencies and defaults, less than full payment from FHA on the defaulted loans and lengthy foreclosure proceedings all combined to shrink program revenues to the point where the Authority was unable to make its scheduled debt service payments.

14) Orange County, CA (Aa1 stable)

» CUSIP: 68428LAN4

» Default date: December 6, 1994

» Obligor: Orange County

» Issuer: Orange County

» Defaulted bonds: Pension Obligation Series B; $110 million of debt affected.

» Cause of default: Orange County Investment Pool's investment losses.

» Recovery: Although the county was unable to fulfill its pledge to purchase any tendered bonds, all principal, interest and accrued interest payments were made to bondholders by 1996. (Sources: Moody's reports, external reports).

The Orange County default and bankruptcy was the result of a liquidity crisis triggered by investment losses. At the time, it was the largest municipal bankruptcy in US history.

In late 1994, the Orange County Investment Pool (OCIP) suffered losses of approximately $1.5 billion out of a total $7.5 billion pool. The County Treasurer had pursued an investment strategy involving high-risk, rate-sensitive securities and leveraging of the pool to maximize returns. While interest rates declined and remained low, the OCIP strategy succeeded. But when interest rates began to rise in 1994, OCIP's gains turned into very large losses. The pool's liquidity crisis was triggered when OCIP was unable to repay a $1.2 billion loan to a Wall Street creditor, who refused to extend the loan and began selling the securities that OCIP had pledged as collateral. To protect itself from other creditors, Orange County filed for bankruptcy for itself and OCIP on December 6, 1994.

Separately, the County pledged that the OCIP would purchase any tendered Pension Obligation Series B bonds. Due to the bankruptcy filing, however, OCIP was unable to fulfill this pledge and the pension bonds defaulted on December 8, 1994. The County did not, however, default on the scheduled principal and interest payments of the Series B bonds or any of its other long-term obligations.

In the aftermath of the filing, Orange County successfully petitioned the bankruptcy court to release funds for upcoming monthly interest payments on four series of short-term Tax and Revenue Anticipation Notes (TRANs) and Teeter Plan Notes, but payments were delayed by a few days each in January and February pending court approval. By March, however, the County had improved its procedures with the bankruptcy court and note interest payments were timely thereafter.

15) Michigan Health Care Corporation, MI

» CUSIP: 430586, 251145AA6

» Default date: June 1, 1995

» Obligor: Michigan Health Care Corporation

» Issuer: Highland Park Hospital Finance Authority

» Defaulted bonds: Revenue Bonds Series 1986, 1987 and 1992; $262 million of debt affected.

» Cause of default: Service area decline, long-term financial strain and automatic stay from bankruptcy.

» Recovery: Between 24% to 54% of par, depending on series (Source: Bloomberg).

Michigan Health Care Corporation's main facilities were located in and around the Detroit area, which by the early 1990s was suffering from high unemployment and population losses from the contraction in the domestic automotive industry. The Corporation was increasingly strained by competition from an oversupply of beds in the Detroit healthcare market, substantial litigation costs, high debt and inadequate reimbursement for its high Medicaid and indigent patient load. These factors eventually caused Michigan Health Care Corporation to file for Chapter 11 Bankruptcy on March 31, 1995. An automatic stay under Section 362(a) of the Bankruptcy Code was invoked as a result of the bankruptcy filing, and the bond trustee was prohibited from using funds on hand to pay debt service, resulting in the June 1, 1995 payment default.

16 & 17) Allegheny Health and Education Research Foundation, PA

» CUSIP: 709172 (Delaware Valley Obligated Group); 717825, 717903 (Graduate Health System)

» Default date: July 21, 1998

» Obligors: Delaware Valley Obligated Group (DVOG) and Graduate Health System (Graduate)

» Issuer: Pennsylvania Higher Educational Facilities Authority (for DVOG); Philadelphia Hospitals and Higher Education Facilities Authority (for Graduate)

» Defaulted bonds: Delaware Valley Obligated Group and Graduate Health System; approximately $200 million of debt affected.

» Cause of default: Financial deterioration, reduction in Medicaid payments and an eventual bankruptcy filing.

» Recoveries: Pending the AHERF bankruptcy case was closed on May 29, 2013, according to bond trustee. AHERF reportedly made a final distribution in or about June 2014, after which no further distributions to creditors, including bondholders, would be made.

» DVOG: Although retail bondholders continue to be paid in full under MBIA insurance, it is unclear whether DVOG has paid any amounts to MBIA.

» Graduate: 41.5% recovery of principal and accrued interest, pending any final disbursements in June 2014 as mentioned above. Through June 2013, bondholders had received distributions of $75.015 million in principal (relative to $155.940 million outstanding par) and $3.783 million in interest. (Sources: trustee's reports; Moody's files).

On July 21, 1998, after a long period of financial deterioration, Allegheny Health and Education Research Foundation (AHERF) filed to seek bankruptcy protection under Chapter 11 of the Bankruptcy Code. The filing triggered an automatic stay under Section 362(a) of the Code and as a result AHERF defaulted on some of its outstanding bond issues.

The filing by AHERF as the parent organization included several other entities including the Philadelphia operations of Delaware Valley Obligated Group and Graduate Health System, as well as the physician organization, Allegheny University Medical Practices.

Beginning in the mid 1980s, AHERF began an expansion from its Pittsburgh base into the highly competitive Philadelphia healthcare market. From 1987 until 1997 the organization's debt grew from less than $70 million to over $1 billion, as AHERF acquired medical schools, numerous hospitals and physician practices. AHERF's problems included operating in the highly competitive Philadelphia and Pittsburgh healthcare markets, and the curb in growth of Medicare reimbursements. Other factors included the increased penetration of managed care plans that negotiated discounts on hospital fees, curbed admissions and mismanaged costly endeavors into physician practices. In 1998, AHERF attempted to sell a large portion of its Philadelphia holdings. When the transaction later fell apart in June 1998, AHERF's options were limited and one month later several of its entities filed for bankruptcy.

AHERF 's successor entity went on to manage a large Pittsburgh area health network. Although operationally unrelated to its forbear, West Penn Allegheny Health System was unable to sustain its competitive position and commenced a major restructuring in 2013 that resulted in a default via a forced exchange.

18) Boston Regional Medical Center, MA

» CUSIP: 575851

» Default date: February 1999

» Obligor: Boston Regional Medical Center (BRMC)

» Issuer: Massachusetts Health and Educational Facilities Authority

» Defaulted bonds: Revenue Bonds Series 1993B; $30 million of debt affected.

» Cause of default: Large operating deficits.

» Recovery: Approximately 20% recovery (Source: Moody's reports).

In February 1999, Boston Regional Medical Center (BRMC) declared bankruptcy after several years of financial decline, which resulted in a default on principal and interest payments due on the Series 1993B bonds.

Four years of large operating deficits eroded the hospital's balance sheet leading to a dangerously low cash position steadily increasing and negative fund balance. The hospital also took on additional debt using of local lines of credit. In 1997, ongoing equity transfers to a physician practice subsidiary contributed to a violation of its debt service coverage test. Finally, the hospital filed for Chapter 11 bankruptcy protection and closed after an anticipated sale of the hospital did not occur as expected.

BRMC's assets were liquidated as part of the liquidation plan approved by the bankruptcy court. At the time of the liquidation, approximately $30 million of Series 1993 bonds were still outstanding. The sale of the hospital's tangible assets, including its hospital facility and property, generated approximately $23 million that was used to pay secured creditors first and then unsecured creditors including Series 1993 bondholders. The partial distribution to bondholders was reportedly made December 9, 2005.

19) Greater Southeast Healthcare System, MD

» CUSIP: 741710A

» Default date: May 1999

» Obligor: Greater Southeast Healthcare System

» Issuer: Prince George's County

» Defaulted bonds: Revenue Bonds Series 1993; $46 million of debt affected.

» Cause of default: Decreasing Medicaid reimbursement, declining patient volume and managerial problems resulting in system bankruptcy.

» Recovery: Less than 50% recovery (Source: Moody's reports).

In May 1999, Greater Southeast Healthcare System filed for bankruptcy protection and suspended payments on its approximately $46 million of outstanding Series 1993 bonds.

Greater Southeast Healthcare System (GSHS) was a community-based health delivery system that included two hospitals, three nursing homes, a physician care network and extensive community based programs. Before the bankruptcy, GSHS was viewed as an essential service provider for a portion of Washington D.C. The system's flagship, the 450 bed Greater Southeast Community Hospital, was located in the southeast quadrant of Washington D.C. with a much smaller 33-bed facility in Fort Washington, Prince George's County. This service area was characterized by an aging and declining population, below average socioeconomic indicators and an increasing reliance on governmental payers.

The System's financial situation deteriorated significantly with changes in reimbursement from Medicaid, a legislative elimination of D.C. Medicaid Disproportionate Share payments and new market forces, which together contributed to the declining patient volume

and lower reimbursement rates. Management turnover and labor disputes further weakened the System's credit profile, leading to the May 1999 bankruptcy filing and suspension of debt service payments.

Despite the local importance of the system, the District of Columbia did not act to provide financial assistance. In November 1999, the sale of Greater Southeast Community Hospital to Doctors Community Healthcare Inc. for $22.5 million was approved. The sale enabled a partial recovery for bondholders, and the resulting distribution was reportedly made on December 10, 2001.

20) Tarrant County Housing Finance Corporation

» CUSIP: 876394D

» Default date: November 15, 1999

» Obligor: Tarrant County Housing Finance Corporation

» Issuer: Tarrant County Housing Finance Corporation

» Defaulted bonds: Home Mortgage Revenue Bonds, Series 1983A; $37.225 million of debt affected.

» Cause of default: Asset deterioration, mortgage insurer canceled all policies.

» Recovery: Not available.

The Tarrant County Housing Finance Corporation defaulted after its mortgage guarantee and pool policies were canceled and the underlying mortgages deteriorated.

The Home Mortgage Revenue Bonds were issued in 1983 to finance a pool of single family mortgage loans. Many of the loans were originally covered by primary mortgage insurance policies issued by Ticor Mortgage Insurance Company, which also issued the mortgage pool policy. In 1988, after several years of financial difficulty, Ticor canceled all of its mortgage guarantee policies. The pool suffered significant asset deterioration when loans that were no longer covered by insurance ultimately defaulted. This eventually led to a failure to make a required redemption payment to bondholders on November 15, 1999.

US municipal defaults 2000-2004 (#21-#38)

21) Marine Military Academy, TX

» CUSIP: 413007A

» Default date: May 2000

» Obligor: Marine Military Academy

» Issuer: Harlingen Higher Education Facilities Corporation

» Defaulted bonds: Revenue bonds Series 1995 and 1997; $10.4 million of debt affected.

» Cause of default: Civil lawsuits against the Academy.

» Recovery: Full principal recovery; partial payment of interest accrued during bankruptcy. (Source: Moody's reports).

In May 2000, Marine Military Academy declared bankruptcy and suspended payments on its $10.4 million of Series 1995 and 1997 debt issued through the Harlingen Higher Education Facilities Corporation, TX.

Several civil lawsuits accused the Academy of not adequately supervising cadets after hazing incidents occurred between 1993 and 1997. As a protective measure the Academy filed for bankruptcy because the potential liabilities from the litigation exceeded the Academy's insurance coverage. In 2004, the Academy emerged from bankruptcy and resumed making debt service payments on outstanding bonds. The Academy separately negotiated a settlement with bondholders for the 1995 and 1997 bonds. While all principal payments were made for both series of bonds, bondholders did not receive the full value of interest accrued during bankruptcy.

22) Citizens' General Hospital, PA

» CUSIP: 961008G

» Default date: First Quarter, 2001

» Obligor: Citizens' General Hospital (CGH)

» Issuer: Westmoreland County Industrial Development Authority

» Defaulted bonds: Series 1998; $30 million of debt affected.

» Cause of default: Operating losses reflecting competition and scale.

» Recovery: Full repayment of principal and accrued interest (Source: Bloomberg).

Citizens' General Hospital (CGH) was a small primary and secondary care facility located in New Kensington, Pennsylvania. The hospital incurred several years of large operating losses given its small size and pressures stemming from the highly competitive Pittsburgh healthcare market led to a default, and CGH's shuttering of operations on November 4, 2001. In the beginning of 2001, a forbearance agreement was signed by CGH, requiring the hospital to transfer all available and future funds directly to the bond trustee for the benefit of bondholders. Subsequently, by August 2003, CGH bondholders were fully repaid all owed principal and accrued interest.

23) Genesee Hospital, NY

» CUSIP: 610755P

» Default date: May 2001

» Obligor: Genesee Hospital

» Issuer: Monroe County Industrial Development Agency

» Defaulted bonds: Series 1991A tax-exempt and Series 1991B taxable; $32.5 million of debt affected.

» Cause of default: Operating losses and overspending on capital.

» Recovery: Undisclosed; an October 2003 distribution of 6.71% of principal was reported but final distributions after the sale of the property in 2006 are unknown. (Source: Bloomberg).

In May 2001, Genesee Hospital defaulted on its 1991 bonds after suffering serious operating losses between 1998 and 2000. The hospital was ultimately shut down by its parent, ViaHealth. Although certain of Genesee's bank loans were guaranteed by ViaHealth, neither series of the 1991 bonds were. Rochester General Hospital, another ViaHealth entity, was also not legally obligated on Genesee's debt. The Genesee Hospital company was legally dissolved and the project property was sold in April 2006 for redevelopment; certain unsecured creditors were paid in January 2007.

24) Metro Health Center, PA

» CUSIP: 295200N

» Default date: July 01, 2002

» Obligor: Metro Health Center

» Issuer: Erie County Hospital Authority

» Defaulted bonds: Series 1992; $9 million of debt affected.

» Cause of default: Low liquidity levels and unprofitable operations.

» Recovery: Approximately 21% of principal (Source: Trustee notice to bondholders).

Metro Health Center declared bankruptcy on July 1, 2002 and defaulted on its Series 1992 bonds. It finally closed its doors effective July 1, 2003.

Metro Health Center was the smallest hospital in a highly competitive market, surrounded by a similarly sized osteopathic hospital and two large tertiary hospitals. With the other nearby hospitals, the community had little need for Metro Health's services. Between 1998 and 2001, inpatient admissions declined 17% and revenues fell 19% leading the hospital to use cash reserves to fund current operations. The hospital's low liquidity levels and unprofitable operations finally led to its bankruptcy filing in 2002.

Rather than seeking the hospital's immediate liquidation, the bankruptcy trustee allowed Metro Health to reorganize and operate as a debtor-in-possession in bankruptcy. On June 6, 2005, the bondholders of the defaulted Series 1992 bonds received approximately $910 of principal and interest for every $5,000 bond (representing about 18% recovery.) On September 15, 2005, after liquidation of the hospital's collateral, the bond trustee declared a final payment to bondholders of $110.67 for each $5000 bond.

Interest payments of $17.67 and $17.98 were made for each $5000 bond with maturities of 2012 and 2022, respectively. As the result of that liquidation payment, bondholder's total principal and accrued interest recovery rate was approximately 21%.

25) Yorkshire Development Project, NE

» CUSIP: 639673HU9

» Default date: October 1, 2002

» Obligor: Nebraska Investment Finance Authority (Yorkshire Development LTD)

» Issuer: Nebraska Investment Finance Authority

» Defaulted bonds: Multi-Family Housing Revenue Bonds, Series 1993; $1,500,000 of debt affected.

» Cause of default: Poor property management and upkeep that led to a loss of Section 8 subsidies for many units.

» Recovery: Bondholders recovered 100% of principal and interest.

The Series 1993 Multi-Family Housing Revenue Bonds issued through the Nebraska Investment Finance Authority financed the acquisition and rehabilitation of 63 housing units in Omaha, Nebraska that were subsidized by Section 8 Housing Assistance Payments from HUD.

By 1998, many units in the project had fallen into disrepair. Twenty units failed to meet the local housing authority's physical inspection standards rendering them ineligible to receive the Section 8 subsidy. The unwillingness and inability of the property owners to repair the debilitated housing units led to the project's further financial deterioration, and a payment default on the $140,000 of principal and $15,618.75 of interest due on October 1, 2002. The project was sold relatively quickly thereafter, on May 2, 2003 and in the final distribution bondholders recovered 100% of principal and interest.

26) St. Francis Medical Center, PA

» CUSIP: 04232L, 01728AP

» Default date: November 2002

» Obligor: St. Francis Medical Center

» Issuer: Allegheny County Hospital Development Authority, PA

» Defaulted bonds: $50 million of AMBAC-insured Series 1992 bonds; $29 million of uninsured Series 1997 bonds. St. Francis Medical Center also acted as a guarantor to St. Francis Hospital of New Castle (which defaulted on $15 million of its Series 1992 bonds) and St. Francis Health Care Services (defaulted on approximately $3 million of its Series 1993 bonds).

» Cause of default: Operating losses and market competition.

» Recovery: Ambac-insured Series 1992 bonds paid in full; final recovery on other series unknown but less than 100%. (Source: Moody's reports).

St. Francis Medical Center was another example of a hospital hard-pressed to compete in the difficult Pittsburgh healthcare market in the early 2000s. In November 2002, the hospital defaulted after several years of growing operating losses, a steady decline in cash and increased dependence on investment income to offset operating deficits. The default occurred only months after the medical center entered into an asset purchase agreement with regional organizations to sell off portions of the system in August 2002.

The default directly affected approximately $50 million of insured Series 1992 bonds and approximately $29 million of uninsured Series 1997 bonds. But St. Francis Medical Center had also acted as a guarantor to St. Francis Hospital of New Castle, which defaulted on $15 million of its Series 1992 bonds, as well as St. Francis Health Care Services, which defaulted on approximately $3 million of its Series 1993 bonds. A partial distribution of principal and accrued interest of approximately $2,447.03 per $5000 bond was paid to bondholders on November 17, 2003. A settlement with creditors was reached in December 2003 and a final distribution of settlement proceeds was made in January of 2004. With the exception of the Series 1992 St. Francis Medical Center bonds, which were insured by Ambac and paid in full, the final recovery for the bondholders was less than 100%.

27) Meadows/ Phoenix Project, IN

» CUSIP: 455261Q

» Default date: July 1, 2003

» Obligor: Phoenix

» Issuer: Indianapolis Economic Development Authority

» Defaulted bonds: City of Indianapolis Economic Development Revenue, Series 1993A; $3,600,000 of debt affected.

» Cause of default: Low occupancy due to location and crime-related history.

» Recovery: 4% for Series 1993A, maturing 7/1/2004, 4% for Series 1993A, maturing 7/1/2009, 4% for Series 1993A, maturing 7/1/2014 and 5% for Series 1993A, maturing 7/1/2023 (Source: Bloomberg).

The Indianapolis Economic Development Authority bonds were issued in 1993 to fund construction of The Meadows, a 330-unit Section 8 assisted apartment project in an economically depressed, high-crime section of Indianapolis. The project was later renamed the Phoenix Project.

In 1997, a few years after project completion, several murders occurred on the property causing the occupancy rate to fall to 75%. In subsequent years, occupancy fluctuated between 70% and 85% creating financial difficulties for the project that were compounded by high tenant turnover and significant capital improvement expenses.

The debt service reserve fund was depleted by the time of the July 2003 debt service date. The property entered into monetary default under the mortgage documents and without sufficient funds to cover debt expenses, the bonds defaulted on July 1, 2003. On November 30, 2005, distributions were made on Series 1993A bonds of varying dates of maturity. The average rate of recovery on the bonds was 4.37%.

28) Lakeview Apartments, TX

» CUSIP: 89438NA

» Default date: July 1, 2003 (Series 2001C and Series 2001D); July 1, 2005 (Series 2001A)

» Obligor: Lakeview Apartments

» Issuer: Travis County Housing Finance Corporation

» Defaulted bonds: Travis County Housing Finance Corporation Multifamily Housing Revenue Bonds, Senior Series 2001A, Junior Series 2001C and Subordinate Series 2001D; $27.3 million of total debt affected.

» Cause of default: Adverse rental market conditions.

» Recovery: Senior bondholders recovered 8.3% of principal; Junior bondholders recovered 3.4%; Subordinate bondholders recovered less than 1%. (Source: Trustee notice to bondholders)

The Travis County Housing Finance Corporation bonds were sold in December 2001 to finance the acquisition and rehabilitation of the Lakeview Apartments, a 504-unit project in Austin, Texas. Initial project revenues were strong, reflecting sufficient market demand, the presence of an experienced management team and the good physical condition of the apartments. But as early as July 2002 revenues began to falter, as a downturn in the Austin economy and a softening in demand for multifamily affordable housing caused a significant decrease in occupancy. Revenues became insufficient to cover the full debt service payments, and the debt service reserve fund for each series was tapped. By July 2003, the debt service reserve funds for Series 2001C and Series 2001D were insufficient to cover the full payment due to bondholders, leading to a default for these Series on the July 1, 2003 payment date. Persistent financial deterioration then caused a Series 2001A default on January 1, 2005. On June 7, 2005, the final distribution to bondholders provided a recovery of 8.3% for Senior Series 2001A, 3.4% for Junior Series 2001C and less than 1% for Subordinate Series 2000D.

29) Cicero Local Development Corporation, NY

» CUSIP: 171731A

» Default date: November 2003

» Obligor: Cicero Local Development Corporation (CLDC)

» Issuer: CLDC (pledged by the Town of Cicero)

» Defaulted bonds: Revenue Annual Lease Appropriation bonds, Series 2001A; $15.3 million of debt affected.

» Cause of default: Over-optimistic development projections, followed by failures to honor obligations under a lease.

» Recovery: Reportedly 10.3% of par. (Source: Bloomberg)

The Cicero Local Development Corporation (CLDC) default was not only caused by poor project performance and revenue shortfall, but also because the Town of Cicero failed to honor its lease obligation to cure the resulting debt service deficiency. The town subsequently cured the deficiency, but then failed to include an appropriation for the lease in its 2004 budget, leading to a second default.

The CLDC undertook the financing for two ice rinks, a recreational center and associated residential and commercial developments. The project was undertaken with the support of the Town of Cicero through its obligations under the Series 2001 Lease Appropriation Bonds. Although the construction was completed as anticipated, utilization estimates proved to be overly optimistic. The project performed poorly and failed to generate revenue forcing the CLDC to tap its debt service reserve fund for the November 2002 debt service payment. The development corporation then fully depleted the reserve fund for the following the May 2003 payment.

The CLDC entered into discussions with a developer for a land sale that was expected to close before the next debt service payment on November 1, 2003. As reported by the issuer's counsel, the proposed sale fell through on October 27, leaving a debt service funding shortfall. Although the Town of Cicero had a legal obligation under the lease to cure the $244,000 deficiency in the bond fund, it failed to do so, causing a missed payment to bondholders on November 1, 2003. The Town of Cicero subsequently fulfilled its obligation under the lease and cured the deficiency. But it then failed to include the appropriation for the lease in its 2004 budget. Consequently, no funds were available to meet the debt service payment due in May 2004, inducing CLDC's second default. On October 28, 2005 the Trustee commenced a foreclosure sale on the mortgages securing the obligations, generating approximately $2 million. Ultimately, the bondholders recovered $1.57 million of the $15.3 million par outstanding or approximately 10.3%.

30) Fair Oaks Apartments, TX

» CUSIP: 876394N

» Default date: January 1, 2004

» Obligor: Tarrant County HFC-Fair Oaks Apts. TX

» Issuer: Tarrant County Housing Finance Corporation

» Defaulted bonds: Tarrant County Housing Finance Corporation Multifamily Housing Revenue Bonds (Fair Oaks Apartment Project) Senior Series 2000A and 2000B, Junior Series 2000C and Junior Subordinate Series 2000D; $8.6 million of total debt affected.

» Cause of default: Adverse rental market conditions.

» Recovery: Senior Series bondholders recovered 70.32%; Junior Series bondholders recovered 1.69%; Junior Subordinate Series bondholders recovered 1.31%. (Source: Bloomberg)

The Maple Avenue Economic Development Corporation (MAEDC) issued bonds in 2000 to finance the Fair Oaks Apartment Project, an affordable housing project located in Euless, Texas. The bonds were issued through the Tarrant County Housing Finance Corporation.

As early as December 2002, the project struggled because of adverse rental market pressures and low rent revenues. Fair Oaks was forced to make deep pricing concessions in an attempt to maintain occupancy as new luxury apartment units that offered amenity packages and move-in specials became available in the Tarrant County submarket. Although the project's occupancy rate stabilized around 90%, the project's rental revenue was insufficient to cover both the maintenance and debt service expenses of the property. By January 2004, after multiple taps on debt service reserve funds, no funds were available to pay the full interest due to bondholders. On December 19, 2005, the final distribution was made by the Tarrant County Housing Finance Corporation using proceeds from the foreclosure sale. Bondholders of Senior Series 2000 A and 2000 B recovered 70% on principal, Series 2000 C recovered 2% and Series 2000 D recovered 1%.

31) Mercy Hospital and Medical Center, IL

» CUSIP: 45200

» Default date: January 2, 2004

» Obligor: Mercy Hospital and Medical Center

» Issuer: Illinois Health Facilities Authority

» Defaulted bonds: Series 1992 and 1996; $63 million of debt affected.

» Cause of default: Weak cash management and trustee error.

» Recovery: 100%; default cured in full on Feb 17, 2004 (Source: Trustee notices to bondholders)

The Mercy Hospital and Medical Center default in 2004 was due to weak cash management and a trustee error. Liquidity and operating performance had been declining since 2000, but high management turnover hindered administrative focus and consistency and may have contributed to a default that was otherwise avoidable.

At year-end 2003, Mercy Hospital transferred $2.1 million of its $6 million debt service reserve fund to its Bond Fund pay the interest due on January 2, 2004. Mercy expected the bond trustee to tap the rest of the debt service reserve fund to make the $3.5 million principal payment due the same day, but the trustee failed to do so, resulting in a payment default.

Moody's estimates that Mercy had approximately $15 million of unrestricted cash as of January 2, 2004, more than enough to fully pay the principal due and avoid default.

Shortly after the January default, Mercy transferred $5.3 million to the trustee using proceeds from the sale of two properties. On February 17, 2004, the trustee made the full payment of principal ($3.5 million) and accrued interest ($29,989.44) to bondholders, curing the default. In April 2005, Mercy retired all of its outstanding rated debt with proceeds derived from bank loans and asset sales.

32) National Benevolent Association (NBA), MO

» CUSIP: Multiple

» Default date: February 16, 2004

» Obligor: National Benevolent Association

» Issuer: Multiple

» Defaulted bonds: Debt of National Benevolent Association and 25 affiliates; approximately $153 million of debt affected.

» Cause of default: Unsuccessful operations and losses in aggressive investment portfolio.

» Recovery: 100% recovery of interest and principal paid in April 2005 (Source: Trustee notice to bondholders)

On February 16, 2004, the National Benevolent Association (NBA), a senior living sponsor, along with 25 of its affiliates, voluntarily filed for bankruptcy protection under Chapter 11 of the Bankruptcy Code. NBA sought bankruptcy protection due to unprofitable operations and losses incurred due to heavy investment losses. NBA had approximately $153 million of Moody's-rated debt outstanding that had been issued primarily to finance an expansion of its senior-care facilities. At the time, it was one of the largest not-for-profit enterprises to file for Chapter 11.

NBA sold some of its senior-living facilities and other assets pursuant to the Chapter 11 reorganization plans. The proceeds covered 100% of outstanding principal and 100% of accrued interest through the February 16, 2004 bankruptcy filing. But only covered interest payments at rates ranging from 2.17% to 2.4% for the period from February 16, 2004 to April 18, 2005.

33) Magnolia Park Apartments, GA

» CUSIP: 184160H

» Default date: June 2004

» Obligor: Magnolia Park Apartments

» Issuer: Clayton County Housing Authority

» Defaulted bonds: Multifamily Housing Revenue Bonds, Series 1999A; $10.1 million of debt affected.

» Cause of default: Adverse rental market conditions, insufficient proceeds from foreclosure sale to cover outstanding principal and interest.

» Recovery: Approximately 67% of principal and interest on senior series 1999A; 0% subordinate 1999 Series C bondholders. (Source: Moody's issuer report dated May 19, 2004).

Several years of adverse market conditions and low occupancy led to a default on the Clayton County Housing Authority's Series 1999A bonds. The bonds were secured by the revenue from the Magnolia Park Apartments, a 328-unit project located 12 miles south of Atlanta. The project was built in 1972 for low- to moderate- income tenants and enjoyed a high occupancy rate for most of its history given a stable local rental market and economy.

By December 2002, after an economic downturn, Magnolia Park's occupancy rate had fallen sharply to 73%. Rent concessions, bad debt expenses and unbudgeted legal fees further reduced the project's revenue. The trustee used the debt service reserve fund to make the required bond payments due in July 2003 and December 2003.

The project was foreclosed upon in May 2004 before the scheduled July debt service payment, but sold for less than the outstanding principal and interest due to bondholders. Bondholders ultimately only recovered approximately 67% of outstanding principal and interest from the sale of the Magnolia Park property.

34) Westridge Apartments, TX

» CUSIP: 876394P

» Default date: June 1, 2004 (Subordinate Series 2001C); June 1, 2005 (Series 2001A, 2001B)

» Obligor: Westridge Apartments

» Issuer: Tarrant County Housing Finance Corporation

» Defaulted bonds: Tarrant County Housing Finance Corporation, Texas, Housing Revenue Bonds (Westridge Apartments Project) Senior Series 2001A and 2001B, Subordinate Series 2001C; $5.7 million of total debt affected.

» Cause of default: Declining revenues due to adverse rental market conditions

» Recovery: Approximately 61.5% of principal for Seniors 2001A and 2001B; 4% of principal for Junior 2001C; and 1% for unrated Subordinate 2001D. (Source: Moody's files)

The Westridge Apartments project default on the Series 2001 bonds was due to adverse rental market pressures and low rental revenue.

The project was located in Fort Worth, TX, a difficult market at this time given declining rental demand. To maintain occupancy rates near 90%, Westridge offered deep concessions, including "move-in specials" and other incentives that decreased rental revenue. When the project's utility expenses increased, operating income was reduced to a level insufficient to afford necessary capital repairs. Default finally occurred on June 1, 2004 when the project failed to make interest payments on its Series 2001C junior bonds. The project's senior bonds, Series 2001A and 2001B, defaulted one year later after continued financial difficulties.

The Trustee conducted a foreclosure sale on May 1, 2007 and sold the Westridge Apartments Project for $3.4 million. Recoveries were approximately 61.5% of principal for Seniors 2001A and 2001B, 4% of principal for Junior 2001C and 1% for unrated Subordinate 2001D.

35) Fort Worth Osteopathic Hospital, TX

» CUSIP: 875906

» Default date: August, 2004

» Obligor: Fort Worth Osteopathic Hospital

» Issuer: Tarrant County Health Facilities Development Corporation

» Defaulted bonds: MBIA insured Series 1993, Series 1996 and Series 1997 bonds totaling $79.7 million; $7.1 million of Series 1993 bonds were uninsured.

» Cause of default: Operating losses.

» Recovery: Uninsured bondholders recovered 21% of principal and interest (Source: Moody's files).

The Fort Worth Osteopathic Hospital default in 2004 was due to operating losses beginning in the late 1990s. The hospital's severe financial difficulties were driven by stiff competition and low healthcare reimbursement rates. The hospital was small compared to nearby competitor systems. Facing insufficient operating funds in the early 2000s, the hospital sought to partner with a larger and more established system. But the potential merger negotiations failed, forcing the hospital to close its doors on October 10, 2004.

The hospital's main campus and ancillary facilities were sold at an auction in February 2005 for $7 million, well under its assessed value of over $38 million. As the result of the proceeds collected from post-default liquidation, holders of the uninsured Series 1993 bonds recovered only about 21% of the principal and interest due.

36) Bay Club at Mesa Cove Project, AZ

» CUSIP: 566823Q

» Default date: September 1, 2004

» Obligor: Bay Club at Mesa Cove

» Issuer: County of Maricopa Industrial Development Authority

» Defaulted bonds: Maricopa County Industrial Development Authority Multifamily Housing Revenue Bonds (Bay Club at Mesa Project) Senior Series 2000A and Subordinate Series 2000B; $21.8 million of total debt affected.

» Cause of default: Adverse rental market conditions, maintenance problems.

» Recovery: 35% for Series 2000 B (Source: Bloomberg).

Bay Club at Mesa was a 472-unit affordable housing project located in the Maricopa County rental market, which was competitive for this type of housing. Bay Club achieved high occupancy rates, but only through rental discounts and other concessions. As a result, rental revenue was not enough to cover the capital expenditures needed to repair mold, piping leaks and other maintenance problems. Lacking the necessary repairs, many apartments were taken off the rental market, worsening the revenue situation. The lack of income ultimately forced the trustee to make debt service payments from the Series 2000 B Debt Service Reserve Fund, and finally to default on the Series 2000 B bonds on September 1, 2004. On November 25, 2005, the trustee made final distributions to bondholders after the sale of the property. Series 2000B bondholders recovered 35.47% of principal.

The Series 2000 A bonds were insured by MBIA, and defaulted September 1, 2005; the Series 2000 C bonds were unrated by Moody's.

37) Riverbend Apartments, FL

» CUSIP: 14052TA

» Default date: September 15, 2004

» Obligor: Riverbend Apartments

» Issuer: Capital Trust Agency

» Defaulted bonds: Multifamily Housing Revenue Bonds Senior Series 2002A, Taxable Series 2002B, Junior Series 2002C and Junior Subordinate Series 2002D; $14.5 million of total debt affected.

» Cause of default: Adverse rental market conditions and poor management.

» Recovery: 99.7% of principal. The Majority Senior Bondholder purchased nearly all of the senior bonds as well as all of the junior bonds and subordinate junior bonds. The Majority Senior bondholder took possession of the project in lieu of payment. The remaining Senior bondholders (approximately 5% of total bondholders) who did not sell their loans to the Majority Senior Bondholder received 94% recovery. (Source: Trustee notice to bondholders).

The Series 2002 A-Capital Trust Agency bonds were issued to finance the acquisition and rehabilitation of the 296-unit Riverbend Apartments affordable housing complex in Tampa, Florida.

Between March and May 2004, the occupancy rate declined from 88% to 81%, primarily due to rental market conditions and poor management. The project did not generate sufficient revenues to pay for routine maintenance, and many apartments were taken offline due to the need for substantial repairs; the increase in deferred maintenance expenses sharply amplified the financial difficulties

caused by the decline in the occupancy rate. By August 2004, Tampa had stopped forwarding project revenues to service its debt and on September 15 filed for Chapter 11 bankruptcy protection.

After the default on the bonds, the majority senior bondholder purchased nearly all of the senior bonds as well as all of the junior bonds and subordinate junior bonds. The majority senior bondholder took possession of the project in lieu of payment, which we classify as a 100% recovery. The remaining senior bondholders (approximately 5% of total bondholders) who did not sell their loans to the majority senior bondholder received 94% recovery. The combined recovery was 99.7%, and the final resolution date was December 21, 2005.

38) Crossroads Apartments, TX

» CUSIP: 876394Q

» Default date: December 31, 2004

» Obligor: Crossroads Apartments

» Issuer: Tarrant County Housing Finance Corporation

» Defaulted bonds: Multifamily Housing Revenue Bonds, Senior Series A $13,.3 million of debt affected; Subordinate Series 2001C, $1.5 million of debt affected.

» Cause of default: Adverse rental market conditions, unexpected rise in costs.

» Recovery: 0% recovery for Subordinate C bondholders (Source: trustee notice to bondholders) Senior bondholders covered in full by insurance, though insurer appears to have recovered less than full interest due

The Series 2001 bonds were issued to finance the acquisition and improvement of Crossroads Apartments, a 292-unit multifamily rental property located in Fort Worth. The Senior Series 2001 A was insured by MBIA.

The project experienced financial difficulties beginning in July 2003. The local affordable housing market had weakened because of competition from luxury housing complexes, as well as low interest rates that encouraged prospective tenants to buy instead of rent. Also the project's utility costs also rose unexpectedly. Project revenues were insufficient to meet debt service in June 2004 and the trustee tapped and nearly depleted the subordinate debt service reserve fund to make the scheduled payment. But this left the reserve fund insufficient to make the full principal and interest payments due to subordinate bondholders on December 31, 2004, whereupon the Subordinate Series 2001 C bonds defaulted.

On April 6, 2011, the trustee posted Crossroads Apartment for sale by foreclosure. The project was sold and final distributions were made to the holders of the Senior Bonds from the foreclosure sale proceeds and funds drawn from the MBIA bond insurance policy; it appears that the insurer itself recovered 100% of principal but took some loss on past due interest. There was no distribution to Subordinate Series 2001 C bondholders, who experienced 0% recovery.

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39) Legacy at Anderson Project, SC

» CUSIP: 837036

» Default date: February 1, 2005

» Obligor: Legacy at Anderson

» Issuer: South Carolina Jobs-Economic Development Authority

» Defaulted bonds: South Carolina Jobs Economic Development Authority Multifamily Housing Revenue Bonds, Series 2002A and Series 2002B; $8,950,000 of debt affected.

» Cause of default: Unanticipated withdrawal of USDA Section 538 loan guaranty and decision by bond trustee not to use the Debt Service Reserve Fund to cover shortfalls.

» Recovery: 86%-89% across Series 2002A CUSIPs; 89% for Series 2002B (Source: Trustee notice to bondholders)

The bonds were issued to finance the acquisition and construction of a 102-unit senior housing facility in Anderson County, South Carolina. The security for the bonds was provided by a mortgage loan guaranty from the US Department of Agriculture (USDA) Rural Development under its Section 538 Program, which provided for both the construction loan and the permanent loan. However, the USDA found that the project did not meet the necessary conditions to secure the permanent loan; since USDA concluded that the permanent loan was not in force and could not be drawn upon to cover shortfalls in the project's mortgage.

While the lender challenged the USDA's interpretation of Section 538, the trustee decided that all monies, including those in the debt service reserve funds, would be retained to serve what the trustee deemed was the best long-term interest of the bondholders. As a result, however, the February 1, 2005 debt service was not made. The property was subsequently sold, and on October 6, 2006, the trustee made a distribution of $8,000,000 to bondholders using proceeds from the sale. The distribution provided Series 2002A bondholders with recovery rates ranging from 85.8% to 89.3% of principal and interest outstanding. Series 2002B bondholders recovered 88.8% of principal and interest outstanding.

40) Park at Wells Branch Apartments, TX

» CUSIP: 894386HK0

» Default date: June 1, 2005

» Obligor: Park at Wells Branch Apartments

» Issuer: Travis County Housing Finance Corporation

» Defaulted bonds: Multifamily Housing Revenue Bonds Subordinate Series 2002 C; $1.33 million of debt affected.

» Cause of default: Weakening of rental market.

» Recovery: 100% of par plus accrued interest.

The Park at Wells Branch is a 304-unit apartment complex comprising of 18 separate buildings located in the north Austin metropolitan area in Travis County, Texas. The property had begun experiencing financial difficulties in 2003 with a softening of the local rental market; from 2000 to 2003, Austin experienced an oversupply of new multifamily developments, with completions outpacing net absorption. The Park's occupancy rates fell during that time to a low of 80%, at which point the property offered substantial concessions to tenants. By the end of 2007 the occupancy levels had returned to 97% but the reduction in rental revenues caused the property's financial performance to deteriorate. Insufficient revenues forced the project to tap the debt reserve fund to service the Subordinate Series 2002 C debt in 2004, and the project defaulted on the debt service payments due June 1, 2005.

After this initial event of default Subordinate Series, bondholders were paid in August, but the subsequent interest payment due in December 2005 was not made until June of 2007. Debt service payments remained sporadic and either late or missed entirely. Fund balances provided to Moody's by the Trustee showed that the Series 2002 C Subordinate debt service reserve fund had been depleted. The unrated Series 2002 D Junior Subordinate bonds are presumed to have been in default as well throughout this period. The Series 2002A Senior debt, however, continued to be paid, with a fully funded debt reserve fund; these bonds were insured by National Public Finance Guarantee (formerly MBIA).

CHC, the owner of the property, contributed substantial amounts to the property to fund working capital and debt service requirements beginning in 2003.

In 2013, the Park at Wells Branch project was refinanced, enabling the defeasance of all three series on August 27, 2013 at 100% of par plus accrued interest, thus curing the outstanding default on rated Subordinate Series 2002 C debt.

41) Ashton Place and Woodstock Apartments, TX

» CUSIP: 88271FA

» Default date: August 1, 2005

» Obligor: Ashton Place & Woodstock Apartments Project

» Issuer: Texas State Affordable Housing Corp.

» Defaulted bonds: $8.66 million of Senior Series 2001 A, $1.02 million of Subordinate Series 2001 Series C and $1.02 million of junior Series 2001 D; $10.7 million of total debt outstanding before distribution to bondholders on June 25, 2009.

» Cause of default: Low occupancy rates, rehabilitation work, poor financial performance.

» Recovery: Estimated by Moody's at 85.5% of principal for senior bonds, under 2% for subordinate bonds and 0% for junior bonds based the results of foreclosure and final distribution reports. (Source: September 2009 Moody's report).

The bonds are secured by two cross-collateralized projects, Woodstock Apartments and Ashton Place Apartments, located in Fort Worth and Galveston, respectively. The financial performance of both apartment complexes in this transaction had been poor preceding the default, with low occupancy rates in particular at the Woodstock Apartments. The high vacancies pushed management to reduce rental rates in an effort to become more competitive with other projects in the area, but this only strained revenues further ultimately triggering the default in 2004 the reserve accounts were depleted.

The two projects securing the bonds were sold in September 2008 at a foreclosure sale for $2,500,000 and $1,000,000, respectively. The Trustee also received insurance proceeds related to damage at the Ashton Place Apartments of $4,367,325 and $54,143 in refunds of unearned insurance premiums. In the Revised Notice of Final Distributions, the Trustee reported a final distribution of $816,774 attributable to the principal balance for the Series A bonds and $16,551 attributable to the principal balance for the Series C bonds. In December 2008 and March 2009, the Trustee made two distributions to the Series A bondholders totaling approximately $6,589,318 of outstanding principal.

Moody's estimates the following recovery on the outstanding principal balances: approximately 85.5% for the Series A bondholders, less than two percent recovery for the Series C bondholders and no recovery for the Series D bondholders.

42) River Falls Project, CO

» CUSIP: 051558A

» Default date: January 1, 2006

» Obligor: River Falls Project (Senior Series A, Subordinate Series C)

» Issuer: Aurora Housing Authority

» Defaulted bonds: Senior Series 1999A, $17.1 million of debt affected; Subordinate Series 1999C, $2.045 million of debt affected.

» Cause of default: Slowdown in market for rental properties compounded by trustee decision to retain reserve funds.

» Recovery: All bonds redeemed at 100% plus interest Project in May 2007 following sale of project.

On January 1, 2006, the River Falls Project went into default after a trustee decision to retain reserve funds preventing full debt service payments on the Subordinate Series 1999 C bonds. The project was also performing poorly. The Senior Series 1999 A bonds subsequently went into default as well before the May 2007 redemption after sale of the property.

The River Falls Project was a 511-unit apartment complex east of downtown Denver housing both low income and market rate tenants. The project exhibited weakening debt service coverage from declining total revenues and increased operating expenses between 2005 and 2006. Despite having sufficient coverage in the debt reserve fund to make the January 1, 2006 payment, the trustee elected not to tap the reserve fund for payment to bondholders, instead choosing to preserve these monies to cover costs and expenses associated with an anticipated inevitable default. On April 17, 2006 the trustee made a partial payment to bondholders, using the revenues received from the borrower and investment income received after the January 1 payment was due. On July 1, 2006 the Project again

defaulted on the Subordinate Series C bond debt service payments; in addition, it appears that the debt service reserve fund was tapped to pay interest on the Senior Series A bonds, while the mandatory sinking fund payment for the Senior bonds was deferred. No principal was due bondholders for either series before 2009 for the Senior Series A and 2029 for the Subordinate Series C, but both series were subject to semiannual mandatory sinking fund redemptions. By the spring of 2007, before the sale of the Project, the Senior Series A bonds were in default as to interest.

Negotiations commenced for the sale of the project in fall 2006. Upon completion of the sale in May 2007 all Series of outstanding bonds were redeemed at 100% plus accrued interest.

43) Legacy at Lehigh Project, FL

» CUSIP: 52349K

» Default date: June 1, 2006

» Obligor: Lee County Industrial Development Authority

» Issuer: Lee County Industrial Development Authority

» Defaulted bonds: Mortgage Revenue Bonds, Senior Series 2003A and Taxable Senior Bonds Series 2003B: $8.12 million of debt affected.

» Cause of default: Inability to meet occupancy goals, and effective withdrawal of loan guaranty.

» Recovery: 100% recovery of principal and accrued interest.

The Legacy at Lehigh project is another example of a default that was associated with an unfulfilled USDA guarantee.

The Legacy multifamily housing project was financed through a US Department of Agriculture program that guaranteed both the construction loan and the permanent financing, though the latter would not take effect until the project achieved 90% occupancy for 90 days. Indeed, after successful completion of 24 month construction phase, the Legacy project was able to achieve no better than an 88% occupancy. The project consequently operated at a loss and began tapping the debt reserve fund to make the June 1, 2005 debt service payment, drawing it down to 28% of the required reserve amount. Without the loan guarantee, and after continuing to operate at a loss and with nearly fully depleted debt reserve funds, the project made only a partial interest payment on June 1, 2006.

The project was subsequently sold through foreclosure in Lee County Florida to Canyon Creek. The trustee distributed the proceeds to all of the Senior Bondholders and Series 2003A and 2003B bondholders received 100% of their principal as well as accrued interest.

44) Cameron Crossing Project I and II, SC

» CUSIP: 396081A

» Default date: June 1, 2006

» Obligor: Greenville Housing Finance LLC

» Issuer: Greenville Housing Finance LLC

» Defaulted bonds: Taxable Mortgage Backed Revenue Bonds, Series 2003A; $14.36 million of debt affected.

» Cause of default: Inability to meet occupancy goals, and effective withdrawal of loan guaranty.

» Recovery: 85% of principal for senior bondholders, 0% recovery for subordinate bondholders.

The Cameron Crossing Project is a third example of a housing development that defaulted when its USDA loan guarantee went unfulfilled because of an inability to meet occupancy thresholds.

The Series 2003 bonds were issued to finance the acquisition and construction of the Cameron Crossing I and II projects, respectively 134-unit and 64-unit components of a multifamily rental housing community located in Greenville County, South Carolina. The bonds were issued with a Section 538 guarantee by the US Department of Agriculture in the form of a combined construction and permanent loan guarantee. The permanent guarantee was conditioned upon achieving 90% occupancy for at least 90 consecutive days post-construction, or alternatively if an escrow had been established within specified terms. The project construction phase was completed successfully but Cameron Crossing was unable to reach the 90% occupancy level (24% as of June 2005, 75% as of June 2006) required for the USDA guarantee. The project operated at a loss, and began drawing down on the debt service reserve fund to pay interest and principal payments through 2005. By 2006 only 10% of the required reserve amount remained. Without the guarantee, no debt service payment was made on June 1, 2006, thereby triggering the default. The project was sold through foreclosure on November 6, 2006 to the lender, Allied Mortgage Capital Corporation. The lender and the trustee transferred title and the remaining trust funds to the Senior bondholders who, in exchange, tendered $12 million in Series 2003A bonds to the trustee for cancellation. This amount represented 85% of outstanding principal on the Senior bonds. No funds were available to pay the Subordinate Bondholders of the Series 2003 B and Series 2003 C.

45) Canterbury/3 Fountains/River Falls/Puckett Place, TX

» CUSIP: 698487A

» Default date: September 1, 2006

» Obligor: Canterbury/3 Fountains/River Falls/Puckett Pl

» Issuer: Panhandle Regional Housing Finance Corporation

» Defaulted bonds: Multi-Family Housing Revenue Bonds; $24.16 million of debt affected.

» Cause of default: Softening rental market and increased competition resulting in a decline in occupancy and net income.

» Recovery: Approximately 36% of principal.

The Series 2000 bonds were largely secured by revenue from four multifamily rental properties located in Amarillo Texas: Canterbury, Three Fountains, River Falls and Puckett Place Apartments. A softening in the rental market combined with increased competition from neighboring developments offering superior amenities caused a decline in occupancy at all four apartment complexes. To remain competitive, the project reduced rents and increased concessions, which resulted in net income substantially lower than had been forecast. The March 1, 2006 debt payment could only be made with the help of the debt service reserve fund, which dropped the 2006 debt service coverage ratio down to 0.64 times, compared to 1.26 times in 2005. The reserve fund balance was insufficient to fully cover the September 1 debt service payments, causing a default.

Since the event of default, the projects have generated sporadic interest payments, but no principal payment since March 1, 2006. In 2007 the trustee halted use of reserves to pay debt service to apply funds to conserve and maintain the projects.

The owner, American Housing Foundation, made contributions to the property in 2008 to bring the interest payments current, but after that the payment defaults continued. As of March 2010, the trustee indicated that they were using the remaining debt service reserves to pay the management fees and workout expenses and make capital improvements. The owner remains in bankruptcy proceedings pending recovery of the local market.

On March 1, 2011, the trustee foreclosed upon all of the property and sold it, from which bondholders received an initial $8 million distribution. A further, final distribution of $679,179 was made on June 28, 2011, producing a total recovery against principal outstanding of about 36%.

46) Forum Health, OH

» CUSIP: 560060

» Default date: September 2006 (forbearance agreement)

» Obligor: Forum Health

» Issuer: Mahoning County

» Defaulted bonds: Revenue Bonds series 2002A; $24.16 million of debt affected.

» Cause of default: Operating losses from competition and economic weakness.

» Recovery: 100% of principal plus accrued interest upon redemption of debt by new purchaser of obligor (Source: Moody's reports).

Forum Health triggered a technical default on its revenue bonds when it filed for bankruptcy protection on March 16, 2009, though default can be deemed to have occurred as early as September 2006, when the first of several forbearance agreements with creditors was signed.

The bankruptcy climaxed a multi-year struggle with cost controls, labor negotiations with a heavily (75%) unionized workforce and declines in admissions and outpatient procedures that reflected competition from non-unionized hospitals as well as declining population and wealth in its Youngstown service area. Although Forum did not miss a debt service payment while in bankruptcy, it had negotiated a series of forbearance agreements with its banks and bond insurer from late 2006. While these agreements likely helped to postpone bankruptcy, they also hindered operating flexibility by requiring the transfer of more cash to reserves. The multiple forbearance agreements eventually coalesced into a single master agreement; in the days preceding the bankruptcy filing, when Forum's unrestricted liquidity had dwindled to 17 days cash on hand, there was approximately triple this amount in the master forbearance agreement debt reserves.

On June 3, 2011, Moody's withdrew the Ca bond ratings for Forum Health following the purchase of Forum Health by Community Health Systems and the redemption of the bonds. The bonds were redeemed at the full principal amount plus accrued interest.

47) Jefferson Commons at the Ballpark, TX

» CUSIP: 882793

» Default date: January 1, 2007

» Obligor: Jefferson Commons at the Ballpark

» Issuer: Texas Student Housing Authority

» Defaulted bonds: Student Housing Revenue Bonds Senior Series 2001A, Junior Series 2001B; $33.7 million of total debt affected.

» Cause of default: Decrease in rents due to competition.

» Recovery: Unknown for the senior bonds; less than 1% for the junior debt.

The Series 2001 bonds were secured by and were issued to purchase a newly built 282-unit/768-bed student housing rental property located in Austin, Texas. The senior bonds were insured through a policy provided by National Public Finance Guaranty (formerly MBIA Corp). The property housed mostly freshman and sophomore students who attended the University of Texas at Austin, but it was otherwise legally and financially unaffiliated with the University. The project's occupancy rate was 97% at the time of purchase, but fell to 79% in 2003 as a result of a softening of the submarket in Austin. This softening led to rent decreases and concessions to stay competitive with new student housing offerings and conventional rental properties in the submarket. With revenues and cash levels substantially lower than at the time of underwriting, the junior debt service reserve fund was tapped on July 1, 2005 to make payments for the Junior Series. The project continued to use reserve funds to pay Junior Series debt service until the junior reserves were depleted, and on January 1, 2007, the project defaulted on the interest payment due. The project began tapping reserves to pay for the Senior Series debt service on January 1, 2007; the senior reserve was depleted by the time of the January 1, 2009 debt payment and at this point deficiencies in Senior Series debt service began to be covered by the bond insurance policy.

In December 2012, the Senior bonds were accelerated and fully paid off from proceeds of the National bond insurance policy along with available monies in the bond fund. Subsequent to this acceleration, the insurance policy on the Senior bonds was canceled and

National was deemed owner of the bonds. In May 2013, the Senior bonds were sold off by National and new CUSIPs were assigned. National's recovery on the Senior bonds from the sale is unknown. A final distribution was made to junior bondholders in October 2014 that resulted in recovery of less than 1%.

48) Tampa Home Mortgage Series 1983 A, FL

» CUSIP: 875157BF5

» Default date: April 1, 2007

» Obligor: Tampa Home Mortgage Series 1983 A

» Issuer: City of Tampa

» Defaulted bonds: Home Mortgage Revenue Bonds, Series 1983 A; $2,720,000 of debt affected.

» Cause of default: Mortgage delinquencies and bond structural issues.

» Recovery: 37% of principal.

Tampa's Series 1983 Home Mortgage Revenue Bonds were used to purchase single family mortgage loans along with a small percentage of home improvement loans. The bonds, which were secured by the pledged mortgage loan revenues and debt service reserves, primarily comprised serial and term bonds, but about 8% of principal consisted of call-protected multiplier bonds, similar in structure to a zero coupon instrument. But the multiplier bonds had an accretion rate that was 0.40% higher than the mortgage rate, which worsened the program's financial deterioration on top of the serious mortgage delinquencies that began to occur in the mid 1990s.

The bonds consequently began to undergo a series of sharp rating downgrades beginning in 1995. In 1998, the bonds were downgraded to Caa1 when the program-asset-to-debt ratio ("PADR") fell below 100%, with a subsequent downgrade to Caa3 in 2005 when the PADR fell to 68%. In 2009, when the bonds were downgraded to C, the PADR had further declined to 47%.

The trustee issued three notices of default starting in 2006 with a technical default and continuing in 2007 with the first monetary default. In October 2012 and February 2015, there were partial distributions totaling of $905,000 on the outstanding principal of $2,720,000, providing a recovery of approximately 37% when adjusting for time value of money.

49) Sankofa Shule Charter School

» CUSIP: 80104PAA9, 80104PAB7

» Default date: December 1, 2007

» Obligor: Sankofa Shule (A Michigan Public School Academy)

» Issuer: Sankofa Shule (A Michigan Public School Academy)

» Defaulted bonds: Full Term Certificates of Participation, Series 2000; $2.45 million outstanding.

» Cause of default: Low enrollment rates, reduction in state aid and history of mismanagement.

» Recovery: Approximately 5% or less of principal and accrued interest based upon final auction of property in March 2014.

Sankofa Shule was a public school academy in Lansing, MI, that operated as a charter school authorized by Central Michigan University Board of Trustees. The school's certificates of participation were secured by a pledge of 20% of Sankofa's state aid.

Sankofa began operating in fiscal 1996, offering an African-centered, college preparation curriculum to students in grades kindergarten through four. Shortly after its debt issuance in 2000, Sankofa began to suffer from poor management and weak financial performance. In 2006, the school did not meet its enrollment targets; state aid was subsequently cut, the school's authorizing charter was not renewed and the school closed in June 2007. On December 1, 2007, Sankofa Shule failed to make its debt service payment.

After the default, the receiver listed the school's single facility with a real estate agent, but the listing never elicited any buyer interest in the property. In late 2012, the trustee reported that its agent lowered the sale price to $750,000 in an attempt to prompt a sale, which suggested a relatively low potential recovery for bondholders. In October 2013, the trustee announced that less than year's reserves were on hand to cover ongoing administration and maintenance of the property and that the building would be sold to the highest bidder at live auction unless bondholders contributed an additional $100,000 in reserves. This funding was not forthcoming, and the March 19, 2014 auction produced a bid of $134,000. A March 31, 2014 court hearing and judgment will allow the trustee to proceed with the sale of the property and make a final distribution from the trust estate. The February 15 disclosure also revealed that, aside from any proceeds from the auction, only $47,300 remains in the trust estate. Given the bid and depletion of other assets, and the accumulation of $1.178 million in accrued unpaid interest since the 2007 default, the overall recovery to bondholders is approximately 5% or less depending upon final trustee fees.

50) Nob Hill Apartments, TX

» CUSIP: 088379S

» Default date: December 1, 2007

» Obligor: Nob Hill Apartments

» Issuer: Bexar County Housing Finance Corporation

» Defaulted bonds: Multifamily Housing Revenue Refunding Bonds, Series 2001A; Subordinate Series 2001B; $13.1 million of debt affected over both series.

» Cause of default: Low occupancy, rise in operational costs.

» Recovery: 100% of par plus accrued interest.

The Nob Hill Apartments Project, a 368-unit multi-family rental property, is located approximately eight miles north of the San Antonio, Texas central business district. The property began experiencing financial difficulties in 2005 when operating expenses began to outpace revenue growth, causing a decrease in debt service coverage. Both financial performance and occupancy deteriorated significantly over the next few years due to the severing of a relationship with Catholic Charities, an organization that placed families in the facility, as well as an increase in tenants who became delinquent in rent. Maintenance expenses also rose with an increase in turnover, and occupancy hit a low of 72% in May of 2007. The trustee did not tap the debt service reserve fund to cover the December 1, 2007 interest payment, thus triggering the interest payment default.

After the initial event of default, the trustee did not pay any interest payments on the subordinate series of bonds. The trustee transferred $750,000 from the debt service reserve fund to a repair and replacement fund to make substantial repairs to the facility. On June 1, 2011, Nob Hill defaulted on the principal for its senior series bonds.

The project manager for Nob Hill has changed to United Apartments Group. On August 5, 2013, the project was foreclosed upon by bondholders and sold to a new owner. The proceeds were sufficient to enable an acceleration of the senior Series A and the subordinate Series B bonds on August 16 at 100% of par and accrued interest, thus curing these defaults. Unrated series C bonds were also accelerated at 100% of par but without payment of defaulted accrued interest.

51) North Oakland Medical Center, MI

» CUSIP: 732557A

» Default date: February 1, 2008

» Obligor: North Oakland Medical Center

» Issuer: Pontiac Hospital Finance Authority

» Defaulted bonds: Series 1993; $38 million of debt affected.

» Cause of default: Operating losses, competition and a decline in liquidity.

» Recovery: Approximately 10.5% of par equivalent (Source: http://emma.msrb.org/EP530356-EP413922-EP811335.pdf).

Located in Pontiac, Michigan, North Oakland Medical Center (NOMC) served an economically weak area that was also oversupplied with acute medical care, given two other competing hospitals. NOMC's patient volumes suffered a multiyear decline, which proved to be a trend that was both unsustainable and irreversible. The hospital's financial operations expenses were further strained by management turnover, which created unexpected costs both for severance obligations and staff replacement. NOMC experienced several years of operating losses and negative cash flow culminating in a sharp decline in unrestricted cash and investments. A new and experienced senior management team was brought in during the 2007 fiscal year but was unable to improve the financial situation substantially, leading to the February 2008 default on the Series 1993 bonds.

NOMC filed for Chapter 11 bankruptcy protection on August 26, 2008 and the rating was subsequently withdrawn. NOMC's assets were sold in November 2008 for approximately $6 million. Although the bonds were not secured by any collateral interest in the assets that were included in the bankruptcy sale, NOMC distributed $3.771 million to bondholders from the proceeds of the sale and other trustee-held funds in November 2008. NOMC continued to liquidate its remaining assets since that time, and a final distribution of $217,7742 was made to bondholders in April 2011, for a total distribution of $3,998,742.

52 & 53) Jefferson (County of), AL

» CUSIP: 472682

» Default dates: Sewer Warrants, April 1, 2008; General Obligations, September 15, 2008;

» Obligor: Jefferson (County of) Sewer Enterprise, Jefferson (County of);

» Issuer: Jefferson (County of) AL

» Defaulted bonds (warrants): Sewer Revenue and General Obligation; $3.47 billion of debt affected.

» Cause of default: Excessive debt load from court-mandated capital improvements to a regional sewer system, compounded by a large liquidity shortfall linked to variable rate and swap exposure; bankruptcy and GO default preceded by invalidation of key County revenue source.

» Recovery: 54% of par and accrued interest for Sewer Warrants.

» 88% of par and accrued interest for General Obligation debt [includes warrants and GO- secured swaps]

The Jefferson County debacle had a long gestation period and was finally resolved in late 2013 with its emergence from bankruptcy and refinancings of sewer and general obligation debt. At the time of its filing it, was both the largest municipal default and the largest municipal bankruptcy in US history, affecting $3.47 billion of debt.

The problem began with the sewer warrants and was rooted in a long-standing inability to bring portions of an aging and complex regional sewage system up to environmental standards. By the late 1990s, a lawsuit over the Cahaba River drainage basin resulted in a federal court mandate for extensive capital improvements. In retrospect, the consent decree allowed Jefferson County officials and their financial advisers -a number of whom subsequently suffered criminal indictment -to lace the sewer capital plan with expansion projects unrelated to the immediate pollution mitigation effort. In the process, the county committed to a debt load that ultimately proved unaffordable; the debt structure in particular included swaps and variable rate instruments that were intended to moderate the high burden of servicing debt but which backfired and created an enormous liquidity problem as markets and the financial counterparties who held much of the debt were roiled by the 2008 financial crisis. The first sewer default occurred in April 2008, followed by a general obligation default September 2008. The coup de grace, arguably, came with a 2011 court decision stripping the county of a major source of operating revenues that left it on a precarious financial footing. Key milestones are as follows:

» April 1, 2008: Initial default when the County fails to make a principal payment on sewer warrants (bank bonds) held by liquidity providers

- September 15, 2008: County fails to make principal payment on General Obligation bank bonds (warrants) held by liquidity providers
- November 4, 2009: SEC settles fraud charges against lead bank JP Morgan
- March 16, 2011: State supreme court finds Jefferson County's 2009 Occupational Business and License Tax unconstitutional, effectively removing 40% of County General Fund revenues
- November 2011: Jefferson County files for Chapter 9 bankruptcy protection
- July 2011: First settlement proposal; approximate 60% recovery offer, 70% counteroffer reported
- April 1, 2012: County misses payments on non-bank held General Obligation warrants
- January 1,2013: County finalizes forced exchange of Series 2006 Lease Revenue Warrants (see case study number 74)
- December 3, 2013: County formally emerges from bankruptcy; by the end of 2013 refinances all outstanding sewer warrants and outstanding variable rate general obligation warrants with new issues of $1.785 billion and $105 million par respectively.

Several of these default milestones bear some discussion. By 2008, Jefferson County's leverage and debt structure rendered it vulnerable to the turmoil of the ensuing, larger financial crisis, exposing it to what quickly became a cascade of failed remarketings and auctions, penalty rates, swap terminations, collateral calls and principal accelerations. The sewer debt, over 90% of which was insured by XL Capital and FGIC, was hit first when these insurer were downgraded, causing a failed remarketing of the $567 million variable rate demand sewer debt, all of which was eventually put back to liquidity providers. At the same time, the county's auction rate securities failed to find new buyers, causing interest payments to spike for these securities. Between the accelerated VRDO principal repayments and the penalty interest rates on variable and auction rate securities, the County's debt service cash flow requirements increased dramatically.

The downgrade of the county's sewer debt to below Baa2 then triggered a swap termination event compounding the demands on the sewer system's cash flow with an estimated $184 million collateral call. The county officially notified swap counterparties on March 4, 2008 that it did not intend to post collateral or provide alternative insurance under the swap agreements, though it did enter into forbearance agreements with its liquidity and swap counterparties, who waived their rights to demand accelerated payments while negotiations continued. The county's General Obligation variable rate demand warrants were also put back to liquidity providers, triggering the second event of default when the county could not meet accelerated payments on these bonds on September 15, 2008. During that same month, the Trustee and the bond insurers filed suit in federal court requesting that a receiver be appointed to manage the sewer system and raise rates sufficient to meet ongoing obligations; the judge subsequently ruled that the federal government did not have the jurisdiction to influence rate-setting for a local public utility. Negotiations between all parties continued without solution, and eventually, the forbearance agreements lapsed without further extensions.

The county's fiscal problems worsened significantly in March 2011 when the Alabama Supreme Court ruled that Jefferson County's occupational and business license tax was unconstitutional. The loss of the 0.45% tax on salaries created a $70 million hole in the County's $317 million fiscal 2011 (September 30) budget, equivalent to 40% of General Fund revenue and it has not been replaced since. In November 2011 the county commission voted to file for Chapter 9 bankruptcy protection, exacerbating the risk to GO warrant holders who suddenly became unsecured obligors given the absence of a statutory lien for GO debt in Alabama. At the time of the filing, both GO variable-rate demand bank bonds and sewer variable-rate demand bank bonds were already in payment default but other county bonds were not. In March 2012, the county filed a resolution directing officials to skip the April 1 principal and interest payment on outstanding GO warrants to preserve an already narrow cash position. This constituted an event of default under the trust indenture, and was also the first payment default on county fixed rate GO warrants.

By mid-2013, the County was working out a recovery plan with creditors. The emergence from bankruptcy in December 2013 was facilitated by a very large refinancing of the sewer debt and a more modest one for the Series 2001B variable rate GO warrants producing the 54% sewer and 88% general obligation recoveries cited above. The bankruptcy and the loss of the occupational tax revenues forced the County to make other significant changes besides restructuring of debt. By the time it emerged from bankruptcy, Jefferson County had reduced overall operating expenditures by a third and cut full-time equivalent employment by 46%, a downsizing

that was likely helped by the presence of a major city and other underlying local governments whose services and operations were not affected by the bankruptcy. Jefferson County still faces steep increases in sewer fees, but its recovery should be buoyed by an overall healthy regional economic base with low unemployment.

A non-defaulting bond pulled into a bankruptcy proceeding: The Jefferson County School warrants

At the time of its bankruptcy, Jefferson County also had $814 million in outstanding limited obligation school warrants across three separate series. This debt suffered no impairment, as the county consistently paid all debt service on time and in full from a pledge of a 1% Education Tax (sales tax) that was not part of Jefferson County's general revenues.

One of the three series, Series 2005-B, had a modification to its terms during the county bankruptcy but one that we do not consider an impairment. This series, with $111 million outstanding, is a variable rate instruments with a standby bond purchase agreement (SBPA) originally provided by Depfa Bank. In June 2008, the Debt Service Reserve Fund (DSRF) surety bond provided by Ambac for the Series 2005-B warrants became ineligible under the terms of the Indenture upon Ambac's downgrade below Aaa. During this time the county was unable to replenish the DSRF with cash within the required 12-month period because of its own liquidity issues.

As a result, the Trustee issued a Notice of Default dated December 28, 2009 and the Series 2005-B warrants were tendered to Depfa for purchase under the Standby Purchase Agreement (SBPA). The SBPA provided for a Bank Rate for bonds so tendered of prime + 200 bps, which rose to prime + 300 bps upon an Event of Default. The county began paying interest to Depfa at the default rate as due in June 2010. The county completely replenished the DSRF with cash in September 2012, curing one Event of Default, but by this time the county was 10 months into bankruptcy so an Event of Default remained, requiring that the county continue to pay interest at the Default Rate.

If the county and Depfa had not made any changes to the SBPA, the Bank Rate would have reverted back to prime +200 basis points upon the county's exit from bankruptcy. But in exchange for Depfa's support for the county's overall plan to exit bankruptcy, the county and Depfa agreed that effective August 31, 2013, the New Bank Rate would equal prime +225 bps. The county continued to pay the Default Rate up until the Effective Date of the bankruptcy exit (December 3, 2013) in case the bankruptcy exit failed. Once the county completed its exit, it was credited the difference between the Default Rate and the New Bank Rate for the period of August 31 through December 3. The 2005-B school warrants provide an interesting example of how even an unimpaired debt can be pulled into a bankruptcy proceeding of the issuer.

54) Fullerton Village at DePaul University, IL (now 1237 West following project name change)

- CUSIP: 45202QA
- Default date: December 1, 2008
- Obligor: Fullerton Village at DePaul University
- Issuer: Illinois Finance Authority
- Defaulted bonds: Senior Series 2004 A and Subordinate Series 2004B; $72.23 million of debt affected.
- Cause of default: Low occupancy levels led to revenues insufficient for debt service.
- Recovery: 100% of principal and accrued and default interest upon the March 15, 2017 sale of the project, after nine years of default.

Fullerton Village at DePaul University initially defaulted on their 2004 A and B bonds when the project failed to make interest payments on December 1, 2008. After the initial default, net operating income was again sufficient to pay missed interest payments and additional accrued interest at the default rate, but not full debt service.

This student housing development suffered low occupancy levels attributable at least in part to the project architecture. The design – loft-style apartments with concrete floors and high ceilings – was unconventional for student housing, and apparently created very

noisy living quarters. The senior property manager was replaced with an affiliate of the project developer (who is the sole bondholder of the unrated Series 2004 C debt) but low occupancy levels persisted. As a result of the drop in occupancy from 87% in Spring 2007 to 52% in Fall 2007, the project tapped debt service reserve funds on both the Senior and Subordinate bonds to make debt service payments on June 1, 2008. On October 24, 2008, the trustee issued a notice to bondholders stating that debt service reserve funds would not be used to make debt service until such time as revenues would be adequate to replenish any draws. This decision was overturned by most bondholders, who were subsequently paid out of the debt service reserve fund, thus drawing it down to below required levels. The debt service reserve funds were subsequently fully depleted such that the project defaulted on December 1, 2008 on both the A and B Series. Project revenues, which include rental income from student residents as well as the retail spaces, were able to cover operating costs as well as interest and accrued interest since the initial default, but remained unable to make full debt service payments or replenish the debt service fund.

As of Fall 2016, project occupancy was reported to be 83%, reflecting ongoing weakening. However, on March 15, 2017, the project was finally sold for $92 million cash and the bonds were redeemed in full. Both senior and subordinate bondholders were repaid in full including unpaid accrued interest and default interest.

55) St. Louis Industrial Development Authority (St. Louis Convention Center Headquarters Hotel Project), MO

» CUSIP: 790906A, 79164T

» Default date: December 15, 2008

» Obligor: St. Louis Industrial Development Authority

» Issuer: St. Louis Industrial Development Authority

» Defaulted bonds: Series 2000A; $98 million of debt affected.

» Cause of default: Oversupply of new or renovated hotels, decline in convention spending by businesses.

» Recovery: 34.10% of principal

Since opening in 2003, the financial and operating performance of the $277 million, 917 room Convention Center Headquarters Hotel had been significantly weaker than originally forecasted. Although the project, also known as the Renaissance St. Louis Grand Hotel, generated enough revenue to cover operating expenses, revenues were not sufficient to cover debt service and to fund fully the furniture and fixtures account. The hotel's financial performance continued to decline due to the broader economic downturn, the consequent slowdown in convention center bookings sales nationally and the oversupply of new or recently renovated hotels in the project area. The demand for hotel services was further weakened by the demise of the TWA hub at Lambert-St. Louis International Airport and American Airlines' subsequent, significant reduction in air service to St. Louis.

The Series 2000A bondholders initiated foreclosure proceedings in January 2009 and shortly thereafter, on February 9, 2009 the hotel was auctioned off to the trustee, UMB Bank, for $98 million. Although bondholders took over ownership, the hotel continued to operate under the management of Renaissance Hotel Management Company. There was reportedly some improvement in operations, though it was uneven and not enough to remedy the default.

The hotel was ultimately sold in 2014, following delays due to a slump in the real estate market and the need to secure agreements between the buyers, the hotel operator, the city and the state. Distributions to bondholders, the final of which occurred in November 2014, provided a recovery of 34.10% of principal on the debt.

56) City of Harrisburg, PA

» CUSIP: 41473E; 414738

» Default date: June 1, 2009 failure to honor city-guaranteed debt service on Harrisburg Authority Resource Recovery bonds and direct GO debt.

» Obligor: Harrisburg (City of)

» Issuer: Harrisburg Authority

» Defaulted bonds: 1998 Series A, 2002 Series A-B, 2003 Series A-F and 2007 Series C-D Guaranteed Resource Recovery Facility Bonds and Notes; $262 million of debt affected. Series 1997 GO bonds; $71 million of debt affected. GO guaranteed construction loan; $20 million parity obligations affected.

» Total parity obligations affected: $352 million. (excludes non-parity $25 million project loan and $5 swap termination, both ultimately within final settlement)

» Cause of default: Project enterprise risk, poor general governments financial position independent of project and consequent city failure to honor guarantee.

» Recovery: 75% of principal and past-due interest for aggregate GO and GO-guaranteed bond and loan creditors.

The City of Harrisburg's road to default and receivership would have perhaps been a typical story of enterprise risk had the city not also chosen to guarantee nearly $310 million of incinerator project debt, an amount approximately three times the city's then outstanding debt. Also the focus on its troubled waste-to-energy (WTE) project should not obscure the fact that Harrisburg's own credit situation had deteriorated steadily since about 2007, when its financial reporting began to be seriously delinquent.

From 1998 to 2003, the Harrisburg Authority issued bonds backed by the city's guarantee for an upgrade and retrofit of its WTE facility. By 2007, the project was experiencing significant construction delays and cost overruns, which led to a draws on the city's guarantee beginning in June 2007. The city guarantee was again called tapped in 2008, but that payment was only made using the proceeds of city-guaranteed working capital notes issued in 2007, an indication of the city's long-running financial problems. On June 1, 2009, the city failed to honor its WTE guaranteed obligations altogether and the city subsequently missed more guarantee payments in 2009 and 2010, as well as swap payments on the incinerator debt.

In September 2010, in the most visible sign to date of the city's faltering financial health, the city announced that it would miss an upcoming $3.3 million payment on general obligation bonds, but ultimately covered the payment with an advance of state aid.

Until this point, none of these actions resulted in a missed payment for retail bondholders. GO-guaranteed incinerator project debt service was covered by a combination of reserve funds, Dauphin County guarantee payments and bond insurance. Similarly, the city's inability to pay its direct general obligation debt was initially covered by the Commonwealth of Pennsylvania's accelerated emergency payment of state aid and thereafter by bond insurance.

The Commonwealth became involved in the city's finances beginning in 2010. State assistance first came in the form of various assistance grants and accelerated state aid, and then enrollment into the Act 47 distressed municipalities program, which saw the appointment of a state coordinator to oversee the city's fiscal recovery. In early 2011, the state-appointed coordinator's plan proposed selling off the WTE plant and leasing City parking authority assets, but was rejected by the council.

Absent any plan to address the city's financial troubles, Harrisburg filed for bankruptcy on October 12, 2011, despite newly passed legislation that prohibited distressed Pennsylvania cities from filing. The next month, the bankruptcy court ruled that the city's bankruptcy petition was invalid; the judge also denied the city's appeal.

Ultimately, the commonwealth played a key role in brokering the final settlement package, which involved two relatively complex bond financings in December 2013. The Lancaster County Solid Waste Management Authority sold $129 million of revenue bonds that enabled it to purchase the WTE plant and redeem several series of WTE project bonds. A second $267 million bond issuance by the Pennsylvania Economic Development Financing Authority was used to redeem or defease all outstanding Harrisburg Parking Authority debt and to redeem additional WTE project bonds. Both financings generated additional funds for creditor settlements. The state helped bolster the value of the assets underlying these transactions with a contractual purchase of co-generated electricity from the WTE plant and with a guaranteed minimum use of parking authority spaces by state employees.

The upfront financial distributions consequently received by the GO and GO guaranteed creditors on December 23, 2013 were in aggregate 75% of the amount owed, including principal and accrued interest. This 75% represents an aggregate of the full recovery for

the city's direct GO bonds and a 66% recovery for the debts of The Harrisburg Authority that were guaranteed with a city GO pledge. Within the aggregate 75% recovery, individual creditors' recoveries ranged widely:

» Covanta: 39%

» AGM: 60%

» Dauphin County: 75%

» AMBAC: 100%+ (direct GO creditor)

These upfront recoveries do not capture additional considerations in the form of future distributions of parking revenues, fees and various other economic benefits reflecting separate settlement reached with the city and the GO guaranteed creditors at closing.

As a matter of note, the $5 million swap termination was paid in full as part of the settlement though not eligible for the GO guarantee under state statute. The non-guaranteed $25 million CIT loan was also repaid as part of the settlement; under the terms of an earlier court settlement, CIT was paid ahead of GO guaranteed creditors but at 39% of par per the court decision. Both of these settlements affected the amounts available to GO guaranteed creditors.

Harrisburg negotiated a forbearance agreement with Assured Guaranty that would enable the city to postpone debt service payments for its Series 1998A GO-guaranteed lease revenue bonds issued to purchase the Strawberry Square office complex. Postponements, which could last through 2026, would likely constitute a distressed exchange under Moody's default definitions. The forbearance leaves aside how the city will fund the large final balloon payment due in 2033.

57) Lower Bucks Hospital

» CUSIP: 515741BW5 and 515741BX3

» Default date: December 15, 2009

» Obligor: Lower Bucks Hospital

» Issuer: Langhorne Manor Higher Education and Health Authority

» Defaulted bonds: Series 1992 Bonds; $24.9 million of parity debt affected.

» Cause of default: Operating losses, cuts in state aid, patient admission declines.

» Recovery: Approximately 33% of par based on available information.

Lower Bucks Hospital struggled with growing operating losses since the late 1990s due to extreme market pressures, including lower reimbursement rates and sharp competition. In 2002, the hospital dissolved its relationship with Temple University, although a tenuous relationship to Temple University Health System remained. The hospital continued to experience several years of significant patient volume declines because of its very competitive market. Key physician specialists left the market or aligned with other providers because of high medical liability costs in the Philadelphia area, which caused patients to shift to ambulatory or competing inpatient facilities. The hospital grew increasingly dependent on state funding for profitability, which steadily dropped from $4.3 million in 2008 to $1 million in 2010, reflecting the state's own fiscal pressures. In 2009, Lower Bucks applied for "distressed status" designation by the Pension Benefit Guaranty Corporation.

Lower Bucks Hospital missed a debt service payment on December 15, 2009 and filed for bankruptcy on January 13, 2010, listing assets of $46.1 million and liabilities of $74.4 million. On July 8, 2011, Lower Bucks Hospital, Lower Bucks Health Enterprises, Inc., and Advanced Primary Care Physicians filed a joint Chapter 11 plan of reorganization.

Lower Bucks Hospital emerged from bankruptcy in January 2012, and in early October 2012 was purchased by Prime Healthcare Services, a for-profit hospital company headquartered in California. According to various sources, bondholders agreed to accept $8.15 million -much less than the $24.9 million in parity debt outstanding at the time of bankruptcy – in exchange for being deemed secured

creditors of the restructured enterprise. The bankruptcy court subsequently rejected the portion of the settlement that permitted mutual releases between the hospital and the trustee. No further information on the final settlement amount or the terms of what appears to have been a distressed exchange is available as of the publication date.

US municipal defaults 2010-2014 (#58-#80)

58) Nevada Department of Business and Industry-Las Vegas Monorail Project

» CUSIP: 25457VA

» Default date: January 13, 2010

» Obligor: Las Vegas Monorail Corporation

» Issuer: Nevada Department of Business and Industry

» Defaulted bonds: Series 2000 Revenue bonds; $439 million of bonds affected.

» Cause of default: Mechanical problems, shutdown of operations and below forecasted ridership and revenues.

» Recovery: 2% of principal recovered

The Series 2000 bonds were issued by the Nevada Department of Business and Industry for the construction of a 4.2 mile monorail corridor on the east side of the Las Vegas Strip connecting hotels, tourist attractions and the convention center. The bonds were secured by net revenues of the monorail system, and were insured by Ambac. The project faltered from the beginning, with passenger service delayed by over a year and a series of severe mechanical and electrical problems causing periodic shutdowns of the system in 2004 and 2005. As important, ridership and revenues significantly underperformed initial projections. The project was further hurt by reduced advertising revenue and competition from existing transportation alternatives. The monorail continued to deplete its reserves until Ambac, the bond insurance provider, fronted $16 million to the Trustee in late 2009 to be applied toward the January 2010 debt service obligations. The project filed for bankruptcy protection in mid-January 2010. The filing was disputed by Ambac, which filed a motion to dismiss the Chapter 11 filing in the belief that LVMC is a municipal entity that is not eligible to file for bankruptcy protection. Ambac itself filed for bankruptcy shortly after Las Vegas Monorail Project, bringing the insurance policy under bankruptcy protection as well. The Las Vegas Monorail Corporation emerged from bankruptcy protection November 2012, with a reported 2% total recovery for bondholders.

59) The Waters at Northern Hills Apartment, TX

» CUSIP: 088379

» Default date: February 1, 2010.

» Obligor: Waters at Northern Hills Apartment (The)

» Issuer: Bexar County Housing Finance Corporation

» Defaulted bonds: Multifamily Housing Revenue Bonds Subordinate Series 2001C ($0.21 million); Senior Series 2001A ($11.4 million) did not default

» Cause of default: Weak occupancy.

» Recovery: 100% of par plus accrued interest on the defaulted subordinate bonds.

The bonds were secured by the revenue from the 304-unit Waters at Northern Hills Apartments, a 1982 vintage multi-family rental property located in San Antonio, approximately nine miles north of the central business district with good access to the city's principal traffic arteries. Despite a satisfactory location, the project suffered poor occupancy levels, as well as operating expenses that were higher than projected in the initial underwriting. Although occupancy rates rose by 4 percentage points to 79% in 2010, they remained significantly below the submarket rate of 93.5%.

On February 1, 2010, the Subordinate 2001 C debt service reserve was fully depleted and no regularly scheduled 2001 Series C debt service payments were made since. There was no default on the Senior Series 2001A, which were insured by National Public Finance Guarantee (formerly MBIA Corp), but the senior debt service reserve fund was almost depleted by 2013. The Waters' lost its tax exemption status with Bexar County, which involves an accrued tax liability of $1.2 million, with additional amounts likely in the future.

In 2013, the project was sold to a new owner and proceeds were sufficient to enable full debt defeasance of senior and subordinate debt. On August 1, 2013, the outstanding subordinate bonds were called in full at 100% of par and accrued interest, curing the default.

60) Honey Creek Apartments, TX

» CUSIP: 088379QR6

» Default date: April 1, 2010.

» Obligor: Honey Creek Apartments

» Issuer: Bexar County Housing Finance Corporation

» Defaulted bonds: Bexar County Housing Finance Corporation's (Honey Creek/Austin Point Apartments) Multifamily Housing Revenue Bonds Subordinate Series 2000C; $1.210 million affected. Junior subordinate bonds, not rated, were also in default. Senior Series 2000A ($11.365 million) did not default.

» Cause of default: Low occupancy.

» Recovery: 100% of par plus accrued interest for the defaulted subordinate Series 2000 C bonds.

Like The Waters at North Hills project, Honey Creek is located approximately 10 miles north of the San Antonio central business district with good vehicular access. Also built in 1982, this garden-style apartment complex was and is composed of 40 two-story buildings. The bonds were limited obligations secured solely by the revenues, receipts and security pledged in the trust indenture.

As of 2010 the occupancy rate was 90-92%, which put the project into financial stress sufficient to affect subordinate bond debt service; Subordinate Series 2000C bond debt service was not paid beginning April 1, 2010, while the 2000A senior Series debt service continued to be paid from project revenues, and the senior reserve remained fully funded. The senior bonds were also insured by MBIA Corporation and reinsured by National Public Finance Guarantee Corporation (formerly MBIA Corp).

In 2013, the Honey Creek project was refinanced, enabling the defeasance of all three series on August 27, 2013 at 100% of par plus accrued interest, thus curing the outstanding default on rated Subordinate Series 2000C debt.

61) AOH — Golf Villas, Rivermill, Village Square Apartments, FL

» CUSIP: 14052T

» Default date: Default June 1, 2010 on Subordinate Series; Monetary default June 1, 2011 on Senior Series after a reserve fund draw on December 1, 2010.

» Obligor: American Opportunity for Housing-Golf Villas, Rivermill, Village Square Apartments

» Issuer: Capital Trust Agency

» Defaulted bonds: Senior Series 2003A, Taxable Senior Series 2003B and Subordinate Series 2003C; $15.1 million of total debt affected.

» Cause of default: Low occupancy rates, rehabilitation work, poor financial performance.

» Recovery: Approximately 75% of principal for senior debt and 0.4% for subordinate bonds.

The bonds were secured by the revenues and mortgages from three cross-collateralized properties – Golf Villas, Rivermill and Village Square Apartments – as well as funds and investments pledged to the trustee pursuant to the bond indenture. All three housing

projects had difficulty maintaining a sustainable occupancy rate; The Golf Villas, Rivermill and Village Square projects reported physical occupancy of 75%, 86% and 91% respectively as of 2010, though these rates appear to have since weakened substantially. Previously, in 2005, revenues at Rivermill had been weak because of rehabilitation work that was performed on the property. With poor occupancy rates across all three projects, net revenues decreased to the point where the American Opportunity for Housing (AOH) failed to make monthly payments for the June 1, 2010 and December 1, 2010 debt service on the Subordinate and Junior Subordinated bonds (not rated), triggering a default on these bonds. AOH provided financial assistance to avert a June 1, 2010 default on the Senior bonds. This financial support then ceased, but the Trustee did have sufficient funds for the December 1, 2010 senior bond debt service payment.

On December 9, 2010, the trustee distributed funds from the debt service reserve fund to partially reimburse the Subordinate and Junior Subordinate bondholders for the June 1 December 1, debt service payments. The project was sold in February 2015, and the proceeds were distributed to bondholders as final payment on the bonds. The recovery was approximately 75% for senior bonds and 0.4% for subordinate bonds.

62) Whispering Palms Apartments, AZ

» CUSIP: 566823M

» Default date: July 1, 2010.

» Obligor: Whispering Palms Apartments

» Issuer: Maricopa County Industrial Development Authority

» Defaulted bonds: Multifamily Housing Revenue Bonds (Whispering Palms Apartments Project), Series 1999A; $5 million of debt affected.

» Cause of default: Weak real estate market and poor operating performance.

» Recovery: 100% plus accrued interest.

Built in 1985, Whispering Palms Apartments is a 200 unit low-income qualified housing complex located approximately four miles west of downtown Phoenix. Serving a predominantly low- to moderate-income clientele, project rents remain below the Phoenix area average and there is fierce competition from nearby properties. The occupancy rate averaged 93% in 2010 but had reached as low as 74% in 2009. Moody's had highlighted significant weakness at the property back in 2004 when the rating was first moved below investment grade as a result of poor financial performance, weak occupancy and a court-ordered change in management.

Beginning on January 1, 2010, the project began tapping the debt service reserve fund to make full debt service payments and the rating was downgraded to Caa1 from B1. The debt service reserve fund was fully depleted by July 1, 2011, when the trustee began making claims under the insurance policy from National Public Finance Guarantee (formerly MBIA Corp.) to make full payment. National Public Finance Guarantee continued to pay debt service through August 17, 2012, when National mandatorily tendered the bonds and paid holders 100% of par plus accrued interest.

63) Knight's Circle and The Pointe at Central at University of Central Florida (formerly Pegasus Landing & Pegasus Pointe at University of Central Florida), FL

» CUSIP: 140427A

» Default date: October 1, 2010.

» Obligor: CAPFA Capital Corp 2000F

» Issuer: Capital Projects Finance Authority

» Defaulted bonds: Student Housing Revenue Bonds, Senior Series 2000 F-1 and F-2 (Capital Projects Loan Program); $137 million of debt affected.

» Cause of default: Low occupancy rates resulting from water damage and mold.

» Recovery: 100%. Bonds were refunded with issuance of the Capital Projects Finance Authority, Student Housing Refunding Revenue Bonds Series 2020A-1 and Taxable Series 2020A-2 (Capital Projects Loan Program – Florida Universities) in October 2020. Full recovery had been likely after physical remediation, strong occupancy of the projects and resumption of debt service payments

This financing is an interesting example of an otherwise sound project that defaulted because of a construction-related defect, which was then cured with additional investment by the bond insurer. The bonds are limited obligations of Capital Projects Finance Authority, secured solely by rental revenue from two privatized student housing projects–subsequently renamed Knights Circle and The Pointe at Central – and various funds pledged under the indenture. The Subordinate Series 2000G were not rated or insured, while the senior bonds were insured by MBIA Corporation and reinsured by National Public Finance Guarantee Corporation (formerly MBIA Corp).

The default was triggered in 2010 when the University of Central Florida began diverting students away from the projects following water damage and the discovery of mold in the buildings. The occupancy rate for the projects dropped to 66% and given reduced rental revenue and tenant relocation, the project began tapping the debt service reserves to help pay debt service for both series beginning in October 2010. Reserves were depleted by October 2011, and a monetary default occurred on the senior bonds, though bond insurance covered the debt service payments. Debt service payments on October 2011, April 2012 and October 2012 were made by the Trustee by drawing on the bond insurance policy.

Unlike other distressed housing projects with weak submarkets, however, these projects still had a strong occupancy potential given the proximity of the University. Accordingly, MBIA in the Spring of 2011 committed to lend the projects funds, now totaling more than $32 million, to cure the mold and water damage problem and restore the buildings to student tenancy. The projects also underwent a name change, as noted above, to facilitate remarketing of the properties. The projects achieved 99% occupied in Fall 2016, which has been sustained, with 99.6% reported for fall 2018. Debt service payments since April 2013 have been made from pledged revenues and not from draws on the insurance policies as in previous periods.

Although recent operating performance has been sufficient to meet current debt service payments, the project incurred approximately $52,800,000 in additional indebtedness between the loan for repair of the project and the bond insurer's outstanding claim from the remediation period. These obligations are subordinate to the debt service on the senior bonds, but have priority over replenishment of the depleted debt service reserve fund which has not yet been restored; full recovery would entail repayment of the debt service covered by the insurer. Thus, although current operations are sufficient to cover regular annual debt service, the now empty debt service reserve fund would be necessary to cover the final bullet maturity, such that a that a refinancing would be necessary to achieve complete recovery.

In October 2020, the project refunded the entire 2000F bonds and repaid the prior mortgage advances through issuance of the Baa3-rated Capital Area Finance Authority, Student Housing Refunding Revenue Bonds Series 2020A-1 and Taxable Series 2020A-2 (Capital Projects Loan Program – Florida Universities). To mitigate COVID-related risks, the 2020A bonds are structured to have lower debt service in the first two years and a special COVID fund funded at fifty percent of maximum annual debt service (MADS). The COVID fund is in addition to a debt service reserve fund funded at MADS. As of March 2023, the project continued to maintain strong occupancy at approximately 99%, which provides revenue sufficient to meet upcoming debt service payments.

64) Rutland Place Apartments, TX

» CUSIP: 052425CR4

» Default date: November 1, 2010

» Obligor: Rutland Place Apartments

» Issuer: Austin Housing Finance Corporation

» Defaulted bonds: Multifamily Housing Revenue Bonds, Series 1998A; $11.18 million of debt affected (parity taxable Series 1998B matured in 2005).

» Cause of default: Low occupancy.

» Recovery: Bondholders recovered 73.6% of outstanding principal after sale of the property

The Rutland Place Apartments project is a 294-unit multifamily housing development located in the North Central Austin submarket, and is comprised of 16 garden-style apartment buildings (known as Rutland Place I) and 15 other apartment buildings (known as Rutland Place II). Phase I of the project was built in 1979 and Phase II was built in 1985. The property is subject to income restrictions, which limit the owner's ability to maximize rental income. The bonds are limited obligations secured solely by the revenues, receipts and security from the project.

The property struggled with low occupancy. Occupancy was weakened by a fire in 2008 which affected a significant number of units, and the project was further exposed to competition from a large inventory of housing units in the local market. The property had not been able to fully cover debt service for six years and the reserve funds were gradually been depleted. Rutland Place Apartments failed to pay principal on Series 1998A bonds beginning in November 1, 2010 and principal and interest since May 1, 2011.

In early 2012, bondholders directed the trustee to sell the property. A total of $8,224,688 was distributed to bondholders on March 30, 2012, for a total final recovery of 73.6% against principal.

65) Boston Industrial Development Fin. Auth., MA

» CUSIP: 10088MAU9

» Default date: Forbearance agreement, effective as of May 24, 2011

» Obligor: Boston Industrial Development Finance Authority

» Defaulted bonds: Series 2002 Senior Revenue Bonds; $41 million of debt affected.

» Cause of default: Forbearance Agreement signed to modify the terms from the original promise.

» Recovery: 96% of principal and accrued interest as reported by trustee

The Series 2002 Bonds financed development of the Crosstown Center, a 175-room Hampton Inn and Suites hotel and a 650-space parking garage located adjacent to the Boston Medical Center in downtown Boston. The Project is approximately one mile from the City's convention center and close to Logan Airport. The bonds are secured by a pledge of net revenues generated primarily from the operation of the hotel and parking garage, as well as debt service and other reserves. Moody's rated the $35.67 million Senior Revenue Bonds but not the $7.75 million Subordinate bonds.

The project opened for business in July 2004, and despite its promising location room, rentals and revenues have been consistently significantly lower than original forecast. Hotel room demand never reached original expectations due to the continued expansion of the Boston hotel supply and the broader economic slowdown. One particularly problematic aspect of this financing was its ascending debt service structure, which reflected overly optimistic revenue growth projections.

The Crosstown Center Project defaulted effective May 24, 2011, when a forbearance agreement was signed that effectively suspended sinking fund principal payments, aimed at allowing the hotel to build its operations and revenues; regularly scheduled payment of Senior (but not Subordinate) interest continued, in some cases with help from the reserve fund. The original forbearance agreement was to run until January 1, 2013, but was extended several times that year in the absence of sufficient project recovery and finally to January 31, 2015.

Ultimately, the borrower was able to secure a refinancing of the original project bonds on March 18, 2016, which enabling an acceleration and final payment to bondholders from proceeds on March 21, 2016. As reported by the trustee, the Senior Bonds recovered 96% of principal and accrued interest, reflecting a slight principal haircut taken by institutional holders.; no retail Senior bondholders were impaired. The unrated Subordinate Bonds reportedly recovered 0%.

66) Santa Rosa Bay Bridge Authority, FL

» CUSIP: 802576

» Default date: July 1, 2011

» Obligor: Santa Rosa Bay Bridge Authority

» Issuer: Santa Rosa Bay Bridge Authority

» Defaulted bonds: Series 1996 Revenue Bonds; $115.9 million of debt affected.

» Cause of default: Insufficient toll traffic revenue, well below projections; competition.

» Recovery: 92%

The Santa Rosa Bay Bridge Authority default is another example of a transportation infrastructure financing that could not live up to utilization forecasts and revenue projections. The Authority, established in 1984, financed and oversaw construction of the 3.5-mile Garcon Point Bridge, which spans the eastern end of Pensacola Bay, connecting Garcon Point in the north to Redfish Point in the south. The bonds are secured by gross toll revenues, along with a debt service reserve fund.

The Bridge provides access to Gulf Breeze and other areas on the peninsula from areas north and east of Pensacola Bay, though the existing toll-free Pensacola Bay Bridge to the west already linked Pensacola directly with Gulf Breeze. The Bridge opened on May 14, 1999, but from the beginning traffic forecasts proved to be overly optimistic; toll revenues were significantly less than projected, which put a strain on the authority's finances starting in the first year of operation. In addition to the Pensacola Bay Bridge, the Garcon Point Bridge faces competition from two other toll-free alternatives, SR 8 and I-10.

The Bridge's continued poor performance caused a full depletion of the reserve and interest accounts, which were still insufficient to cover the scheduled debt service payment of $5 million on July 1, 2011. While some of the bonds issued are insured by MBIA Corporation and reinsured by National Public Finance Guarantee Corporation, the July 1 defaulted bond was not insured.

Improved bridge traffic yielded sufficient revenue to enable the trustee to make modest periodic payments on the 1996 bonds, typically occurring each June and December. This weak cash flow suggested a weak recovery as did trading values immediately post-default which indicated an expected 35% recovery.

Florida Department of Transportation (FDOT) did not set tolls at a sufficient rate, prompting litigation by the trustee. A Circuit Court compelled the Florida Department of Transportation (FDOT) to increase tolls beginning March 1, 2020, resulting in some additional revenues for bondholders though the distributions still fell short of the growing accruals. A September 2020 hurricane which damaged a nearby bridge resulted in the suspension of tolls on the Garcon Bridge. Bondholders subsequently filed a complaint against FDOT which ultimately resulted in a settlement. Per the settlement agreement, FDOT paid $134 million intended to cover outstanding principal plus accrued and accreted interest. The Trustee did not accrue interest on unpaid interest, driving a 92% estimated recovery by our calculations.

67) Charitable Leadership Foundation, NY

» CUSIP: 012440FZ1, 012440GA5, 012440GB3

» Default date: July 1, 2011

» Obligor: Charitable Leadership Foundation

» Issuer: Albany Industrial Development Agency

» Defaulted bonds: 2002A Civic Facility Revenue Bonds (Center for Medical Science Center); $48.2 million of debt outstanding.

» Cause of default: Bankruptcy of primary tenant.

» Recovery: Highly uncertain, dependent upon sale or re-use of property

Charitable Leadership Foundation ("the Foundation") is a private foundation devoted to various charitable, scientific, religious or literary purposes including the fields of medicine and education. In 2002, the Foundation issued bonds to finance the creation of a

biomedical research facility, called Center for Medical Science, in Albany, NY. The research facility was occupied by three tenants, one of which, Ordway Research Institute (ORI), comprised 43% of the space. Ordway stopped making rental payments in July 2010 and filed for bankruptcy in April 2011.

All three tenants at the time of the default were not-for-profit research or state-related entities. Health Research Inc., a not-for-profit corporation, leased approximately 45% of the space and the New York State Department of Health Division of Lab Quality and Control leased another 11% of space. These renters reportedly still occupy their share of the building. The bonds are secured by a mortgage lien on the leasehold interest in the research facility, a security interest in the equipment and a debt service reserve fund via a Citigroup guaranteed investment contract.

After the loss of a large portion of rental income with the ORI bankruptcy, the Foundation tapped the debt reserve fund to make the January 2011 debt service payment but defaulted on July 1, 2011, when it failed to pay the scheduled principal payment due in the amount of $1.875 million. Bondholders foreclosed and formed a new for-profit entity, Albany Medical Science Research LLC. In January 2013, the Albany Industrial Development Agency agreed to payments in lieu of taxes from the new private entity. The property still appears to be listed for sale or lease with Pyramid Brokerage Company-Albany Office. Recovery remains uncertain, and appears to be fully dependent upon the market value of the building, which is currently listed for approximately 50% of the original par value of the bonds. There has been no formal disclosure since 2011.

68) Southern California Logistics Airport Authority (Baa2 stable) / Victorville Economic Development Authority- Southern California Logistics Airport Project

» CUSIP: 842472D, 842472C

» Default date: Failure to pay $535,000 in subordinate bond principal on December 1, 2011; reserve fund only available for interest payments, which were made ($1.3 million); subsequent defaults occurred in 2012-2015.

» Obligor: Victor Valley Economic Development Authority

» Issuer: Southern California Logistics Airport Authority

» Defaulted bonds: Subordinate Tax Allocation Revenue Bonds Series 2007, 2008A (non-housing); $51 million of bonds affected.

» Cause of default: Loss of pledged tax increment revenues because of collapsing real estate values, despite a very large project area base.

» Recovery: 97% estimated. The December 2011 default of the rated subordinate bonds was cured with tax receipts in March 2012, but reportedly without accrued interest; defaults since then have not been cured. Unrated Taxable Subordinate Series 2006, which effectively occupy a 'mezzanine' level pledge ahead of the rated Series 2007 and Series 2008A debt, also defaulted in December 2013 and 2014. The Series 2006 defaults were each cured in the year after the default.

The Southern California Logistics Airport Authority (SCLAA) is a joint powers authority between the City of Victorville and the obligor, the Victor Valley Economic Development Authority (VVEDA). SCLAA is effectively controlled by the City of Victorville. SCLAA was formed in 1997 to pursue redevelopment of the 2,500-acre George Air Force Base, which was deactivated in 1991. To this end it issued approximately $347 million of tax increment debt by 2008, of which $321.54 million was outstanding as of FY 2014. While aspects of the redevelopment effort have proceeded well with diverse warehousing, manufacturing and aviation tenants, other project components including a BNSF rail spur, a power plant and a 'visa investor center' faltered after considerable expenditure of bond funds.

On December 1, 2011, SCLAA first missed payment on its subordinate non-housing tax allocation bonds. Although the tax base area is very large, comprising some 85,000 acres, 12 sub areas and several towns and cities, the region was hit hard by losses in housing valuation during the downturn. As a result, tax increment revenues fell sharply, bringing debt service coverage on the rated subordinate non-housing bonds -of which about $51 million remain outstanding -to under 1.0x. The issuer was able to cure the December 2011 default with tax collections received during the next March distribution, however defaults since then have not been cured as no excess funds were available in the subsequent debt service payment cycles.

The State of California dissolved all redevelopment agencies in 2012. The successor agencies to these redevelopment agencies are subject to a semiannual, state approval process to use their tax increment revenues for preexisting obligations. Funds available for SCLAA's subordinate debt service have actually increased because the distinction between housing and non-housing tax increment was removed with the dissolution. In 2015, available revenues provided 0.86 times coverage of all housing and non-housing debt, up from 0.82 times in 2014.

There is also ongoing uncertainty over whether prior debt service defaults may be cured with subsequent, excess tax increment revenues, when available. A June 2015 continuing disclosure by SCLAA indicated that the state's Department of Finance (DOF) had disallowed the use of excess tax increment revenues in a subsequent period for the payment of previously defaulted debt service. The DOF's determination, relating to the July through December 2015 semiannual period, was inconsistent with prior decisions.

In December 2015, SCLAA received notice regarding its January 2016 through June 2016 period, that DOF had reversed its prior decision and would allow the use of excess tax increment revenues in a subsequent period for the payment of previously defaulted debt service. But this reversal was heavily caveated. Previously defaulted debt service obligations could only be paid from former tax increment generated from the George Air Force Base (GAFB) Parcels, which is only a small portion of the total project area securing the bonds.

SCLAA along with their legal counsel worked with DOF to explain that its determination of limiting tax increment to the GAFB parcels was inconsistent with the bond indentures. In February 2016, DOF shifted its position to allow the use of all pledged tax increment for debt service, default payments and reserve replenishment. DOF's decision is not binding and could be altered in future Recognized Obligation Payment Schedule (ROPS) period. Bondholder recovery rates and the rating will both be informed by not only AV growth rates but by DOF's stance in future ROPS periods on the permitted use of excess tax increment revenues.

Based upon tax base growth, and as long DOF's February 2016 position remains unchanged, Subordinate Tax Allocation bondholders should recover all of the originally due principal and interest payments, but would still suffer an estimated 3% loss (or 97% recovery) on a present value basis.

69) KidsPeace, Inc., PA

» CUSIP: 524805F37, 524805F45, 524805F52, 524805F60

» Default date: January 15, 2012

» Obligor: KidsPeace, Inc., PA

» Issuer: Lehigh County General Purpose Authority, PA

» Defaulted bonds: Series 1998 and 1999 Revenue bonds; $51.3 million of debt outstanding.

» Cause of default: Weak operating performance.

» Recovery: 9.3% for principal and accrued interest; excludes any value for new bonds.

KidsPeace is a private institution providing youth behavioral and mental health treatment and foster care with facilities in 10 states and the District of Columbia. Despite its scale and 130 year history, the debt supported by the institution was never rated above speculative grade by Moody's since its initial sale in 2000.

Operating and financial performance weakened significantly in subsequent years, reflecting declining or less-than-expected average daily census at residential facilities, cutbacks in governmental funding for programs and a series of professional liability issues. By fiscal year 2011, KidsPeace's liabilities exceeded assets by over 50%, and it was cutting salaries across the board and seeking to terminate its pensions. Given the resulting cash pressures, KidsPeace requested a two-year debt service payment suspension from bondholders and pension relief from the Pension Benefit Guaranty Corporation (PBGC). Both petitions are now pending. In March 2012 the PBGC placed an approximate $3 million lien on KidsPeace, becoming a secured creditor. In January 2013, KidsPeace agreed to a forbearance agreement with bondholders through June 1, 2013 that included a $15 million mortgage on property in favor of the trustee; a related

step was PBGC's agreement to subordinate status. KidsPeace missed its May 1, 2013 interest payment and filed for Chapter 11 bankruptcy shortly thereafter on May 21.

On December 18, 2013, KidsPeace and its affiliates filed a plan of reorganization in federal bankruptcy court. In 2014, bondholders were subject to a distressed exchange, comprising an upfront cash payment equivalent to 9.3% of outstanding par and accrued interest and $25.11 million in new 30 year Series A and accreting Series B bonds. (There are no-interest Series C bonds that function only to provide a claim against a second bankruptcy). Bondholders who purchased secondary insurance from ACA are also offered a cash payout of 36% in exchange for release from the insurance claim. There is no available estimate of the value of the replacement bonds.

70) City of Wenatchee, WA

» CUSIP: 950494

» Default date: June 1, 2012

» Obligor: City of Wenatchee, WA

» Issuer: Greater Wenatchee Regional Events Center Public Facilities District (unrated)

» Defaulted bonds: Contingent loan agreement on parity with general obligation debt; $9.3 million rated debt outstanding.

» Cause of default: Unwillingness to pay; failure to understand enterprise risk; poor management.

» Recovery: 100% following long-term takeout of the BANs three months after default.

The City of Wenatchee, located in north central Washington, had pledged its full faith and credit to backstop interest payments on unrated BANs issued by the Greater Wenatchee Regional Events Center Public Facilities District (PFD), a municipal corporation established to build and operate a 4,300-seat sports and entertainment arena. The Town Toyota Center arena enterprise had performed weakly for years and ultimately forced Wenatchee to honor its guarantee, which in turn exposed the City's General Fund and general taxing authority to liabilities far in excess of statutory and constitutional limits. In May 2012, Wenatchee announced it had insufficient funds to advance loans for future interest payments and did not advance funds for a note interest payment due June 1, 2012. This occurred despite PFD voter approval earlier in April for a 0.1% sales and use tax increase intended to help pay off the arena's $42 million debt.

Wenatchee's missed interest payment constitutes a default because the City made a clear pledge to support the contingent loan agreement, backed by its General Obligation Limited Tax authority.

On September 28, 2012 the PFD refinanced the BANs with $48.2 million long-term debt secured by several sources, including the 0.1% districtwide sales tax, an existing 0.033% districtwide sales tax and a 0.2% Wenatchee-only sales tax. The City and PFD also settled favorably with most of the city's major potential legal counterparties.

71) City of Stockton, CA

» CUSIP: 861361, 861394

» Default date: June 28, 2012

» Obligor: City of Stockton, CA

» Issuer: City of Stockton, CA

» Defaulted bonds:

Series	Debt Affected ($ mm)
2007 Taxable Pension Obligation bonds	$124.28
2004 Public Financing Authority Lease Revenue Bonds (Parking)	$31.64
2007 A&B Public Financing Authority Variable Rate Demand Lease Revenue Bonds	$40.36

2009 A Public Financing Authority Lease Revenue Bonds	$35.08
2004 Redevelopment Agency (Stockton Events Center)	$45.59
2006 A Public Financing Authority Lease Revenue Bonds	$12.09
2003 A&B Certificates of Participation (Redevelopment Housing)	$12.97

Note: Default as defined by Moody's, reflecting bankruptcy filing; city had suspended support for five of seven above series. Series 2003 A&B and 2006 A lease bonds did not default.

» Cause of default: Substantial losses in housing values and employment; inability to manage costs within confines of statutory property tax revenue limits; lack of sufficient financial controls.

» Recovery: Average recovery of about 50% across all seven outstanding bonds; recovery for Moody's rated 2007 POBs 41% of principal and accrued interest.

A historic inland port city and the seat of San Joaquin County, Stockton was caught in the boom-bust economic cycle of the 2000s and suffered substantial losses in tax base and employment. The city also had major problems with controlling spending; although a series of earlier self-declared "fiscal emergencies" were seen as aids to renegotiating labor contracts, Stockton also had serious unreported issues with financial management in general. In 2012, when it first proposed a suspension of general fund support for lease obligations, the city simultaneously announced a major, negative restatements of prior years' audits.

At the time, Stockton's June 2012 bankruptcy filing was the largest of any city in the US by population. It was also the first California city to use the state's new AB 506 mediation process. The city's bankruptcy also set a number of other precedents: it was the first city in which leased assets in a rated transaction were repossessed by the bond trustee (here, the 2004 Parking related transaction), and it was one of the first case in which a court deflated the ability of CalPERs to claim it was an arm of the state.

Stockton also demonstrated that default in bankruptcy can be selective; the Moody's rated 2006 A lease (office building housing key city functions) did not default, nor did the 2003 A&B COPs (fire, police and library properties). The other lease and lease-like obligations that were impaired covered a range of other city functions; ultimately, this broad class of debt saw impairment ranging from 0% to over 80%. Similarly, though Stockton's utility revenue bonds were at risk of default because of liquidity exposure to the city, they suffered no impairment and were not even part of the bankruptcy.

Although the Stockton bankruptcy has since been eclipsed by Detroit's filing in scale, the Stockton case will reverberate and redefine how we think about municipal Loss Given Default. Most significantly, it, along with San Bernardino, tested the status of pension obligations in relation to bonded debt.

The court's February 2015 written opinion confirming Stockton's plan of adjustment was a mixed bag for bondholders. Favorably, it made clear that pensions are not exempt from impairment under Chapter 9, despite substantial pressure from the state's pension fund to find otherwise. Negatively for bondholders, the court found that the ability to cut pensions was limited to cases where the court applied a complicated balancing test and ultimately decided cuts to pensioners would be allowed.

Further, the Stockton decision potentially established a road map for future bankrupt local governments to impose more severe cuts on bondholders than retirees. It did this by conflating the legally separate claims of pensions and retiree health benefits (also known as Other Post-Employment Benefits, or OPEBs) in determining whether to confirm the city's plan of adjustment. The judge allowed Stockton retirees to recover all of their future pensions, including the unfunded portion, while reducing OPEB liabilities to almost nothing. In its plan Stockton treated both claims, which are arguably unsecured, as separate classes.

The court made the point that the plan was fair to investors because the outcome for retirees must consider their overall recovery on pensions and OPEBs combined. By combining these two distinct classes of claims to arrive at a calculation of losses for retirees, the court provided a justification for eliminating OPEBs while keeping pensions, possibly opening the door for other bankrupt local governments to consider using the same approach in the future.

For creditors, Stockton's bankruptcy was complete after Franklin Templeton Investments lost its legal challenge to the bankruptcy exit plan approved in October 2014. Franklin, investor in the 2009 A COPs firm had argued that its recovery on the city's 2009 A certificates of participation should be far higher in large part because retiree pension benefits were untouched. The 2009 A COPS were significantly more impaired in the bankruptcy than the city's five other bond transactions outstanding at the time of the bankruptcy

(the 2004 Parking lease assets had been repossessed). Franklin had initially been offered about 10%, and its ultimate recovery of about 17.5% was far lower than the other debtors.

72) American Opportunities for Housing -Colinas, LLC, TX

» CUSIP: 088379SD5

» Default date: July 1, 2012

» Obligor: American Opportunity for Housing — Colinas, LLC, TX

» Issuer: Bexar County Housing Finance Corporation, TX

» Defaulted bonds: Subordinate Series 2001 C; $27.26 million total debt outstanding.

» Cause of default: Weak real estate market and poor operating performance.

» Recovery: 100% after sale of property in February 2013 and March 2013 defeasance.

The Colinas Project comprises 776 rental units in three properties-Las Colinas Apartments, Huebner Oaks Apartments and Perrin Crest Apartments-all built between 1978 and 1984 and located around San Antonio, Texas. The project subsequently experienced weak operating performance and then sustained fire damage, which left 16 units uninhabitable along with water damage. The bonds were first downgraded to below investment-grade in December 2006, in part because occupancy had fallen below 90%. To reduce vacancies, the project began to offer rental concessions that further weakened its financial position. The subordinate bonds first defaulted on July 1, 2012 after tapping both the surplus and debt service reserve funds. The borrower sold the project on February 14, 2013 and generated proceeds sufficient to pay all delinquent and outstanding principal and interest on the defaulted $3.37 million of subordinate bonds and redeem in full the $23.890 million of senior bonds.

73) City of Oakdale Sewer Enterprise, CA

» CUSIP: 672010

» Default date: August 31, 2012

» Obligor: City of Oakdale Sewer Enterprise, CA

» Issuer: City of Oakdale Sewer Enterprise, CA

» Defaulted bonds: Loan on parity with revenue debt; $1.6 million rated debt outstanding.

» Cause of default: Weak management practices.

» Recovery: 93.5%, reflecting principal and accrued interest

In August 2009, Oakdale Sewer Enterprise entered into a loan with the California State Water Resource Control Board (CSWRCB), which provided $13 million in capital financing for the rehabilitation and upgrade of the wastewater treatment plant. In August 2012, Oakdale failed to make a payment on this loan which was secured on a parity basis with Oakdale's rated 2002 revenue bonds. The default was a result of weak management practices, with the city staff reportedly unclear as to when the first payment was due. Apparently, however, miscommunication was not uncommon; the finance department also failed to set aside $844,000 in reserves, as was required by the loan agreement and had generally failed to track rate increases and projected revenues against expenditures.

Despite a reported doubling of residents' sewer rates since the borrowing, net revenue had remained insufficient to cover total debt service for the sewer system. Weeks before the missed payment, the city council decided to make a partial, interest-only payment on the CSWRCB loan (equivalent to about 39% of debt service due). Debt service on the 2002 parity bonds, however, which was significantly less than that on the loan, remained current at all times.

The city was reluctant to impose further sharp rate increases on residents and began negotiating with the Water Resource Control Board to restructure the entire loan obligation, which occurred in June, 2013. Under the terms of the restructuring, the final maturity date and the total principal for the CSWRCB loan remain unchanged, although the amortization schedule has been modified and backloaded to produce lower annual principal payments (and debt service) over the next seven years. The system made the required interest-only payment of $329,200 on August 31, 2013 and will resume principal payments in August 2014. The loan modification plan also required the system to raise rates sufficient to stabilize the system. In November of 2013, the system adopted a series of rate increases extending out to 2017.

While the new amortization schedule calls for full repayment of the CSWRCB loan principal within the original final maturity date, Moody's calculates a present value loss of approximately 6.5% for the CSWRCB as creditor.

74) Jefferson County Public Building Authority (Jefferson County Lease)

» CUSIP: 4726PA

» Default date: January 1, 2013

» Obligor: Jefferson County, AL

» Issuer: Jefferson County Public Building Authority, AL

» Defaulted bonds: Lease Revenue Warrants Series 2006; $78.4 million outstanding.

» Cause of default: Distressed exchange and workout related to county bankruptcy.

» Recovery: 100%+, reflecting principal, accrued interest and additional payments over time

The Jefferson County Public Building Authority was created as a facilities financing vehicle for Jefferson County and its agencies. In 2006, the Authority undertook the construction of a new courthouse and the renovation of the existing jail and courthouse with the sale of $86.7 million of lease revenue warrants. The Bessemer Court House and Jail project warrants were secured by rental payments from Jefferson County, subject to the annual renewal of the lease. After its bankruptcy filing in November 2011, however, Jefferson County skipped its 2012 lease payments to preserve its already-narrow cash position. The County petitioned the court for relief from its automatic bankruptcy stay to allow the trustee to draw on the debt service reserve fund to make the April 2012 payment. The court allowed it, and full payment was made to bondholders. A similar motion was filed and granted for the October 2012 payment. Jefferson County examined a number of options in regards to the lease, including rejecting the lease and relocating the jail and courthouse services elsewhere. Ultimately, however and in conjunction with its plan of recovery, the County restructured its obligations with the Authority in November 2012 in a workout arrangement that included Ambac, the insurer for the 2006 Warrants. This allowed the county to keep the warrants' original 20 year maturity schedule by relying in part upon Ambac insurance and with a new lease that eases and extends the county's repayment obligations over 30 years. The workout, which became effective January 1, 2013, essentially comprises a distressed exchange wherein original warrant holders remain unimpaired; they receive principal and interest as originally scheduled with the help of Ambac, who will cover scheduled debt service payments from 2016-2021 and in 2026. In return for Ambac's contributions, the county will reimburse Ambac with semiannual payments of $2.3 million from October 1, 2026 through April 1, 2036, a period that extend well beyond the warrant maturity. The final recovery calculation for the lease revenue debt provides Ambac as ultimate creditor with a recovery of 117% (using a 5% discount rate); the greater than 100% recovery reflects Ambac's return for covering some of the payments on the warrants.

75) West Penn Allegheny Health System, PA

» CUSIP: 01728AG

» Default date: April 30, 2013

» Obligor: West Penn Allegheny Health System

» Issuer: Allegheny County Hospital Development Authority

» Defaulted bonds: Health System Revenue Bonds, Series 2007A through distressed exchange; approximately $710 million of debt affected.

» Cause of default: Declining patient volumes and large operating losses.

» Recovery: About 85% of outstanding bonds were tendered in the distressed exchange and reportedly received 87.5% of par. There was no monetary default on either principal or interest up until the distressed exchange. Status and recovery for the remaining outstanding bonds is pending. (Source: Moody's files)

West Penn Allegheny Health System (WPAHS) formed at the merger of The Western Pennsylvania Hospital and Allegheny Health and Research Foundation's (AHERF's) Pittsburgh operations, after AHERF's bankruptcy filing and restructuring of its Philadelphia operations in 1998 (See: #16 and #17). In the succession, WPAHS inherited a weakened balance sheet and other credit challenges.

WPAHS's 2013 restructuring was the result of years of financial troubles for the entity, which included drops in patient volume, management and governance missteps, continuous large operating losses, a concentrated and exclusive insurance market which provided insurance companies unusually high negotiating leverage and a significant degree of market competition from neighboring University of Pittsburgh Medical Center (UPMC). UPMC had grown to become the largest health system in the region and WPAHS's ability to compete was constrained by a lack of capital resources to invest in facilities and other strategies.

WPAHS restructured its Pittsburgh operations in 2013, which included a distressed exchange with bondholders. As part of the restructuring, Highmark Health Services, a not-for-profit health insurance company in western Pennsylvania, became affiliated with WPAHS and in doing so took over management of operations and in an associated move attempted to acquire all outstanding debt at a discount. The distressed exchange that resulted affected 85% of outstanding bonds whose holders accepted the tender offer of 87.5% of par. The status and recovery of the remaining outstanding debt is pending. In late 2013, Highmark reportedly acquired another $50 million or roughly half of the non-tendered bonds up to that point. At no time did any of bonds suffer monetary default on either principal or interest.

76) Pontiac City School District, MI

» CUSIP: 732538G

» Default date: May 1, 2013

» Obligor: Pontiac City School District, MI

» Issuer: Pontiac City School District, MI

» Defaulted bonds: Series 2006 General Obligation Limited Tax School Building and Site Bonds; approximately $1.4 million of debt affected.

» Cause of default: Extreme operating and financial stress stemming from sharp enrollment declines and loss of state aid.

» Recovery: 100% repaid to insurer.

The Pontiac City School District default was the first by any Moody's rated school district, and was followed by the default of a second albeit unrated Michigan school district, Buena Vista, which was then dissolved. A third Michigan district, Inkster, was also dissolved and two more, Muskegon Heights and Highland Park, were effectively dissolved by their emergency managers and converted to charter academies, These broadly reflect large scale changes in Michigan public education, which promotes school choice and competition through mobility of per student state aid, on top of severe economic and demographic declines in the southeastern part of the state. School districts' very limited revenue raising flexibility and stagnant state funding have also contributed to financial distress among districts.

The steady erosion of Pontiac School District's credit quality reflected a variety of problems stemming from a weakened economic base, with school enrollments declining 50% from a decade ago and rapid turnover of management. The district had been operating with very limited liquidity for several years, with increasing reliance on cash flow borrowing via tax anticipation notes (TANs) and state

aid anticipation notes (SANs) to fill shortfalls. Leading up to the default, the district's General Fund deficit had risen to 50%, and it had a large backlog of unpaid bills. The default was triggered by a series of state actions related to the district's deficit operations. First, the Michigan Department of Treasury withheld permission for the district to issue TANs for fiscal 2013, citing insufficiency of financial information and its concerns about the district's ability to ultimately repay the notes. Then, Michigan Department of Education (MDE) separately withheld Pontiac's aid payments in March and April because the district did not comply with its deficit elimination plan. All this while, the state was considering putting the district under increased financial oversight. The MDE eventually released state aid to Pontiac, but not in time to avert the default.

Defaulted bondholders were paid promptly by the insurer, Syncora Guaranty, once the claim was made, but this was delayed because the paying agent did not notify Syncora of the default until May 21, 2013. While the missed debt service payment was relatively minor in comparison with district operations – approximately 2% of general fund revenues – repayment had to compete against a growing backlog of unpaid bills. The district was then granted permission by the state to issue a TAN, improving cash flow and also agreed a quarterly repayment schedule with Syncora for principal and accrued interest. The final payment to the insurer was made in June 2014, resulting in recovery of over 100%.

District finances have improved since 2013 given a combination of emergency state loans, expense cuts and stronger management practices. In March 2016, voters renewed the district's local operating tax, providing predictability for a core operating revenue and approved a new sinking fund millage that will raise funds for capital expenses and relieve spending pressure on the General Fund.

77) City of Detroit, MI Certificates of Participation

» CUSIP: 251228A; 25113PA

» Default date: June 14, 2013

» Obligor: City of Detroit, MI

» Issuer: Detroit Retirement Systems Funding Trust

» Defaulted bonds: Series 2005 and 2006 Taxable Certificates of Participation; approximately $1.45 billion of debt affected.

» Cause of default: Extreme operating and financial distress after years of economic contraction and outmigration.

» Recovery: 12%

The City of Detroit's decades-long descent into financial distress has been well documented, and its unraveling, though unique in its severity and duration, may have implications for the treatment of bondholders in other distressed municipalities going forward. Some of its actions have been predictable, but others have been less expected; the treatment of its COPs debt falls into the latter category.

The city defaulted on the COPs on June 14, 2013, the same day it presented a proposal to its creditors to restructure its obligations. The proposal laid the groundwork for the city's bankruptcy filing. It argued that the city was insolvent from a service perspective and claimed that the city's debt and pension burden and other financial challenges prevented it from adequately providing public health and safety services. The concept of service level insolvency was a central element of the federal bankruptcy court's decision permitting the City of Stockton, California to file for Chapter 9 bankruptcy protection. One month later, the city filed for bankruptcy and defaulted on its general obligation debt (see following case study).

On January 31, 2014, the city filed a motion with the bankruptcy court to invalidate its $1.45 billion of COPs debt. Detroit alleged that its COPs were issued illegally, in that they violated the city's statutory debt limit. If such a repudiation had been successful, holders of the COPs could have received 0% recovery. If the city successfully repudiated the debt, it may have been required to return the proceeds of the sale, which funded the city's pension systems. Notably, repudiating the COPs could have increased recovery for other creditors, as more of the city's limited funds would have been available to pay off other liabilities. Ultimately, the city never followed through with its legal motion.

Because the COPs were issued as variable rate instruments, the city had entered into a series of swap agreements that later comprised another set of liabilities in the bankruptcy. The city reached a settlement with the counterparties to the swap agreements, whom the

city considered to have secured status, resulting in a payment of $85.0 million. The contrast between the proposed treatment of swap counterparties compared to COP holders who faced repudiation highlights the uncertainty of creditor treatment in times of distress.

Ultimately, the city's filing was rescinded as part of the final settlement with creditors; the bankruptcy settlement provided an approximate cash recovery for COP bondholders of 12%, which is significantly lower than that provided to GOLT and GOULT bondholders (see Case Study 78 and 79).

This upfront recovery does not capture additional considerations in the form of property transfers, lease agreements or various other economic benefits reflecting separate settlements reached between the city and the bond insurers.

78, 79) City of Detroit, MI Limited Tax and Unlimited Tax General Obligation

» CUSIP: 251093Q; 251093M, 251093N, 251093P, 251093G, 251093F, 251093H, 251093J, 251093K, 251093E, 251093B, 251093C, 251093D, 251093A, 251093Z, 251093Y, 251093X, 251093W

» Default date: July 18, 2013

» Obligor: City of Detroit, MI

» Issuer: City of Detroit, MI

» Defaulted bonds: Unlimited Tax General Obligation Series 2002, 2003, 2004, 2005, 2008; Limited Tax General Obligation Series 2004, 2005, 2008; $552 million of principal affected

» Cause of default: Extreme operating and financial distress after years of economic contraction and outmigration.

» Recovery: 73% for GOULT bonds; 42% for GOLT bonds.

Detroit initially attempted to treat of Limited and Unlimited Tax General Obligation bondholders as "unsecured" creditors, which put them on par with other unsecured creditors such as pensioners and vendors. Bondholders contested the treatment of GO debt as "unsecured" in bankruptcy court, claiming that the debt was secured because voters approved a dedicated property tax levy to pay debt service on the GO bonds. Under state law, proceeds from this levy were to be put aside and used solely for payment of principal and interest. The city argued that federal bankruptcy protection dissolved any rights the bondholders have to either access those funds or to sue in court to have property taxes increased to pay debt service.

Eventually, the city announced a settlement with most of the insurers of GOULT debt that reclassified this lien as "secured." Ultimately, because the city and bondholders settled, there was no court decision as to whether or not the bonds would have been designated secured or unsecured. The final bankruptcy settlement ultimately impaired both types of GO bondholders, with GOULT and GOLT debt recovering 73% and 42%, respectively.

80) Detroit Academy of Arts & Sciences, MI

» CUSIP: 5955RQ

» Default date: October 1, 2013

» Obligor: Detroit Academy of Arts & Sciences, MI

» Issuer: Michigan Municipal Bond Authority

» Defaulted bonds: Public Schools Academy Facilities Program Revenue Bonds (Detroit Academy of Arts and Sciences Project), Series 2001; $25.5 million of debt affected

» Recovery: 49% reflecting principal and accrued interest and a distressed exchange into new bonds

The Detroit Academy of Arts and Sciences was a not-for-profit charter school that received its charter in 1997 and began operations in August of that year. It originally served public school children in grades K-5, but eventually expanded to include K-12. The 2001

bonds were secured by monthly installment payments of state aid revenue transferred to the trustee, who is directed to retain no more than 20% for debt service, Pledged revenues in 2011 were a very narrow 1.06 times debt service. The 2011 closure of the Academy's high school dealt a devastating blow to the already-weak financial position of the Academy, as state aid revenues are distributed on a per-pupil basis. Additionally, the Academy operated in a highly competitive public education market in the state of Michigan, which resulted in large drops in enrollment for K-8 students (which were down 38% from 2004 to 2013) and imposed volatility on enrollment and revenue trends going forward. Since February 2012, the Academy had been operating under a forbearance agreement with bondholders, which was extended several times.

The Academy defaulted on debt service in October 2013. Relatively quickly thereafter in December 2013 the Academy sold $14.9 million of bonds in a distressed exchange of the remaining $25.5 million principal on the original Series 2001 bonds. In addition to the 42% reduction in principal, the new bonds extend the final maturity from 2013 for the exchanged Series 2001 bonds to 2043 for the new debt. The new 2013 debt is similarly secured by state aid payments to the Academy. The resizing of debt and annual debt service payments is likely to more closely match annual pledged revenues of the Academy following the steady decline in enrollment, but because of the longer amortization, the 58% recovery of principal translates into an all-in recovery rate is 49%.

US municipal defaults 2015-2022 (#81-#100)

81) Cook County, IL, Single Family Mortgage Revenue Series '83A – Municipal Multiplier

» CUSIP: 216144CE3

» Default date: July 1, 2015

» Obligor: Cook Country, IL Single Family Mortgage Revenue

» Issuer: Cook Country, IL

» Defaulted bonds: Series '83A – Municipal Multiplier; $130K total debt outstanding.

» Cause of default: Negative Arbitrage.

» Recovery: Approximately 15%

The Single Family Mortgage Revenue Bond Series 1983A financed a pool of single family mortgage loans. The bonds defaulted as a result of a weak bond structure. A portion of the bonds were Municipal Multiplier Bonds, a similar payment structure to capital appreciation bonds (CABs), which could not be redeemed until all other bonds were redeemed. Those bonds had an interest rate that was higher than the mortgage and investment rate. Due to the prepayments and defaults on the loans securing the bonds, for much of the life of the bonds, the program experienced negative spread between the interest rates earned on the assets (10.75% on the mortgage loans and 7.75% to 10.125% on the reserves) and rate accruing on the Municipal Multiplier Bonds of 11.25%. This negative spread resulted in insufficient assets to pay off all of the bonds and the default on the bonds.

82) Dowling College, NY

» Default date: July 20, 2015

» Obligor: Dowling College, NY

» Issuer: Suffolk County Industrial Development Agency, NY and Town of Brookhaven Industrial Development Agency, NY

» Defaulted bonds: Subordinate Series 1996; $3.5 million outstanding (6/30/2014, rated Ca, issued by Suffolk County Industrial Development Agency), Subordinate Series 2002; $9 million outstanding (6/30/2014, rated Ca, issued by Town of Brookhaven Industrial Development Agency), Series 2006; $34.5 million outstanding (6/30/2014, not rated by Moody's).

» Cause of default: The deterioration of college's financial condition due to multiyear trend of unsustainable enrollment declines (53% in last four years), weak operating performance (FY 2014 debt service coverage of 0.5 times), and very thin liquidity (12 days cash on hand in FY 2014).

» Recovery: Average recovery 17.8% of principal across all series, but ranged from 100% (Series 2015) to less than 1% (Series 1996)

Dowling College is a small two campus private educational institution in Long Island NY that had long struggled with costs, competition and poor financial performance. Unusually tuition dependent, some 40% of Dowling's enrollment -about 4000 FTE – had typically been in graduate business, and aviation and other professional programs. Never rated higher than Ba2 since 1997, Dowling fell into the B category in late 2008. By 2009, Dowling was beginning to miss financial covenants and required noncompliance waivers to continue operations. Dowling began to suffer large enrollment declines and a worsening liquidity position.

The college entered into a forbearance agreement on 7/20/2015 with respect to the debt service payments on the Series 1996, 2002 and 2006 (not rated) bonds through June 30, 2016, unless terminated earlier pursuant to the agreement terms. The college also entered into a new debt agreement ($6.7 million; not rated) which will be used to provide much needed liquidity and pay down outstanding mortgage notes.

The College sold one of its two campuses for $26 million, and sold the other for $14 million. Average recovery of principal across all series was about 17.8%. Recoveries ranged from 100% of principal (Series 2015) to less than 1% (Series 1996).

83) Puerto Rico Public Finance Corporation

» Default date: August 3, 2015

» Obligor: Puerto Rico (Commonwealth of)

» Issuer: Puerto Rico Public Finance Corporation

» Defaulted bonds: 2011 A and B, 2012 A; $1.2 billion outstanding.

» Cause of default: Failure to appropriate funds for payment.

» Recovery: Bondholders will get a cash settlement, with a recovery ranging from approximately 2% to perhaps 5% adjusted for lost time value of accrued principal and interest.

Puerto Rico's Public Finance Corporation (PFC), a conduit agency that issues debt supported by appropriations of Puerto Rico's central government, on August 3, 2015, defaulted on four series of bonds for which Puerto Rico's Legislative Assembly had failed to appropriate payments. This was the first payment default of any of the Commonwealth's various debt issuing arms, all of which were rated in the deep speculative ranges at the time of this default. The total payment due was $58 million, and bondholders received only $628,000. Confronted by a growing liquidity and debt crisis, the legislature in June 2015 had approved a budget lacking the required $93.7 million for the PFC bonds' fiscal 2016 debt service, even though the executive branch Office of Management and Budget had included this amount in budget bills it submitted to the legislature.

The absence of bondholder objections to PFC's missed payments underscores the comparative weakness of these subject-to-appropriation bonds with respect to some of the other debt issued by the commonwealth and its various entities.

The PFC debt, along with that of several other Commonwealth issuing entities, was removed from the bankruptcy-like restructuring under the Title III Plan of Adjustment into a consensual negotiation process under Title VI. Per the restructuring support agreement, bondholders will realize $40.5 mm in PFC "distribution funds" resulting in a cash, adjusted recovery of around 2%; this rises to about 5% if some $48 million additional "trustee GDB claim/recovery" funds are realized, though this may depend upon GDB recovery itself and trustee fees.

84) Cardinal Local School District, OH (Baa3 stable)

» CUSIP: 141519GW2

» Default date: December 1, 2015

» Obligor: Cardinal Local School District, OH

» Issuer: Cardinal Local School District, OH

» Defaulted bonds: General Obligation Library Improvement Bonds, Series 2002

» Cause of default: Strained cash flow coupled with narrow reserves; management's decision to delay debt payment to make payroll

» Recovery: 100% of the amount due

Located about 35 miles outside of Cleveland, OH, Cardinal Local School District's operations were pressured by enrollment declines, decreased state aid, rising special education expenditures and limited voter support for new operating levies. Ongoing structural imbalance led to weakened cash flow and negative fund balance levels. Although Cardinal's debt is secured by a dedicated tax levy, the district intentionally defaulted on its Series 2002 bonds in December 2015, opting to pay salaries instead. Bondholders were ultimately paid by the insurer, Assured Guaranty Municipal Corp., but not until February 2016, as the district did not notify Assured of their inability to pay or their decision to default. Cardinal subsequently repaid Assured the full amount of delinquent principal and interest.

85) Puerto Rico Infrastructure Financing Authority

» Default date: Date: January 1, 2016

» Obligor: Puerto Rico (Commonwealth of)

» Issuer: Puerto Rico Infrastructure Financing Authority (PRIFA)

» Defaulted bonds: Various Special Tax Revenue Bonds; $1.64 billion outstanding.

» Cause of default: Failure to appropriate funds for payment.

» Recovery: Distressed exchange with cash and Contingent Value instruments effective March 15, 2022. Immediate recovery estimated at 9% with lost time value (compared to a notional 14%), but could go to 27% depending upon future success of the rum tax-based contingent value instruments.

The second of the Puerto Rico entities to default, the Public Infrastructure Finance Authority (PRIFA) is a conduit agency that had issued debt supported by federal rum excise taxes. Although rum tax revenue continued to flow to PRIFA, the governor invoked the provisions of a November 30, 2015 Executive Order implementing a revenue clawback under the Puerto Rico Constitution, effectively seizing PRIFA's excise tax revenues for general government operations as of 2016. PRIFA consequently defaulted on January 4, 2016, the first business day of the new year.

In addition to rum tax bonds, a small subset of PRIFA's debt was issued to fund port improvements. These Puerto Rico Ports Authority's 2011B Ports Authority Project Revenue were payable solely from revenues received by the Financing Authority under the Loan and Trust Agreement. The obligations of the Port Authority under the Loan and Trust Agreement constitute a general, unsecured obligation of the Ports Authority, which ranks on parity with all other general, unsecured and unsubordinated obligations thereof. The bonds were also secured by two irrevocable, transferable direct pay letters of credit issued by the Government Development Bank, a public corporation and governmental instrumentality of the Commonwealth of Puerto Rico.

On December 30, 2019 holders of the 2011B Ports Authority Project Revenue Bonds, originally issued in the amount of $192.83 million, received a recovery of approximately 78%. The higher recovery rate reflects the trustee's legal remedy to assert remedies that "may be disruptive to current PPP efforts" for the cruise ship terminal, bolstering creditors position at the negotiating table.

Beyond this settlement, the bulk of the PRIFA debt, along with that of several other Commonwealth issuing entities, was removed from the bankruptcy-like restructuring under the Title III Plan of Adjustment into a consensual negotiation process under Title VI. Per the resultant Qualifying Modification, bondholders received $193.5 million in cash and may receive additional amounts from the contingent value instruments

86) Puerto Rico Government Development Bank

» Default date: May 1, 2016

» Obligor: Puerto Rico Government Development Bank (GDB); Commonwealth of Puerto Rico

» Issuer: Puerto Rico Government Development Bank

» Defaulted bonds: Series 2006 B, 2009 C and D, 2010 B and C, 2011 A, I and H; $3.9 billion senior notes; $4.13 billion outstanding total debt excluding GO guaranteed debt

» Cause of default: Invocation of the Commonwealth's debt moratorium law.

» Recovery: Distressed exchange with new GDB Debt Recovery Authority Bonds enacted November 29, 2018; original projected recovery of 41% assumed but revised to 35% or lower due to the erratic performance of the municipal loan collateral

Puerto Rico's Government Development Bank (GDB) defaulted in May 2016 when it was unable to meet a large bullet debt service payment for its Senior Notes. The GDB's main revenues source comprised repayments of loans made to underlying municipal governments across the commonwealth; by spring 2016 the GDB's own liquidity was severely weakened and it had no independent market access.

The GDB was the first of the defaulted Puerto Rico entities to complete a restructuring, via a distressed exchange completed on November 29, 2018. Creditors received new privately issued "GDB Debt Recovery Authority Bonds" with a total par amount of nearly $2.6 bill for an expected recovery of 41% assuming the collateral for the new securities performs as scheduled. However, actual recoveries could be below 35% if the collateral does not perform, which is not unthinkable because it is primarily composed of loans made to municipal governments that will likely come under fiscal strain if the commonwealth reduces municipal aid.

Indeed, within a little over a year from this settlement, the new unrated GDB notes were only able to make a partial payment from cash on hand, with the remainder of the payment added to the principal balance, per restructuring terms. Collateral sales resulted in a $293 million pay down of principal in August 2021, but in February 2022, revenues again were insufficient with the shortfall being added to the outstanding balance. Since then, revenues have recovered and have recently been sufficient to pay down principal.

87) Puerto Rico (General Obligation and GO Guarantee)

» Default date: July 1, 2016

» Obligor: Puerto Rico (Commonwealth of)

» Issuer: Puerto Rico (Commonwealth of)

» Defaulted bonds: Various General Obligation and Public Improvement Bonds; $17.65 billion General Obligation including GO guaranteed GDB debt

» Cause of default: Invocation of the Commonwealth's debt moratorium law.

» Recovery: Distressed exchange with cash, new GO bonds and Contingent Value instruments effective March 15, 2022. Immediate recovery estimated at 53% with lost time value (compared to a notional 74%), with possible additional amounts from contingent value instruments.

Puerto Rico's general obligation pledge ostensibly reflected the highest and broadest form of security for the Commonwealth's non-enterprise debt and it is protected by the Commonwealth's constitution. Despite this apparent strength, the GO pledge has not fared well. First, Puerto Rico defaulted on its GO debt before other securities with weaker legal claims, underscoring both the comparatively large amount of GO debt and debt service and also the severity of the government's current liquidity crisis. Next, the GDB and COFINA debs were restructured before the GO debt (see Case Studies 86 and 92/93), and thereby laid claim to revenues and resources that arguably might otherwise have gone to GO bondholders. In addition —and significantly —the commonwealth sought to repudiate some of the outstanding GO debt and guarantees by arguing that the debt issued after 2012 was in violation of constitutional debt limits and was thus invalid. While settlement for all GO was ultimately included in the POA that went into effect March 15, 2022, GOs were divided into no less than nine classes depending upon issuer (e.g., Public Building Authority) and date, with notional recoveries ranging from 68% to 80%. Our estimate above (74% notional, 53% time value adjusted) reflects GO as a single class.

88) Puerto Rico Highway and Transportation Authority

» Default date: July 1, 2016

» Obligor: Puerto Rico Highway and Transportation Authority; Commonwealth of Puerto Rico

» Issuer: Puerto Rico

» Defaulted bonds: Subordinated Transportation Revenue Series 1998; $52 million outstanding

» Cause of default: Failure to appropriate funds for payment.

» Recovery: estimated 0% without future recovery from contingent value instruments

Similar to the PRIFA rum tax bond default earlier in the same year, the Puerto Rico Highway and Transportation Authority (PRHTA) defaulted in July 2016 on one of its two subordinate transportation revenue bonds when the commonwealth seized the pledged highway user tax revenues to fund general governments operations under its clawback authority. PRHTA's highway user tax debt, however, with $815 million debt outstanding, was untouched by the clawback and remained current until July 2017 as did the senior lien transportation revenue bonds and additional subordinate lien series. (see case study 97 for more information).

The PRHTA debt has been the subject of much municipal market interest because of two important decisions by the Puerto Rico Title III court that were then upheld by the US First Circuit Court of Appeals. First, in August 2018, the First Circuit held that PRHTA bondholders likely had no statutory lien on the pledged revenues, by virtue of language in both the enabling legislation and the bond authorization. Then, in March 2019, the First Circuit ruled that PRHTA revenues did qualify as "special revenues" and were thus exempt from the automatic stay. The application of the revenues to pay bondholders, however, was ruled to be optional and at the discretion of the debtor, who could suspend payments during the pendency of the bankruptcy. This counters the special revenue decision in the Jefferson County bankruptcy, where the revenues were deemed to be special revenues and the county needed to continue making payments to the bondholder.

In January 2020 the US Supreme Court denied a request to review the First Circuit's special revenue ruling, thus leaving open the broader question of whether governments must pay debt service on utility revenue, special tax, tax increment and other categories of municipal debt while a Chapter 9 filing remains open. As a result, the March 2019 ruling remains a binding precedent only for the commonwealth and those states that are within the 1st Circuit.

These decisions are unique because municipal bankruptcy and restructuring cases so rarely reach the Federal appeals level. The decisions underscore the risks of relying on legal provisions in situations of extreme economic and financial stress, particularly in the absence of additional Supreme Court clarity.

Under the 8th Plan of Adjustment which was confirmed by the bankruptcy court in October 2022, subordinate lien bondholders (both the Series 1998 and the Series 2003 which defaulted in 2017) did not receive any cash distribution or any new bonds. Additional amounts potentially to be recovered from clawback contingent value instruments (CVIs) with a lifetime cap of $207 million over 30 years.

89) Birmingham-Southern College, AL (Caa2 negative)

» CUSIP: NA; unrated private placement

» Default date: March 23, 2017

» Obligor: Birmingham-Southern College, AL

» Issuer: Birmingham-Southern College, AL

» Defaulted bonds: Unrated privately-placed senior lien refunding notes

» Cause of default: Strained cash flow coupled with narrow reserves; management's decision to delay debt payment to make payroll on time

» Recovery: Distressed exchange netting 63% of the original par amount

Birmingham-Southern College undertook a distressed exchange of unrated senior lien debt in March 2017. At the time, the college had total debt of $57 mm, of which $21.3 million comprised rated Tuition Revenue Bonds across three series (Series 2002, CUSIPS 091075AR2, T8, S0; Series 1997, CUSIP 091244CB7; and Series 1996 091244BG7, H5), all of which remained unaffected.

The remainder of the debt, however, comprised an unrated $34.7 million refunding note placed with Regions Bank, which had a first lien on all other assets of the college including real estate and financial assets; in legal and practical terms, this debt is senior in claim to the rated debt, which was payable only from annual tuition receipts.

Interest rates on the Regions note had already bumped up from 4% to 5% and were headed higher; since this was increasingly unaffordable, Regions agreed to a 38% haircut, accepting a $21.5 million settlement, which was funded by two new bank loans and a $1.5 million internal borrowing from endowment. Essentially, owners of 60% of the college's outstanding debt settled for 62 cents on the dollar in a distress situation, even though this debt was effectively senior to the Moody's rated debt that remained untouched. Although the Regions note had the strongest lien position in the event of college bankruptcy or foreclosure, a Regions executive was also on the board of the College, which was a factor in their exit.

90, 91) Dallas County Schools, TX

» CUSIP: Public Property Finance Contractual Obligations (GOLT)

  – Series 2012: 234830AL1, M9

  – Series 2012-A: 234830AX5, AY3, AZ0, BA4, BB2, BC0, BD8

  – Series 2013: 234830BM8, N6, P1, Q9

  – Taxable Series 2014: 234830BY2, Z9

  – Series 2014: 234830BT3, U0, V8, W6, X4

  – Revenue Pass Through Custodial Receipts (Promissory Notes) Series 2015: 234830CE5

» Default date: Date: June 1, 2017

» Obligor: Dallas County Schools, TX

» Issuer: Dallas County Schools, TX

» Defaulted bonds: Public Property Finance Contractual Obligations (GOLT), Series 2012, 2102-Q, 2013, Taxable Series 2014, Series 20414: $44.7 million outstanding; Revenue Pass Through Custodial Receipts (Promissory Notes) Series 2015: $3.2 million outstanding

» Cause of default: Financial and governance mismanagement brought on by speculative venture into enterprise operations.

» Recovery: 100% of principal and interest for GO LT debt given tax pledge, but approximately 96% on a present-value basis; 0% expected for Promissory Notes given dissolution of District and distribution of assets to underlying K-12 school districts

Despite its name, Dallas County Schools was a limited-purpose, noneducational district that provided bus services to approximately 10 K-12 school districts within Dallas County. Its bus operations were sizable, with a fleet of some 1900 vehicles. Even with this simple mission, and the revenue advantages of a 10 mill levy on a vast countywide tax base, the district ultimately defaulted and put itself out of business within five years of embracing a speculative enterprise.

Rated debt at the time of default included $44.7 million GOLT debt, secured by the 10 mill ad valorem tax and $3.2 million promissory notes payable from available revenues. In addition, the District had $82.6 million in outstanding lease and other contractual obligations broadly payable on the same basis as the promissory notes.

In 2012, Dallas County Schools began equipping its bus fleet with stop-arm camera with the hope of catching drivers who passed stopped school buses and share in the ensuing traffic violation revenue. The district ultimately envisioned selling or licensing the camera system nationwide to further enhance district coffers. The system, however, proved to be unpopular. The demand for the technology never developed and the resulting revenues were much lower than expected. The district ended up overleveraged, with widening budget gaps and much political ill-will.

In early 2017, the district had a very sizable $40 million budget gap and needed to either sell cash flow notes or effectuate a refinancing to meet a June debt service payment. However, three key developments worsened the district's market access prospects significantly, putting it in immediate risk of default. First, the Texas AG surprisingly denied the District permission to refinance and extend their debt. Second, the bill to abolish the district, driven by the adverse publicity of the district's venture and self-inflicted financial pressures, passed the Legislature and was signed by the Governor. The result was a November 2017 ballot measure the if Dallas voters did not vote "yes," the dissolve the district by September 1, 2018 and its buses will be distributed to local school districts at no cost. Third, under the dissolution bill, the District would not be allowed to apply its GOLT to repay any new debt nor, possibly, any accrued interest from a nonpayment. But the bill would allow the District to maintain its GOLT levy until existing outstanding GO debt was retired. This was not uncommon practice for other dissolutions or consolidations in Texas and elsewhere.

Thus the downside scenario was a dissolution that allowed the GOLT debt to be repaid, but stripping out all other assets would leave no means by which to repay the rated Promissory Notes or other similar obligations. However, even with long term ability to pay off its GOLT debt under dissolution, the exclusion of any note or other new debt from the levy — along with the adversarial position of the State in general — effectively closed off its access to a public TAN borrowing or other loan. The immediate consequence of this was that the District was unable to borrow to meet an approximate $6 million GOLT debt service payment due June 1, 2017, and defaulted on the Promissory Notes. Even though the bonds benefited from a separate ad valorem levy, the District had commingled its tax revenues with enterprise operations and had not set aside tax receipts for debt service.

In midsummer 2017, the District had managed to cure the springtime GO default with a privately placed TRAN borrowing a few months later. In the November election, however, Dallas County voters opted to dissolve the district. The district ceased operations after the 2017-18 school year, at which point all buses were distributed to the various served local school districts. A dissolution committee determined a payment plan for the repayment of outstanding obligations, including the GOLT debt, by 2023 using the 10 mills. GOLT is likely to be paid in full with the exception of one year of unpaid accrued interest while the promissory notes are expected to have a 0% recovery given the payment plan does not allow for repayment from the property tax levy.

92, 93) Puerto Rico Sales Tax Financing Corporation (COFINA)

» Default date: June 1, 2017

» Obligor: Corporación del Fondo de Interés Apremiante (COFINA, Commonwealth of Puerto Rico Urgent Interest Fund Corporation)

» Issuer: Corporación del Fondo de Interés Apremiante (Puerto Rico Urgent Interest Fund Corporation)

» Defaulted bonds: Various Junior and Senior Lien Sales Tax Bonds; approx. $7.7 billion outstanding senior lien; $9.9 billion outstanding junior lien debt

» Cause of default: Bondholder lawsuit and court order

» Recovery: Distressed exchange with new "Puerto Rico Sales Tax Financing Corporation Restructured Sales Tax Bonds" effective February 12, 2019. The new debt was distributed to both existing senior and subordinate debtholders in differing proportions as negotiated. The estimated nominal recovery is 93% for senior COFINA debtholders and about 56% for subordinate debtholders based on this distribution, but the performance of the new debt depends upon the commonwealth's overall economic and financial recovery. Moody's estimates recovery of about 82% for senior COFINA holders, and a recovery of closer to 50% for junior lien holders.

The COFINA default was triggered in June 2017 by a court order resulting from a bondholder lawsuit.

COFINA was the second Puerto Rico entity to complete a restructuring, after the GDB (see Case Study 86). The plan was negotiated by summer 2018 and put into effect on February 19, 2019 following the approval of the Title III court with the issuance of $11.87 billion Restructured Sales Tax Bonds, Series 2019A. The new bonds were distributed 93% and 56% to existing senior and subordinate lien bondholders, respectively. Moody's expects actual recoveries on the order of 82% and 50% respectively because the new Restructured Sales Tax debt performance depends upon the Commonwealth's overall economic and financial recovery, which is far from certain. Overall recovery across both liens is estimated at 64%.

The COFINA default and restructuring may also have ripple effects across the municipal market. COFINA was an example of a "securitized" financing that would theoretically survive a bankruptcy or default of the fundamental credit. Pledged revenues were intercepted and collected by a trustee for benefit of bondholders before net revenues were passed onto the government. Similar structures were used in the late 1980s and early 1990s state-assisted financings for Philadelphia and various New York cities and counties, though these states – nor these structures – were never subjected to Puerto Rico-like stresses, and notably involved two separate (i.e., state and local) governments. Securitized sales tax structures are now also being essayed by stressed credits in Illinois, for example. Even though COFINA was restructured faster than the Commonwealth's GO debt, the fact that COFINA defaulted and was subject to a distressed exchange illustrates how these are structures are not as independent of the parent as they may appear.

94) Puerto Rico Industrial Development Company (PRIDCO)

» Default date: July 3, 2017

» Obligor: Puerto Rico Industrial Development Company (PRIDCO); Commonwealth of Puerto Rico

» Issuer: Puerto Rico Industrial Development Company

» Defaulted bonds: Various General Purpose Revenue Bonds: $156 million debt outstanding

» Cause of default: Invocation of the Commonwealth's debt moratorium law.

» Recovery: Pending

The default of the PRIDCO obligations was part of a larger default of Puerto Rico debt following the invocation of the debt moratorium under PROMESA. Because of the moratorium law (and an executive order signed by the governor), revenue from PRIDCO's "trusteed properties" stopped being transferred to the trustee; trusteed properties included many facilities used by large, mainland-based companies like Johnson & Johnson and US Surgical Corp.) Although the trustee had already started tapping the Debt Service Reserve Account earlier, in August 2016, the July 2017 moratorium shut off all funds and is recorded as the default date, even though the first monetary nonpayment occurred on the next due date, October 2, 2017. As negotiations have been ongoing, PRIDCO has entered into several Standstill Agreements with holders, resulting in payments being made periodically since July 2021 which have been applied in order of maturity to defaulted interest payments. Meanwhile, PRIDCO continues defaulting on current monthly interest payments. The Forbearance Period continues through mid-April 2022 with the goal of negotiating a Restructuring Support Agreement.

95) Puerto Rico Electric Power Authority (PREPA)

» Default date: July 3, 2017

» Obligor: Puerto Rico Electric Power Authority (PREPA); Commonwealth of Puerto Rico

» Issuer: Puerto Rico Electric Power Authority

» Defaulted bonds: Power Revenue Bonds; $8.96 billion outstanding

» Cause of default: Failure to appropriate funds for payment.

» Recovery: Pending, but expected below 35% of principal and accrued interest

The PREPA default was similarly part of a larger default of Puerto Rico debt following the invocation of the debt moratorium under PROMESA. There have been a number of attempts at restructuring. In May 2019, PREPA reached a restructuring support agreement

(RSA) with an ad hoc group of bondholders and its bond insurer. This RSA, like the preliminary one negotiated in July 2018, would have bondholders exchange their debt for new securitization bonds at about 68 cents on the dollar. However, in March 2022, the Puerto Rico financial Advisory and Fiscal Agency Authority terminated the RSA, pointing to changed economic conditions compared to when the RSA was finalized in 2019.

The latest fiscal plan filed by the Puerto Rico Oversight Board in June 2023, cuts the amount of anticipated issuance of new PREPA bonds to satisfy claims by more than half compared to the prior plan. The plan guarantees a minimum 12.5% recovery for bondholders who did not settle plus possible future recovery from contingent value instruments, a strategy used for several other securities. The plan has yet to be confirmed and the scheduled hearings regarding the plan of adjustment were recently suspended.

96) Puerto Rico Employees Retirement System (PERS)

» Default date: July 3, 2017

» Obligor: Puerto Rico (Commonwealth)

» Issuer: Employees Retirement System of the Government of the Commonwealth of Puerto Rico (PERS)

» Defaulted bonds: Senior Pension Funding Bonds; $3.16 billion outstanding

» Cause of default: Failure to appropriate funds for payment.

» Recovery: 10% recovery estimated based upon cash settlement and time-value of lost principal and accrued interest

The default of the Employees' Retirement System debt was also part of a larger default of Puerto Rico debt following the invocation of the debt moratorium under PROMESA. In June 2019, the Title III court ruled that creditors do not have a lien on employer contributions made to the pension funds after ERS's Title III case commenced and further ruled that employer contributions are not special revenues. Despite attempts by ERS creditors to appeal, the final Title III (8th) Plan of Adjustment (January 18, 2022) dismissed remaining litigation and recovery attempts. ERS holders will get $373 mm cash and the remaining value of the pension trust assets, which the POA values at $70.75 mm; this is a nominal 14% recovery, but time value-adjusted is estimated 10%.

97) Puerto Rico Highway and Transportation Authority (PRHTA)

» Default date: July 3, 2017

» Obligor: Puerto Rico Highway and Transportation Authority (PRHTA); Commonwealth of Puerto Rico

» Issuer: Puerto Rico Highway and Transportation Authority

» Defaulted bonds: Transportation Revenue Bonds (Senior Lien — 1998 Resolution) — $3.09 billion; Highway Revenue Bonds (1968 Resolution) — $830 million outstanding; Transportation Revenue Bonds (Subordinate Lien Series 2003 — 1998 Resolution) — $216 million

» Cause of default: Failure to appropriate funds for payment.

» Recovery: estimated 67% for 1968 resolution, 20% for 1998 resolution senior bonds, and 0% for 1998 resolution subordinate bonds with potential additional amounts from contingent value instruments

Puerto Rico's Highway and Transportation Authority (PRHTA) first defaulted in July 2016 on one series of its subordinated transportation revenue debt, when the commonwealth seized the pledged revenues — in this case, highway user taxes — to fund general governments operations under its clawback authority. Throughout 2016, PRHTA's highway user tax debt, with $815 million debt outstanding, was untouched by the clawback as were the senior lien transportation bonds ($3.2 billion outstanding) and the Series 2003 subordinate bonds ($216 million outstanding). This ended in July 2017 when the automatic stay was invoked under PROMESA. See further PRHTA commentary above in case study 88.

Separately, the 2003 issue for the Teodoro Moscoso Bridge project had a backup pledge under the 1998 resolution, which normally added credit strength beyond the project's organic support. However, when the PRHTA's subordinate lien became subject to the clawback in 2016 driving the subordinate lien default, the underlying project flows (net revenues derived from Autopistas de Puerto Rico, LLC's operations of the bridge) continued to pay the 2003 Teodoro Moscosa debt which were ultimately unimpaired.

The 8th Plan of Adjustment which was confirmed by the bankruptcy court in October 2022 and fully executed in December 2022 with the issuance of new HTA bonds. Similar to other Puerto Rico credits, recovery was derived from a combination of cash, new bonds and contingent value instruments and varied significantly by pledge and lien. The 1968 bondholders had the broadest pledge including all gas taxes, certain motor vehicle license fees and toll revenues were pledged. We estimate their recovery at 67% from the cash distribution and new money bonds, adjusted for time value of money. For the 1998 resolution senior lien bonds, which carried a limited pledge of excise taxes plus certain toll revenues and excess revenues of the 1968 bonds, we estimate recovery at 20%. As noted in case study 88, the 1998 resolution subordinate lien bondholders did not receive any cash distributions or new bonds, driving a 0% recovery. Additional amounts potentially to be recovered by all three sets of bondholders from clawback contingent value instruments (CVIs) subject to a lifetime cap and waterfall over 30 years. The cap for 1968 bondholders (first in the waterfall) is $179 million, for 1998 senior bondholders (second in the waterfall) is $1.83 billion, and for 1998 subordinate lien bondholders (third in the waterfall) is $207 million.

98) Puerto Rico Convention Center District Authority

» Default date: July 3, 2017

» Obligor: Puerto Rico (Commonwealth of)

» Issuer: Convention Center District Authority

» Defaulted bonds: Hotel Occupancy Tax Revenue Bonds, Series A; $386 million outstanding

» Cause of default: Failure to appropriate funds for payment.

» Recovery: Distressed exchange with cash and Contingent Value instruments effective March 15, 2022. Immediate recovery estimated at 19% with lost time value (compared to a notional 25%), with potentially additional amounts from contingent value instruments.

The Convention Center District Authority (CCDA) default was similarly triggered by the invocation of the larger debt moratorium under PROMESA. However, the CCDA debt, along with that of several other Commonwealth issuing entities, was removed from the bankruptcy-like restructuring under the Title III Plan of Adjustment into a consensual negotiation process under Title VI. Bondholders received $97 million in cash in March 2022 with additional amounts potentially to be recovered from clawback contingent value instruments (CVIs) with a lifetime cap of $217 million over 30 years.

99) Archdiocese of New Orleans

» Default date: Bankruptcy – May 1, 2020; Failure to pay principal – July 1, 2020

» Obligor: Archdiocese of New Orleans

» Issuer: Louisiana Public Facilities Authority

» Defaulted bonds: Refunding Revenue Bonds (Archdiocese of New Orleans Project); $38 million outstanding

» Cause of default: Preemptive bankruptcy filing, presumably due to anticipated legal claims.

» Recovery: Pending

The Archdiocese of New Orleans is the second oldest archdiocese in the country, has approximately 520,000 parishioners in 112 parishes and administers approximately 75 schools with over 34,000 students. It also supports affiliated, separately incorporated nursing homes, affordable senior living facilities and other community service facilities. In addition to its direct debt, the Archdiocese

also guaranteed $48 million of debt of a senior living facility at the time of its bankruptcy filing. Notably, the Archdiocese also had significant financial reserves at the time of filing, with spendable cash and investments of over $160 million as of fiscal 2019, inclusive of deposit and loan funds, an internal "bank" used since the 1960s to aid Archdiocesan institutions with low-interest loans for parish capital projects. The Archdiocese was also proactive on the legal front, adding $8.5 million to reserves in fiscal 2018 for pending legal claims and continued set aside reserves for additional claims through fiscal 2020

The Archdiocese failed to make its scheduled debt service payments since filing for bankruptcy, despite prior statements of intent to fulfill its financial obligations in accordance with canon law. While canon law requires repayment of debt and obligations, with default not permitted, bankruptcy proceedings take precedence. However, through an agreement with the trustee, on November 2, 2020, the bankruptcy court entered an order approving a Settlement Agreement in which Bondholders would receive their full interest payments and the Trustee waives its right to the payment of its fees and expenses during the pendency of the bankruptcy

Until 2018, the Archdiocese had successfully dealt with most of the six sexual misconduct claims outstanding in 2016. Initial Chapter 11 filings included over 30 new claims starting in 2018. Post-bankruptcy, approximately 400 new sexual misconduct claims were filed before the March 1, 2021 deadline. The timing of resolution and ultimate impact of these new claims remains uncertain as how many will continue on to settlement or to litigation will be determined through the bankruptcy process.

Depending on how various assets and liabilities are treated throughout the bankruptcy proceedings, bondholders could receive either near full recovery or suffer a substantial loss.

100) NCCD — College Station Properties LLC, TX

» Default date: July 1, 2022

» Obligor: NCCD — College Station Properties LLC, TX

» Issuer: New Hope Cultural Education Facilities Finance Corporation

» Defaulted bonds: Student Housing Revenue Bonds (NCCD — College Station Properties LLC — Texas A&M University Project) Series 2015A and 2015B; $341.6 million outstanding

» Cause of default: Weakness in the student housing submarket since the project opened resulted in insufficient revenues that eventually depleted all reserves

» Recovery: Pending

Ahead of the 2015 bonds, Texas A&M University on-campus housing had been at maximum capacity for 5 years, so the 2015 bonds were issued to finance a new, large student housing project known as Park West. The project, anticipated for completion in 2017, would increase on-campus housing stock by 28%, creating a risk that the new stock may not be fully absorbed. While project construction completed on time, the initial lease up rate fell well below projections, in part because during construction numerous additional housing projects were completed in more favorable proximity to campus. Additionally, the market has not supported rent levels at targeted price points, further compounding cash flow weakness. As a result, in 2018, the first year of amortizing debt service, Park West used operating reserves to make debt service payments.

While occupancy did significantly improve and has remained strong, above 90%, since 2018, the submarket has not supported rent charges sufficient to cover operations and debt service. Operating and debt service reserves were steadily depleted since 2018 and as of the July 1, 2022, payment, funds were sufficient only to make the interest payment but not principal. Net revenues were sufficient in 2023 to again make interest and begin to pay down principal still owed from July 1, 2022, but no principal payment was made for July 1, 2023.

Appendix E: Near misses and unrated defaults

Weak operating and financial performance does not always lead to a default. Governments can step-in to support struggling entities or to help provide temporary relief. Mergers and Acquisitions in the enterprise sectors can also come at the right time to stave off a default. Because of the high degree of uncertainty and the ability of governments to withdraw their support -even when there is an explicit guarantee as in the case of Wenatchee, WA or an appropriation pledge in the case of Menasha, WI -Moody's ratings generally do not consider the possibility of such interventions. In the recent past, there have been several notable examples of 'near misses' - instances when defaults were averted by fortuitous circumstances.

Several interesting default cases, while not rated, have helped inform our knowledge of the universe of municipal defaults. Below we profile a few notable examples. While these cases are not included in our data statistics, they tend to reflect similar credit trends observed in the rated portfolio -weakening economic profiles, reduced financial flexibility and lacking governance practices.

1) Rhode Island Economic Development Corporation -38 Studios (near miss)

In 2010, Rhode Island Economic Development Corporation (RIEDC) issued bonds on behalf of startup company 38 Studios, which was a video-gaming venture. The bonds were secured by loan payments made by 38 Studios and featured a moral obligation from the State of Rhode Island to appropriate funds to cover deficiencies in the capital reserve fund and debt service on the bonds. The company struggled financially, failed to make a required annual payment of $1.125 million due in May 2012 and although payment was eventually received within the 30-day cure period specified in the loan contracts, 38 Studios eventually declared bankruptcy. Politically, the once-positive sentiment over job creation in connection with the venture was replaced with frustration over the agreement terms and Rhode Island's exposure to the outstanding debt. But the state has continued to appropriate funds to meet its moral obligation pledge without interruption. In March 2016, the Securities and Exchange Commission filed a complaint against RIEDC and the bond underwriter, Wells Fargo. The complaint alleges, among other things, that the offering documents contained a significant omission because they did not disclose that even with the loan proceeds the project faced a known funding shortfall. This is not expected to affect annual appropriations going forward, which have indeed continued.

2) Camden County Pollution Control Finance Authority, NJ (near miss)

Before paying off debt in 2010, the solid waste system in Camden did not generate sufficient revenues to pay its debt service. The Authority had relied on state aid since 1999, receiving more than $150 million. Although the State of New Jersey provided ongoing support, it had no legal or moral obligation to do so. In fact, the State's assistance did wane in recent years, coming in at $6 million despite increased requests from the Authority. Concerns began to emerge whether Camden County Pollution Control Finance Authority would meet its ballooning principal payment of $24.3 million due December 2010. A last-minute deal with the State Department of Environmental Protection helped the Authority narrowly avoid a default.

3) Westerly Hospital, RI (near miss)

Despite its favorable market position as the dominant player on the southwest coast of Rhode Island, Westerly Hospital has experienced a precipitous decline in financial performance since Fiscal 2000. On December 7, 2011, the hospital filed for receivership to address its operating performance and expense pressures related to salaries and unfunded pensions. Throughout the period of receivership, Westerly Hospital continued to make all debt service payments on time and in full, although it did so by using funds from the debt service reserve fund and skipping the mandatory redemptions. In June 2013, Lawrence and Memorial Hospital based in New London, Connecticut, purchased Westerly Hospital, assuming its debt and ending a 17 month receivership.

4) City of Moberly, Missouri (unrated default)

» Default date: August 2011 (default on bonds); March 2012 (Moberly's renege of appropriation pledge) approximately $35 million of debt outstanding.

» Cause of default: Fraud, city's failure to appropriate.

Located in Randolph County, Missouri, the City of Moberly has a population of 14,000 and an annual budget of about $7 million. In 2010, the City issued $39 million of bonds through its economic development authority on behalf of Mamtek -a corporation building an artificial sweetener facility in the city. Pursuant to the bond issue, Moberly pledged to appropriate funds to the economic development authority for payment on the bonds. Construction of the facility was never completed and the plant closed due to

financial troubles. Mamtek defaulted on $3.2 million in August 2011 and the City reneged on its appropriation pledge when allegations of fraud emerged. Mamtek CEO Bruce Cole pleaded guilty to two counts of securities fraud and one criminal count of theft under a plea deal for missing bond proceeds for personal gain and is now serving seven years in prison. In December 2011, creditors filed an involuntary bankruptcy proceeding for Mamtek that resulted in a final distribution to bondholders of only 10% when adjusting for the time value of money. This recovery does not include settlements from various class action lawsuits against various parties involved in the transaction.

5) Buena Vista, VA (unrated default)

Similar to Cicero, NY (2003), Vadnais Heights, MN (2012) and Platte County, MO (2018). City issued lease bonds to finance a golf course. The city's obligation was to make lease payments subject to appropriation. to enhance the deal the city also pledged "essential" assets including its police station and city hall. the golf course was never self-supporting, however and required large city subsidy. The city decided not to appropriate in the 2011 budget and entered into a forbearance agreement with the insurer ACA. The insurer was reluctant to foreclose on the city's properties as remedy in default.

6) Town of Mammoth Lakes, CA (unrated bankruptcy)

» Default date: July 2, 2012 (filing for bankruptcy protection).

» Cause of default: Unfavorable court ruling equaling three times the city's annual operating budget.

Mammoth Lakes, a ski resort town near Yosemite National Park, filed for Chapter 9 bankruptcy protection after the state appellate court upheld a judgment against the Town. In 1997, Mammoth Lakes entered into an agreement in which developers, Mammoth Lakes Land Acquisition, improved airport operations in exchange for rights to develop retail and housing properties and an option to buy the land. When the Town announced the project would interfere with Federal Aviation Administration policy governing the use of airport property for aeronautical purposes, developers filed a lawsuit citing breach of contract. The Town appealed the 2008 decision to award $30 million against it. In 2012, the ruling was upheld and the judgment was increased to $43 million, commensurate with interest and legal fees. When mediation with the developers failed, Mammoth Lakes filed for bankruptcy protection. A month after the filing, the Town announced a settlement and asked the court to dismiss the bankruptcy filing, which was signed by the Judge in November 2012.

7) City of Vadnais Heights, Minnesota (unrated default)

» Default date: August 27, 2012 (Vadnais Heights decision to renege on appropriation pledge); lease termination December 2012; approximately $1.8 million of lease debt and $10.6 million of general obligation debt outstanding.

» Cause of default: City's failure to appropriate.

The City of Vadnais Height's action to renege on an appropriation pledge is an example of how the failure to support the operations or debt service of struggling enterprises can have serious ramifications for a local government's general obligation rating. Some will experience severe deterioration in credit quality.

For example, the City of Vadnais Heights, Minnesota made an appropriation pledge to support a lease revenue transaction (unrated) used to finance a sports complex. City management expected net revenues of the facility to fully fund debt service, but when net revenues were insufficient, the city faced an unexpected call on its appropriation pledge. City officials chose to terminate the lease payments, a decision that led to our September 2012 downgrade of the city's general obligation rating to Ba1 from Aa2. A key factor in our rating action was the city's unwillingness to honor its pledge on publicly-issued debt. The city's rating has since been upgraded to Baa2, reflecting the elimination of the contingent liability with the sale of the project assets as well as the moderate risk associated with a pending lawsuit brought by the complex's operator.

In counterpoint to this is the City of Monticello, Minnesota, which discontinued its support of an underperforming telecommunications enterprise. But when the bonds for this enterprise (unrated) were originally sold, the security was expressly limited to net revenues generated from the utility. The city made no pledge to support the debt from any other source, and while it ultimately did not provide funding to directly avert a default on the bonds, it did use its General Fund to support for the utility's operations prior to default. This weakened the city's the financial position, triggering our September 2012 downgrade of the city's general obligation rating to A2 from

Aa3. The city's general obligation credit profile remained in the investment-grade range, though the telecommunication venture clearly damaged its general credit. Unlike the Vadnais Heights transaction, Monticello made no assurances to consider appropriating for debt service; the risks on the utility revenue bonds were transparent to investors.

8) Harrisburg University of Science and Technology, Pennsylvania (unrated default)

» Default date: March 1, 2014

» Cause of default: Higher than projected expenses and low enrollment

Harrisburg University of Science and Technology was created in 2001 and opened its doors in 2005 as a private not-for-profit university in the capital city. The University was partially supported by public funds, including a $1.5 million a year pledge from Dauphin County to support debt service through 2019. Located downtown and meant to spur development, the University issued approximately $88 million in bonds in 2007 to support a science and technology project.

The University, which aimed to provide science, mathematics and technology education through undergraduate, graduate and professional programs, was never able to meet its enrollment projections. Enrollment for Fall 2013 semester stood at about 420 students, with the University needing between 520 and 550 to break even.

The University experienced both payment and nonpayment defaults, the latter in the form of failing to submit funds to the trustee in advance of the bond payment date as required. The trustee has been able to draw on Dauphin County's guaranty to provide payment to bondholders, but it is insufficient to cover total annual debt service. Ultimately the defaulted bonds were refunded with new bonds in 2017.

9) Munster School District (IN) (unrated default)

The school district, which defaulted in January 2015, serves a wealthy population about 30 miles outside Chicago. It faced severe cash flow constraints following major cuts to state funding coupled with lower-than-expected tax collections in December 2014. The district was a participant in a post-default state intercept program, but the district cured the deficiency with an emergency loan and did not trigger Indiana's (Aaa stable) post-default intercept program. The district is planning cuts in spending, including significant layoffs, to allow it to make its next debt service payment.

10) Penn Hills School District, PA (near miss; B3 positive)

Penn Hills School District, PA's serves approximately 3,400 students in western Pennsylvania near the City of Pittsburgh. The district continues to be challenged by weak financial operations, a heavy debt and pension burden, steady enrollment declines and stiff competition from 31 nearby charter and cyber schools, but bondholders have been shielded from payment default by a state intercept program.

Penn Hill's financial challenges began in 2012, when the already-leveraged district issued debt to finance two new school buildings but failed to budget for increased debt service. By 2015, the district's annual operating shortfall was more than $10 million and with a cumulative fund balance deficit of -$19 million (24% of 2015 revenue) it was unable to meet its April 1, 2015 debt service payment. Unlike Munster School District referenced above, Penn Hills tapped Pennsylvania's Act 150 post-default program with sufficient advance warning to the state so that the program was able to make debt service payments from intercepted state aid before there was a default.

Even with a substantial deficit issuance in 2015, a refinancing and other attempts to increase revenues and curtail expenditures, the district has been thus far unable to achieve structurally balanced operations, with significant operating deficits through FY 2019 that brought its fund balance deficit back to 2015 levels. Penn Hills was formally placed in the commonwealth's financial recovery program in 2019, with increased oversight. A 2020 refunding issuance now ensures that annual debt service is directly paid from the commonwealth to a trustee for the benefit of bondholders.

11) San Bernardino, CA (unrated bankruptcy)

» Default date: August 1, 2012 (filing for bankruptcy protection).

» Cause of default: A $46 million projected budget deficit and large unfunded pension liabilities.

San Bernardino is the county seat of San Bernardino County located in southeast California's Inland Empire. On August 1, 2012, the city filed for bankruptcy protection and stopped making payments on its pension obligation bonds (POBs). The filing came after the city announced it faced a sizable $46 million projected budget deficit, nearly 40% of operating revenues. San Bernardino suspended its employer contributions to the California Public Employees' Retirement System (CalPERS, Aa2 stable) for one year after it filed for bankruptcy, but, in a 2014 deal, eventually agreed to a schedule to repay its foregone contributions and to contribute according to the actuarial requirements annually determined by CalPERS going forward.

The city filed its plan of adjustment on May 23, 2015 after nearly three years of disputes with its unions, creditors and CalPERS. The proposed plan of adjustment called for full payment on pension obligations to CalPERS and no impairment to the small amount of lease debt outstanding. In exchange for preserving pensions, retirees agreed to cuts in other post-employment benefits or OPEB, primarily retiree health insurance. The city eliminated its monthly subsidies and retirees were placed in a retiree-only benefit program, instead of a blended program with active city employees, resulting in increased premiums. These changes resulted in a 86% cut to the city's OPEB liabilities.

The city also proposed a significant 99% loss for POB holders. The strategy of cutting OPEB and debt obligations, while leaving pensions untouched, is consistent with the earlier Stockton and Detroit bankruptcies. In mid-September 2015, Ambac and the Luxembourg bank Erste Europäische Pfandbrief-Und Kommunalkreditabnk AG (EEPK) filed objections to the proposed plan.

On March 28, 2016, the city a reached a settlement agreement with EEPK and Ambac. The new payment schedule is stretched out by 10 years and is significantly backloaded. We estimate the recovery to be about 30%, which is more than the initial 1% proposal and somewhat less than the stated recovery of 40%. Overall, the loss is sizable when compared to the historic recovery rates for the sector.

Although the POBs were "unconditional legal obligations" of the city, they were unsecured obligations and the agreement is another example of how such debt fares against secured dent and pension obligations.

12) Griggs County, ND (near miss)

Griggs County, ND is an example of how a lack of public support for a lease project can significantly increase bondholder risks, even if the security pledge is nominally strong. The county's Series 2013 Lease Revenue Bonds were used to finance a new county courthouse in conjunction with a new emergency operations center that was concurrently financed by federal grants. The Griggs County Building Authority (GCBA) was created for the sole purpose of issuing the 2013 bonds and governed by the same Board of County Commissioners (Board) who authorized the project. The pledge securing the bonds is strong as it is unconditional and not subject to annual appropriation. Because the project had a public safety component, under state statute the county dedicated an irrevocable 10-mill lease levy for repayment that is backed by an unlimited property tax if the lease levy is insufficient.

But community opposition to the project, undisclosed at the time of issuance, was very high and voters had previously defeated the project three times. All five of the County Commissioners who authorized the original bond issuance in March 2013 were replaced through a recall election in October in direct response to the county's proceeding with the courthouse project the public had voted against. The newly elected County Commissioners refused to sit on the GCBA board, leading to an unusual separation of the governance of Griggs County and the GCBA and laying the foundation for the new Board to distance itself from the unpopular courthouse project. The GCBA board is still composed of the now recalled former Commissioners.

Since the recall election, the Board has engaged in standoff with the GCBA. It has blocked completion of the courthouse project, threatened to not make its lease payments and has generally attempted to terminate its obligation to pay. Most recently, in August 2015, the county filed suit against the GCBA to break the lease agreement. On December 30, 2015 a Judge of the Southeast Judicial District court in North Dakota denied the County's motion for a summary judgment terminating its lease and later scheduled a date for a jury trial to resolve the case. Ultimately, the litigation was dismissed and the county continued to make all of its required lease payments.

13) Atlantic City, NJ (near miss; Ba2 positive)

Atlantic City's near miss highlights the risk of extreme taxpayer concentration, in this case exacerbated by an unusual structural vulnerability to tax appeals. Much of the city's economy and tax base lay in the casino and gaming industry. The industry's competitive

advantage in the city had been declining over years, but became significantly impaired when neighboring states legalized gaming in their own jurisdictions. Multiple casinos closed, and city's tax base suffered catastrophic collapse, falling 62% between 2008 and 2015. On top of this, the city was the tax collecting agent for the county and the school, which meant that it was responsible for funding the large amount of tax appeals won by the casinos based on their well-documented revenue declines. Atlantic City's own direct debt exploded as it sought to bond out the appeals payments, even as its revenues plummeted.

Although the State of New Jersey had a track record of supporting distressed municipalities such as Camden and Newark, the scale of the challenges in Atlantic City's appeared to be too big. In January 2015, then Gov. Chris Christie signed an executive order declaring a fiscal emergency and appointed an emergency manager tasked with crafting recommendations to restructure the city's operations and adjust its debts. In a clear signal to the market of the seriousness of Atlantic City's problems, Christie appointed Kevyn Orr, the emergency manager in Detroit's bankruptcy, to advise and consult on the plan.

After months of tense negotiations and eleventh hour decisions, the state ultimately prevented a default with a bailout package that restructured the city's tax base, reducing the exposure to tax appeals by casinos and increased the level of ongoing and extraordinary state aid. Perhaps most important, the state directed excess casino revenues from the Investment Alternative Tax (IAT) to city's outstanding debt.

14) Hartford, CT (near miss; Ba2 positive)

A default by Hartford was averted in the spring 2018 by the State of Connecticut's last-minute decision to take on the city's debt service payments on a contractual basis, though Hartford's general obligation pledge on this debt remains.

Once a major manufacturing center and a locus of the US insurance industry, much of Hartford's historic economic activity has dwindled and been replaced over time by state government and healthcare and higher education. Roughly 50% of the current economic base is tax exempt, with the remainder concentrated across several employers and industries. At the same time, the wealth and income profile of Hartford's remaining resident base has weakened, with income levels well below half of the state median. As a result of these trends, Hartford's tax revenue base shrank even as its spending needs increased, driving the city's financial operations into significant structural imbalance. Hartford is highly leveraged; a series of past bond refinancings created some budgetary relief but also created a near-term peak in debt service that, in the absence of extraordinary state support, was increasingly unaffordable.

Hartford's new mayor was vocal about the city's unsustainable financial and debt situation immediately upon taking office in 2016, suggesting that the city could end up in bankruptcy in the absence of more state aid or concessions from bondholders and unions. This occurred in the context of pressure on the state's own credit profile, resulting in significant controversy within the legislature over the prospect of a state bailout or even increased aid, particularly in light of funding problems across many of Connecticut's towns. By spring 2018, however, as another debt service payment for Hartford loomed, the state had reaped a series of one-time liquidity boosts related to tax reform and equity markets, which may have tipped the scale in favor of Hartford debt service assumption.

15) Platte County, MO (unrated default)

In 2007, the Platte County Industrial Development Authority issued $32.2 million in Transportation Refunding and Improvement Revenue Bonds (Zona Rosa Retail Project). The project financed economic development including parking for a mall. The county gave its support to the project via a financing agreement. The county would step in, subject to appropriation, if revenue generated by the transportation development district's (TDD) 1% sales tax, coupled with liquidity available via the developer's required letter of credit facility, were insufficient to fulfill debt service requirements.

From the beginning, the TDD regularly failed to generate sufficient revenue and developer contributions cured the shortfalls. In December 2017, the trustee drew on the developer's required letter of credit facility to meet debt service. Revenue from the TDD continued to be weak. The developer made a $100,000 contribution to meet the June 1, 2018 interest payment but failed to replace the letter of credit facility as required by the financing agreement.

In August 2018, the county signaled its unwillingness to disburse funds to the trustee, despite having made the appropriation in the fiscal 2018 budget. In fact, the county had annually budgeted for the Zona Rosa debt service shortfall for the entire decade following issuance and even listed the debt in its December 31, 2017 financial statements. Footnote 15 of the statements further reported "as collateral, the parking garages at the Zona Rosa Retail Project have been deeded in the County's name to secure the debt."

Per the conditions of the financing agreement, the trustee notified the county of a $1 million revenue shortfall and demanded the county provide for the December 2018 principal and interest payment. In November 2018, the county sought court clarification of the obligation. Court rulings affirmed that the financing agreement did not obligate the county to appropriate or to pay.

16) Chester, PA (unrated bankruptcy)

The City of Chester in Pennsylvania had been under the state's distressed cities program since 1995, was put into receivership in 2020 and ultimately filed for Chapter 9 bankruptcy on November 10, 2022, succumbing to unaffordable pension liabilities and decades of economic stagnation.

Grappling with a budget crisis, Chester turned to its pension plans as a source of relief starting in 2014. Each year, the city made a contribution that fell short of the amount required to fund new benefits and amortize the outstanding liability. Each shortfall effectively became a loan from the pension fund to the city, accruing interest at the assumed rate of return on the plan. In fact, the city's latest financial statement formally recognized this loan: the main reason for the city's negative $21 million general fund balance was a $21.1 million payable to the pension plan representing the contributions it had failed to make.

Given the deep insolvency facing the city, an important question for the city is whether it can successfully write down debt whose holders enjoy a security interest in certain key revenues. Chester has two types of bonds outstanding: publicly issued 2017 general obligation bonds, and a 2010 note issued to the Delaware Valley Regional Finance Authority (A1 stable; the authority's exposure to Chester is minimal).

In addition to the city's general obligation pledge, the bonds and note are secured by a pledge of host fees paid by a trash incinerator in the city, gaming taxes on slot and table game revenues from a local casino and payments the casino makes to the city under a redevelopment agreement. The indenture for the 2017 bonds grants bondholders a security interest in these revenues, which are deposited directly with the trustee.

A state-appointed receiver characterized the city's $20 million of debt as “not unusually large” (revenues are about $50 million) and “the least problematic of the three legacy costs” (meaning debt, pension liabilities and retiree health benefits).

Still, we expect that the city's pension and retiree healthcare beneficiaries, facing steep cuts in their benefits, are likely to argue for an “equitable” restructuring, meaning that all three legacy costs would share the pain to some degree. That is likely to set up a dispute between the city's retirees and bondholders attempting to cling to the revenues pledged to the bonds.

Appendix F: Short-term municipal defaults

Although the focus of this study is on long-term defaults, short-term risks are inevitably incorporated in the performance data. Liquidity, market access and solvency are key considerations for both short-term and long-term ratings. Furthermore, short-term pressures reflect an issuer's credit profile and Moody's adjusts its long- and short-term ratings accordingly when such information is discovered. There were four notable short-term defaults during the study period; these exclude the slight interest payment delays on Orange County notes which resulted from procedural issues, as noted in the Orange County default case study (14) in Appendix D.

1) New York State Urban Development Corporation

UDC was the first major municipal issuer to default on its obligations since the Great Depression. Established in 1968, the Urban Development Corporation (UDC) was created to provide low- and moderate-income housing around the New York State. The Corporation relied heavily on moral obligations from New York State to help fund its construction projects, having issued $1.1 billion in long-term debt by 1974. But at the time UDC's programs had not yet developed sufficient cash flow to cover debt service, and the concept of what debt service it should be covering was itself hazy since borrowings were frequent, new programs continuously starting and accounting techniques for capitalized interest still evolving.

By the end of 1974, UDC had substantial future borrowing requirements to complete projects under construction and to repay $100 million in maturing BANs and $30 million in a private bridge loan, both due February 1975. Security for the BANs included UDC's full faith and credit and commitment to issue bonds to pay them off. In January and February, UDC tried to issue new debt to continue its operations but was unable to do so. Gov. Carey stepped in and asked banks to lend to the Corporation, but an agreement could not be reached. On February 25, UDC missed a $104.5 million payment due on its BANs, $100 million principal and $4.5 million interest; the default was cured within eight days.

After the default New York State Legislature and Gov. Carey created New York State Project Finance Agency (PFA) to provide long-term financing not otherwise available to UDC. The Agency received $190 million state appropriations and $280 million credit line from commercial banks and state agencies. PFA purchased mortgages from UDC, thus, enabling UDC to pay principal and interest on defaulted notes, to make contributions for completing projects under construction and to provide one year's debt service on existing bonds. UDC's financing needs continued to be met through bond issuances by PFA until the 1980s, and the Corporation remained reliant on state support for years afterward given high mortgage delinquencies in its housing program.

Leading up to the default, Moody's had a MIG 2 rating on the notes and a long-term rating of Baa, which was based in part on the evolving support from the State. Moody's suspended its rating on the BANs on January 29, 1975.

2) New York City, NY (Aa2 stable)

New York City's three year moratorium on note repayment occurred in the context of an epic fiscal crisis that came to a head in 1975, nearly resulted in a monetary default, caused the city to flirt with bankruptcy and was ultimately resolved only with the assistance of the federal and state governments. The problem lay in chronic overspending and budget deficits that reached back as far as 1961, an accumulation of short-term cash of borrowing to meet operating needs and opaque and improper accounting and budgeting practices that camouflaged the imbalances. By early 1975 the market was beginning to reject New York City paper; a February TAN sale had to be canceled, and subsequent proposed issues could not get clean legal opinions. The Urban Development Corporation then defaulted on a BAN issue, which was unrelated to the City but which heightening the overall market concern. By April, the city was resorting to bank and pension fund loans for short-term operating funds.

In November 1975, New York State enacted the Moratorium Act, which suspended for three years the right to sue the city of New York to force payment of its short-term obligations. Using the terms of this law, New York City deferred payment and thus defaulted on its notes as they came due. The financial emergency that existed in New York City in the early to mid-1970s was a result of spending that exceeded operating revenue for several years. The overspending created accumulated fund deficits and cash flow problems that could be resolved only by short-term borrowing to meet expenditures. At the time of the moratorium, the city had an estimated $11 bil or more in total debt.

When banks refused to roll over its short-term debt, the city did not have the funds necessary to pay its obligations. To provide cash to the city while implementing a plan to return it to balanced budgets under the supervision of a state control board, the state advanced the city money, the Municipal Assistance Corporation for the City of New York (MAC) was established to issue debt on behalf of the

city, the city's pension funds provided loans and the federal government provided loans and guaranteed the city's other loans. Most of the short-term debt was converted to long-term debt through the MAC. This allowed the city to eliminate its fund deficits by reducing debt service payments by lengthening the repayment time. These actions allowed the city to emerge from its fiscal crisis.

In the mid-1970s, the MAC scaled back the interest rate payable and extended the maturity of its debt through bondholder approved amendments. This restructuring was part of a series of actions taken to secure fiscal support from the US Government. At the time, Moody's did not classify this restructuring as a bond distressed exchange default by MAC because:

» The restructuring was not undertaken to avoid default on the MAC bonds since the MAC bonds were legally separate and distinct from the City of New York and therefore not at risk to a potential bankruptcy;

» The restructuring was approved by MAC bondholders as part of a larger agreement designed to bolster and secure the finances of New York City; and

» Financial and political issues broader than payment on the MAC bonds motivated approval by the bondholders.

Under our current definition of a distressed exchange, however, the restructuring of some investors' bonds as a precondition for federal support would support the conclusion that the debt exchange was "distressed." We have not incorporated this default into our default statistics, however, since the definition of default, to which the ratings were then calibrated, was different at the time.

3) Cleveland, OH (Aa3 stable)

The City of Cleveland (OH) defaulted in December 1978 on $14 million short-term notes held by six local banks. The default was not cured until November 1980, after a voter-approved tax levy in 1979 and the January 1980 passage of a 'Local Fiscal Emergencies' statute that enabled state intervention including loans and financial oversight. Broadly similar to New York City's fiscal emergency, the source of the Cleveland default lay in its chronic inability to balance its operations and resulting questionable financial practices. Throughout the mid-1970s, Cleveland's general fund expenses greatly exceeded its revenues which ultimately led the city to adopt a practice of 'borrowing' restricted bond fund monies from the Water Department to meet ongoing general operating costs. While the incoming Kucinich administration (1977-79) inherited this problem, it also did not act quickly to remedy the situation. Concerns over this practice and the structural budget imbalances brought the Moody's rating from A to Baa and then Ba by mid-1978; Cleveland was unable to issue bonds nor refinance or renew outstanding notes. The rating had fallen to B by November, shortly before the default itself.

While the Cleveland default was rooted in its very poor financial management, the triggering event was bound up in a curious political flight over the fate of the city's electric system, Municipal Light, which had been in a long-running feud with its wholesale supplier, Cleveland Electric Illuminating (CEI) that ultimately resulted in antitrust allegations against the latter. The former administration had planned to sell Municipal Light to CEI to resolve the suit and generate cash for Cleveland, but the Kucinich administration opposed the sale. In the context of the city's worsening financial situation and absence of market access, the banks holding the city's notes, headed by Cleveland Trust, refused to renew the notes unless the utility sale went ahead. It was subsequently reported that Cleveland Trust and CEI had interlocking directors and, with another bank, had ownership interests in CEI.

In a February 1979 special election, Cleveland voters approved a new half-cent income tax that began to produce new revenues, and further rejected the plan to sell Municipal Light, which it still operates. The Voinovich administration came into office in November 1979 and developed a three-year refinancing plan that included $15 million in state loans under the Fiscal Emergencies statute. Cleveland was upgraded to Ba1 in August 1981, and reached Baa in early 1985.

4) City of Menasha, WI

The City of Menasha (WI) defaulted on its appropriation-backed Steam Utility Revenue BANs with the failure of a steam enterprise project that seriously compromised the city's overall debt capacity and creditworthiness. The Steam Utility had begun as a local economic development effort when Menasha Utilities' gas-fired electric generating units were idled by the dispatching utility in 2004. The plan was to divert the redundant units to industrial steam production for four surrounding paper mills; by converting the units to coal-at the time cheaper than gas-the hope was that cheaper energy would help revive the mills' fortunes and sustain their employment. The project rapidly suffered cost overruns more than triple the initial $12.6 million BANs (2005, due 9/1/2009), along with a variety of technical and environmental problems and shortfalls in actual steam sales. To keep up with project costs, Menasha

issued another $11.5 million in Steam BANs, $2.675 Steam Note Anticipation Notes (NANs), and $13 million privately placed Steam BANs in 2006 and $13.93 million GO Promissory Notes in 2007. By 2007, the reserve funds were tapped to make BAN interest payments. By April, the city's advisers recommended closure of the plant to avoid further financial damage to the city, but by this time the Steam notes were rated speculative-grade and the city's GO and GO-note ratings had also suffered. In April 2011, Menasha sold the assets to WPPI Energy (formerly known as Wisconsin Public Power Inc.) with the proceeds used to partially repay noteholders of the defaulted securities, representing a recovery rate of approximately 75%.

Appendix G: Recalibration to the global rating scale

US municipal sector ratings were recalibrated to Moody's global rating scale in May 2010 to align the expected credit risk of a given municipal rating with Moody's ratings for other sectors, which were rated on the global rating scale. This was accomplished by raising municipal bond ratings, especially for general governments. Generally, Aa-rated credits moved one notch up, A-rated credits moved two notches and Baa-rated credits moved three notches up. These new rating assignments did not reflect an improvement in credit risk, but simply a rescaling of that risk.

After the recalibration, the difference between corporate and municipal credits CDRs has shrunk. For example, as shown above in Exhibit 6, which compares CDRs between municipal and corporate issuers over 1970-2022 period, the difference in the five-year CDRs between SG municipal issuers and SG corporate issuers is approximately 14.1%. However, in post-recalibration, the difference is 12.2% (see Exhibit 30 below).

Exhibit 30

Post-recalibration municipal cumulative default rates are better aligned, but some differences remain

Cumulative default rates, average over the post-recalibration period, municipal issuers compared toglobal corporate issuers

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	908	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Aa	7,463	0.00%	0.00%	0.00%	0.00%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
A	5,136	0.00%	0.01%	0.01%	0.02%	0.03%	0.04%	0.06%	0.06%	0.06%	0.06%
Baa	858	0.04%	0.07%	0.14%	0.31%	0.53%	0.71%	0.78%	0.78%	0.78%	0.78%
Ba	163	0.05%	0.38%	0.87%	1.12%	1.13%	1.13%	1.16%	1.16%	1.16%	1.16%
B	32	1.82%	4.00%	6.67%	7.51%	8.70%	8.70%	9.24%	9.24%	9.24%	9.24%
Caa-C	21	11.09%	19.81%	25.19%	28.15%	30.89%	33.24%	33.24%	33.24%	33.24%	33.24%
Investment-grade	14,365	0.00%	0.01%	0.01%	0.03%	0.04%	0.06%	0.07%	0.07%	0.07%	0.07%
Speculative-grade	216	1.33%	2.66%	3.89%	4.46%	4.87%	5.04%	5.15%	5.15%	5.15%	5.15%
All rated	14,581	0.02%	0.04%	0.06%	0.08%	0.10%	0.12%	0.13%	0.13%	0.13%	0.13%

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	60	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Aa	331	0.03%	0.03%	0.04%	0.04%	0.04%	0.04%	0.07%	0.07%	0.07%	0.07%
A	1,264	0.02%	0.05%	0.10%	0.12%	0.15%	0.20%	0.27%	0.32%	0.34%	0.38%
Baa	1,720	0.11%	0.27%	0.48%	0.70%	0.93%	1.22%	1.51%	1.97%	2.56%	3.18%
Ba	757	0.54%	1.52%	2.61%	3.86%	5.51%	7.03%	8.69%	10.21%	11.91%	14.06%
B	1,001	1.49%	4.18%	7.44%	11.10%	14.56%	17.73%	20.50%	23.49%	26.89%	30.24%
Caa-C	1,264	6.71%	12.68%	18.29%	23.53%	28.31%	32.66%	36.23%	39.57%	42.97%	46.19%
Investment-grade	3,375	0.07%	0.16%	0.29%	0.40%	0.52%	0.68%	0.86%	1.09%	1.37%	1.67%
Speculative-grade	3,022	3.41%	6.93%	10.41%	13.85%	17.09%	19.97%	22.48%	24.92%	27.54%	30.25%
All rated	6,397	1.61%	3.20%	4.72%	6.13%	7.40%	8.50%	9.44%	10.36%	11.34%	12.33%

Period calculations begin in October 2010

Source: Moody's Investors Service

When US municipal ratings were recalibrated in 2010, only then outstanding ratings were moved. Any rating that had been withdrawn before recalibration was unchanged. In our historical data set, we have projected the 2010 recalibration back in time to all credits throughout the study using an algorithm to estimate what these ratings would have been on the global rating scale.

This projection of the 2010 recalibration to the entire historical data set was carried out in two steps. First, we shifted upward historical ratings in accordance with Table 1 from the "Recalibration of Moody's U.S. Municipal Ratings to its Global Rating Scale." Namely, we universally mapped municipal scale ratings to their global scale equivalents on the basis of sector and municipal scale rating. Second, where there were discrepancies between a credit's mapped recalibrated rating immediately before the recalibration in mid-2010 and its realized recalibrated rating, we extended backward the realized recalibrated rating to the last rating action date before April 2010. This second step serves to eliminate artificial rating volatility.

For rating dates before the recalibration date (4/16/2010 in these examples), global scale ratings reflect uplift of up to 3 notches relative to the corresponding municipal scale rating. For example, as of 7/19/1982, San Diego (County of), CA received an A1 rating

on municipal scale. Per the recalibration algorithm, this was equivalent to an Aa2 rating on global scale, reflecting a two-notch shift upward for this obligor. As of 10/24/1996, the same obligor received a Baa1 rating on municipal scale, which was adjusted to an A1 rating on the global scale or a three-notch shift. Below investment-grade ratings did not change before and after the recalibration.

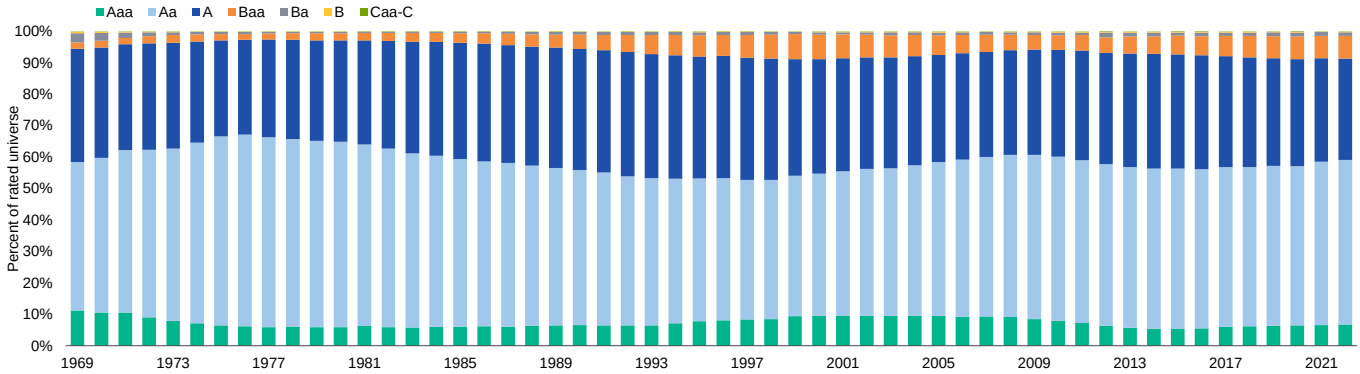
Exhibit 31 shows the historical rating distributions before and after applying the projection described above to illustrate the effect of the estimation of global scale ratings before recalibration. The top panel shows that after estimating all ratings in the historical data set on the global scale, rating distributions change gradually over time, reflecting only changes in fundamental credit quality.

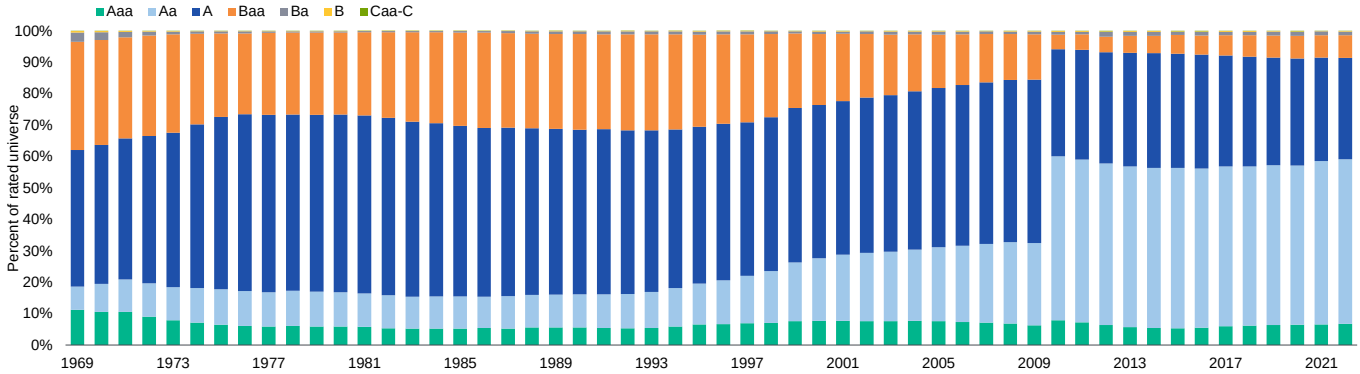
In contrast, in the bottom panel of Exhibit 31, which shows rating distributions without estimating pre-recalibration ratings to the global scale, we see there is a clear shift in distribution after 2010. This shift reflects primarily the change in rating scale as opposed to changes in fundamental credit quality of municipal bonds. Before 2010, ratings are measured on the municipal scale. Afterward, they are measured on the global scale.

Exhibit 31

Rating distribution more stable with fewer Baa credits after estimating pre-recalibration ratings to global scale

Distribution of ratings by broad rating category, year-end 1969-2022 (Top panel: All ratings on global scale; Bottom panel: Pre-2010 ratings on municipal scale, post-2010 ratings on global scale)





Source: Moody's Investors Service

Consequently, our key metrics are more significant, have greater explanatory power and allow us to have more powerful inferences about long-term trends. For example, as a result of this change, the ratings history no longer shows an artificial increase (decrease) in the share of Aa-rated (Baa-rated) credits as shown in the bottom panel of Exhibit 31. Instead the rating history is significantly more stable, in accordance with the historical performance of the sector through this period (top panel of Exhibit 31).

Endnotes

1 See Ratings Symbols and Definitions for more information on enhanced ratings.

2 A default refers to a default on a Moody's rated bond in all references unless otherwise specified.

3 See past annual studies since 2013 for more detail on this evolution.

4 See US Municipal Bond Default Study 1970-2012 for a larger discussion on this topic, and various financial crises from the mid 1970s through 2009.

5 Into 2023, the Graceland Project continues to show weakness and thus may not be a purely pandemic related default

6 As another example, in February 2021, charity provider Mercy Hospital filed Chapter 11 to keep providing ambulatory services; this was related to Trinity Health Care but not part of the Aa2 rated obligated group. The filing did not impair Mercy's sole HUD insured debt.

7 These events are identified by continuing disclosure notices that are posted by municipal bond issuers on the Municipal Securities Rulemaking Board's Electronic Municipal Market Access (EMMA) system. Issuers unrated by Moody's are not captured in the default statistics.

8 For more information, please see the report Rating revisions: 2022 upgrades outpaced downgrades for second year in a row.

9 Exhibits 19 and 20 show three- and five-year horizon APs over time. We do not present one-year horizon APs over time because the count of defaults that are averaged over to calculate AP are generally too small to support robust measurement of ratings accuracy.

10 Corporate default rates are determined using the 30 day trading price post default while this municipal study are calculated, whenever possible and to the extent data is available, as the discounted recovery rate based on the value creditors actually received at the resolution of the default relative to what they should have contractually received, inclusive of any accrued interest.

11 This count excludes all nonfundamental enhanced ratings as well as issuer ratings.

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