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HEATING UP: THE MUNI MARKET INCHES CLOSER TO PRICING CLIMATE RISK

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Key Takeaways

- Extreme and damaging weather events traceable to climate change cost the U.S. economy almost \$150 billion annually.
- The effects are changing homebuyer and insurance company behavior.
- Nonetheless, municipal credit spreads remain insensitive to climate risk in any measurable way.
- This perspective explores this market disconnect and highlights trends that suggest a change may be in the offing.



Climate change is making weather events more extreme and damaging.¹ Such events now cost the U.S. economy almost \$150 billion annually and are beginning to change homebuyer and insurance company behavior.² 80 percent of homebuyers now consider climate risk when making a purchase.³ Homeowner's insurance is increasingly unavailable or prohibitively expensive in certain parts of the country.⁴

\$150B

Annual cost to U.S. economy for damage from climate change related events²

80%

of homebuyers now consider climate risk when making a purchase³

Nonetheless, municipal credit spreads remain insensitive to climate risk in any measurable way.^{5,6} This is surprising. On paper, state and local governments have significant exposure to physical climate risk. They own 23 percent of all U.S. fixed assets, public *and* private.⁷ They pay for 70 percent of U.S. public sector infrastructure, often by issuing bonds (See Figure 1), and property taxes—which derive their value from potentially vulnerable real estate assessments—secure over one-fourth of the market's \$4 trillion in outstanding debt, as of September 30, 2024.⁸

In this perspective, we seek to explain this disconnect. We summarize the factors driving market insouciance regarding climate change and highlight several trends that suggest a

change may be in the offing. We conclude that a climate-risk premium is likely to appear—eventually—for a subset of issuers. Breckinridge continues to refine its integrated approach to assessing climate risk and customizing portfolios for both adaptation and mitigation, with the goal of enhancing the value of these capabilities over time.

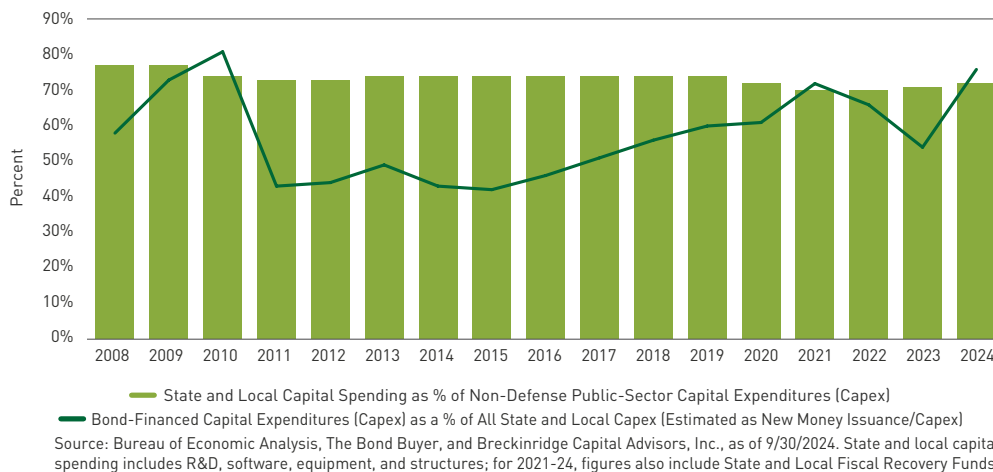
THE CURRENT STATE OF CLIMATE RISK PRICING IN THE MUNICIPAL BOND MARKET: LOTS OF SMOKE BUT NO FIRE

In the past decade, professional muni investors have gone from broadly ignoring climate risk to acknowledging it and (at least sometimes) incorporating it into investment decisions. However, investors appear hesitant to *price* climate risk in any meaningful way. Why is this so?

We believe, there are several good reasons:

First, many municipal bond investment strategies are benchmark-aware, and relatively few municipal securities in major benchmarks are materially exposed to physical climate risk.⁹ This creates an incentive to overlook climate risk associated with some of the market's larger issuers (e.g., Miami-Dade County, Florida, or the Houston, Texas, combined utility system). As illustrated in Figure 2, only 10 percent of the broad market Bloomberg (BBG) Municipal Bond Index faces high physical climate risk, per data from Intercontinental Exchange (ICE), a third-party climate data provider.¹⁰

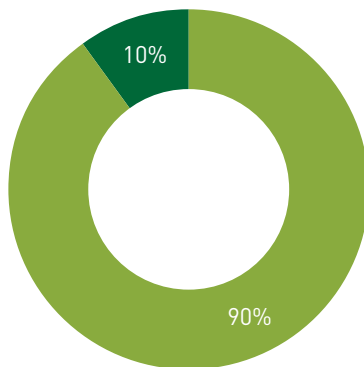
FIGURE 1: STATE & LOCAL GOVERNMENTS OWN MOST OF THE PUBLIC INFRASTRUCTURE IN THE U.S. & FINANCE MUCH OF IT WITH BONDS



- Intergovernmental Panel on Climate Change Sixth Assessment Report: "Human-induced greenhouse gas forcing is the main driver of the observed changes in hot and cold extremes on the global scale (*virtually certain*) and on most continents (*very likely*). It is *likely* that human influence, in particular due to greenhouse gas forcing, is the main driver of the observed intensification of heavy precipitation in global land regions during recent decades..." (p. 426). Italics are the IPCC's. Available at: https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_FullReport.pdf; see also: <https://www.economist.com/the-economist-explains/2022/09/29/is-climate-change-making-hurricanes-worse>.
- Fifth National Climate Assessment, Overview, p. 1-17 (November 2023). Available at: <https://nca2023.globalchange.gov/>.
- Per Zillow. See: <https://www.marketplace.org/2024/09/30/zillow-adds-climate-risk-score-to-property-listings/>.
- Congressional Budget Office, "Climate Change, Disaster Risk, and Homeowner's Insurance," August 2024. Available at: <file:///C:/Users/astern/Downloads/59918-Climate-Change-Insurance.pdf>
- Smull et al., "Climate, race, and the cost of capital in the municipal bond market", PLOS ONE, August 9, 2023. Available at: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0288979>
- "The U.S. municipal bond market does not price in physical climate risk ... Yet", Intercontinental Exchange, June 2022, Available at: <https://www.ice.com/insights/the-us-municipal-bond-market-does-not-price-in-physical-climate-risk-yet>
- Breckinridge analysis of U.S. Fixed Asset Accounts, 2022 data (Bureau of Economic Analysis).
- Breckinridge analysis of Bloomberg data.
- This conclusion is based on physical climate risk scores provided by Intercontinental Exchange's (ICE's) Climate Analytics Platform, accessed September 30, 2024. Other definitions and approaches may differ and produce different results. See Footnote 10 for additional information.
- For this analysis, Breckinridge defines "high" as an issuer having a score of "3" or more on a one-to-five scale. Per conversations with the data provider, a score of "3" is potentially suggestive of material physical climate risk. Approximately 8% of municipal issuers have a score of "3" or more. The score is a measure of financial risk related to the physical impacts of climate change. For more, see disclosures on Intercontinental Exchange's (ICE's) Climate Analytics Platform (<https://www.ice.com/fixed-income-data-services/data-and-analytics/sustainable-finance-data/climate-data>). Definitions and approaches may vary and produce different results.



FIGURE 2: ONLY 10% OF THE BROAD MARKET INDEX EXHIBITS MATERIAL PHYSICAL CLIMATE RISK



— Low Physical Risk — High Physical Risk

Source: Barclays-Bloomberg Municipal Bond Index, International Continental Exchange, and Breckinridge Capital Advisors, Inc., as of 10/28/2024. Material physical climate risk defined by Breckinridge as an issuer with a score >3, per data from Intercontinental Exchange (ICE). For more, see footnote 10.

Asset managers who refuse to hold these names on climate exposure grounds risk underperforming, or at least deviating, from their benchmark.

Second, bonds that exhibit material physical risk are unlikely to experience credit weakening over the near-term. Physical climate risk is most relevant for buy-and-hold investors who own longer tenor bonds. But 63 percent of municipal market maturities occur within the next 15 years.¹¹ Most climate-exposed issuers have time to adapt, upgrade building and zoning codes, and harden infrastructure.

Third, over the past decade, credit fundamentals in the most at-risk regions of the country have generally improved. Physical climate risk is geographically concentrated, including in states like Arizona, California, Florida, and Texas. Real gross domestic product (GDP) growth in these states has ranged from 53 percent in Arizona to 63 percent in Texas, since 2010. U.S. growth has been 38 percent over the same time frame.¹² Municipal debt-to-GDP ratios in each of these states has declined since 2020, and home prices are up at least 93 percent in each since 2015.¹³

Much has been made of the 113 days of consecutive 100-degree days in Phoenix, Arizona, this year. But private payrolls in Phoenix have grown by just under 10 percent since the onset of the COVID-19 pandemic, ranking 34th out of 400 U.S. metro areas.¹⁴ Likewise, the prospect of even dryer, water-scarce futures in places like Phoenix or Las Vegas have proven no bar to well-run water systems. Both remain highly rated, in no small part, because they have sophisticated management systems and ample water availability.¹⁵

Fourth, despite rising climate risk, municipal credit has proven to be resilient in the aftermath of extreme weather events. Private insurance proceeds have continued to flow into jurisdictions to help finance the rebuilding of public and private structures after disasters. Subsidized insurance via the National Flood Insurance Program (NFIP) and state-based reinsurers (e.g., Florida's Hurricane Catastrophe Fund or CAT Fund) have continued to play their traditional roles without interruption notwithstanding closer scrutiny from investors in recent years.



11. Breckinridge analysis of Bloomberg data, September 2024.

12. Breckinridge analysis of Bureau of Economic data, regional accounts, from 2010 through Q2-2024.

13. See Breckinridge's 2024 Municipal Bond Outlook, figure 3. Housing data per Breckinridge analysis of Federal Housing Finance Agency data, through Q1-2024.

14. Breckinridge analysis of Bureau of Labor Statistics data, 2020-24.

15. For example, *Moody's Investors Service's* conclusion on Phoenix, AZ's water system: "Although the region is experiencing an extended period of drought, the city's water system is well-managed with ample resources that will support continued economic development; potential allocation reductions of Colorado River water pose limited near-term risks and will be mitigated over the long-term by ongoing capital improvements that will increase the utilization of water from the Salt River Project." [April 30, 2021 rating opinion for the City of Phoenix's Junior Lien Water System Revenue Refunding Bonds].



The Federal Emergency Management Agency (FEMA) delivers aid in the most acute circumstances, and state and local government reserves are also available where needed. Hurricane Helene in 2024, which devastated western North Carolina, may prove a wake-up call for issuers and investors, particularly given the lack of private flood insurance from many homeowners and businesses. But officials there and professional municipal investors note that state and local credit quality is well positioned to help finance the recovery.¹⁶

Fifth, where investors wish to assess climate risk, precise information is often lacking. Climate disclosures remain the exception, not the rule, in official statements.¹⁷ When information is available, it's often difficult to measure the cost of adapting to climate change. Analyses require estimating the age and resilience of existing infrastructure, which has long been a challenge.¹⁸ There is limited agreement on how to discount the future, and climate modeling at granular geographies can be a fraught exercise.¹⁹ All of this means that investors are challenged to make sound relative value judgments between securities on account of climate risk.

Sixth, municipal investors' credit discernment has atrophied in recent years, at least since 2017. That year's *Tax Cuts and Jobs Act* inaugurated a market without tax-free advance refundings, shrinking the availability of high-grade, tax-advantaged bonds.²⁰ Then, Congress passed the American Rescue Plan Act (2021) which delivered a record amount of one-time aid to municipal issuers.²¹ This was followed by unusually strong post-COVID personal consumption patterns and record-high asset markets. Both buoyed tax collections. In combination, the lack of supply and improvement in credit

quality has likely contributed to weaker buying discipline across the market. Municipal/Treasury (M/T) ratios and credit spreads ratcheted lower over the past eight years (See Figure 3).

A PHASE SHIFT IN MUNI CLIMATE CONSIDERATIONS?

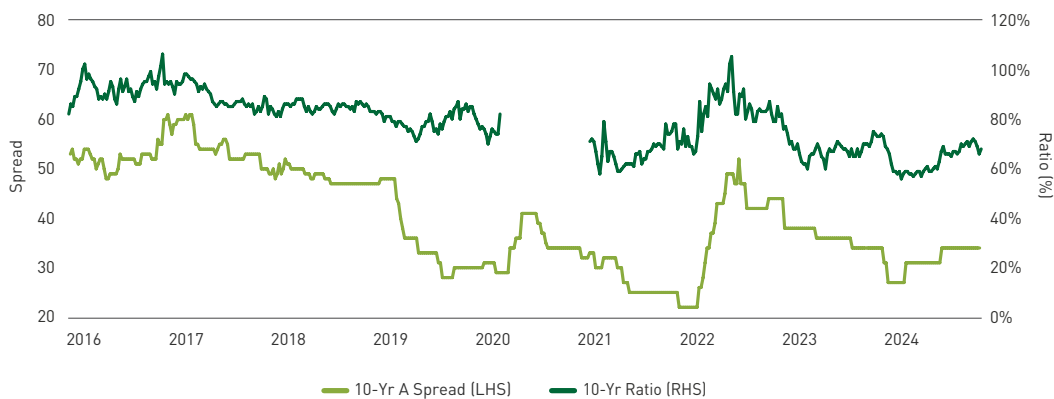
One hallmark of good investing is the ability to recognize when the past may no longer provide insight into the future. Breckinridge anticipates the market is getting closer to such a point regarding physical climate risk. At least five trends suggest that investors will, at some point, begin to price climate risk.

These include:

- 1 A changing insurance environment
- 2 Improving climate risk disclosures
- 3 The emerging ability to scale climate data inputs
- 4 A normalization in credit fundamentals
- 5 An uptick in climate-adjacent credit events

We anticipate that highly exposed, smaller, and less resourced issuers will be most vulnerable to spread widening, though states have tools to reduce risks in most places. Over time, larger issuers with significant physical risk exposure could be negatively impacted. Those that proactively finance adaptive infrastructure projects are likely to outperform. The economic returns to upgrades will likely exceed the cost of new debt-financed capex.

FIGURE 3: SPREADS & RATIOS HAVE GENERALLY DECLINED IN RECENT YEARS ON LESS SUPPLY & IMPROVING CREDIT



Source: Refinitiv TM3 and Breckinridge Capital Advisors, Inc., as of 10/28/2024. Past performance is not indicative of future results. Note: Ratio data for March through December 2020 is omitted. Ratios were unmoored from historical norms during this period because of the pandemic and do not reflect the general trend during the period observed.

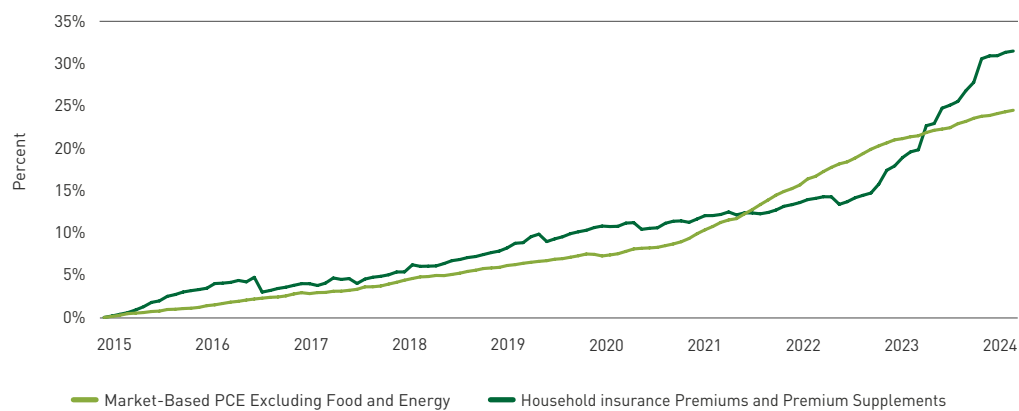
16. Robert Slavin, "Public Finance Concerns Remain as North Carolina digs out from Helene," Bond Buyer, October 3, 2024. Available at: <https://www.bondbuyer.com/news/public-finance-concerns-remain-as-north-carolina-digs-out-from-helene>.
17. See figure 5. Only approximately 30% of municipal offering statements in 2024 included a climate disclosure, per Breckinridge analysis.
18. Based on Breckinridge's November 2016 article, "Infrastructure Accounting: A Blind Spot for Investors."
19. Schoenmaker and Schramade, "Which discount rate for sustainability," Journal of Sustainable Finance and Accounting, Vol. 3, September 2024.
20. The *Tax Cuts and Jobs Act* prohibited issuance of tax-free advance refunding bonds. These bonds had been as much as 20% of market issuance in some years prior to 2017. For more, see Breckinridge's "Election Outlook 2024: Tax Risk Rising," Available at: <https://www.breckinridge.com/insights/details/election-outlook-2024-tax-risk-rising/>.
21. We noted the following in March 2021: "For perspective, the ARP's state, local, and k-12 public education aid alone is equivalent to 25 percent of 2019 state and local tax revenue. In combination with previous aid packages since last March, state and local governments have now received federally provided support equivalent to 40 percent of 2019 tax revenue." See Breckinridge, "Still Work to do for Many Municipal Issuers After Credit-Positive American Rescue Plan," March 2021.



(1) The insurance landscape is changing. The future is likely to be characterized by a less generous private-insurance and post-disaster public assistance environment. In areas of high climate risk, private sector insurers and reinsurers are already underwriting fewer new policies or exiting markets.²² In the highest risk states (e.g., California, Florida, Louisiana), state-subsidized insurance backstops have begun to take on leverage to meet increased demand.²³ The federal NFIP is increasing premiums, as it updates risk ratings to reflect something closer to actuarially sound pricing. Reserves in the federal government's Disaster Relief Fund (DRF) have dwindled, even as advocacy groups seek to add heat and smoke events to the definition of coverable disasters.²⁴ (The DRF is the primary funding source for the Federal Emergency Management Agency's annual disaster relief efforts).²⁵

One consequence of a more austere insurance and government subsidy landscape could be lower bond ratings for highly exposed issuers. Reduced access to private or public insurance threatens to transform the financial risk associated with natural disasters from a diversified and socialized problem to a localized or individualized one. Municipal issuers may need to hold more in reserve to offset these risks or conduct emergency borrowing more often to finance recovery needs (localization). Homeowners may begin to price flood- or fire-prone neighborhoods differently (individualization). Tax bases may grow more slowly as homeowners' insurance premiums rise faster than prices, overall (See Figure 4).

FIGURE 4: CLIMATE RISK CONTRIBUTES TO RISING HOME INSURANCE PREMIUMS



22. <https://assets.firststreet.org/media/National-Risk-Assessment-The-Insurance-Issue.pdf>

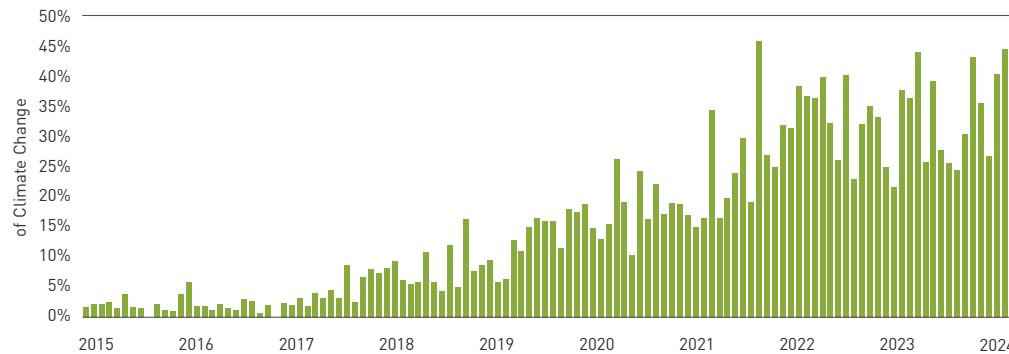
23. <https://www.economist.com/podcasts/2024/04/15/climate-change-could-cost-homeowners-25trn-who-will-pay>

24. https://www.bondbuyer.com/news/pressure-mounts-for-fema-reform?utm_campaign=NL_BB_Daily_Briefing_06242024&position=5&utm_source=newsletter&utm_medium=email&campaignname=NL_BB_Daily_Briefing_06242024&oly_enc_id=4680A8275156A0N

25. Annual federal disaster spending has increased over 3x since 2005; see <https://www.spglobal.com/ratings/en/research/articles/240611-your-three-minutes-in-the-2024-atlantic-hurricane-season-u-s-federal-disaster-relief-funding-will-be-stress-13145498>



FIGURE 5: AN INCREASING PERCENTAGE OF OFFERING STATEMENTS INCLUDE A MENTION OF “CLIMATE CHANGE”



Source: DPC Data, Municipal Securities Rule Making Board, and Breckinridge Capital Advisors, Inc., as of 10/28/2024.

Today’s most at-risk obligors highlight the fiscal challenge. To take one example: *Moody’s Investors Service* currently gives credit to proactive management of climate risk in Miami Beach, Florida. However, the rating agency also notes that “absent these mitigating initiatives” the city’s credit profile could weaken.²⁶ What might happen to the ratings of similarly exposed communities in Florida that are unwilling or unable to keep pace?

(2) Better climate risk disclosure. More issuers are starting to provide the market with climate risk disclosures. Figure 5 illustrates the trend. In 2024, nearly 30 percent of municipal bond market offering statements included the term “climate change”. This figure is up from below 5 percent in 2015.

The quality of these disclosures is likely to improve.²⁷ As an initial matter, regulators have taken an interest in climate risk. This year, the Securities and Exchange Commission (SEC) finalized and adopted standardized climate disclosure rules for corporate securities.²⁸ The rules do not apply to municipal debt (and they could be rescinded or watered down in a future presidential administration), but they hint at a future where investors and regulators expect more of municipal issuers.²⁹ Notably, highly exposed municipal issuers—even in states that are less friendly to environmental, social and governance (ESG) investing strategies—include ample climate-related disclosures in their offering statements.³⁰

Advances in municipal data reporting may also hasten better disclosure. The Financial Data Transparency Act (FDTA), signed into law in 2022, requires submission of machine-readable PDFs to the Municipal Securities

Rulemaking Board’s (MSRB) Electronic Municipal Market Access (EMMA) system.^{31,32} A readable format could eventually help investors more easily integrate climate risk into their decision making.

Lastly, the Government Accounting Standards Board (GASB) announced improved infrastructure disclosures.³³ More transparency into the asset condition of municipal infrastructure should help investors pinpoint issuers that face both elevated climate and latent physical asset risks.

(3) Scaling climate information is getting easier. A proliferation of new data providers makes this possible. ICE and Bloomberg offer investors a variety of climate-related data and solutions.³⁴ *Moody’s Investors Service* and *Standard & Poor’s* purchased climate data providers in recent years, as well.³⁵ Each year, scalable data should become more reliable at granular geographic levels. We believe such data can be used to surface relative and directional risks between borrowers.

Qualitative climate information is also becoming more digestible. Issuers have long posted climate adaptation, land use, and economic development plans on their websites. But until recently there was little ability to integrate these documents swiftly into an underwriting process. Publicly available large language models (LLMs) make it possible to query and compare these documents quickly and efficiently. Many asset managers deploy scoring to help assess credit risk; widely available machine-learning statistical models can now be used to integrate this kind of information from multiple presentation formats, including the written word.

26. *Moody’s Investors Service*, credit opinion for City of Miami Beach, FL, June 28, 2023.

27. Breckinridge has supported better climate disclosure in the past. Currently, it is a signatory to CDP, which is an organization that has supported standardized municipal climate reporting through its Municipal Disclosure Campaign. The Campaign encourages cities and public authorities to report on their climate mitigation and adaptation activities.

28. <https://www.sec.gov/newsroom/press-releases/2024-31>

29. <https://www.bondbuyer.com/news/issuers-on-notice-for-climate-risks>

30. For example, Florida’s HB3, “An act relating to government and corporate activism” is no bar to securities laws which require the disclosure material information. As such, investors will commonly be furnished with substantial climate-related disclosures even for issuers in Florida. A recent disclosure for the City of Miami included the following language: “... global climate change increases the potential of considerable financial loss to the City, including, without limitation, substantial losses in tax revenues.” [City of Miami, FL Limited Ad Valorem Tax Bonds, May 30, 2024].

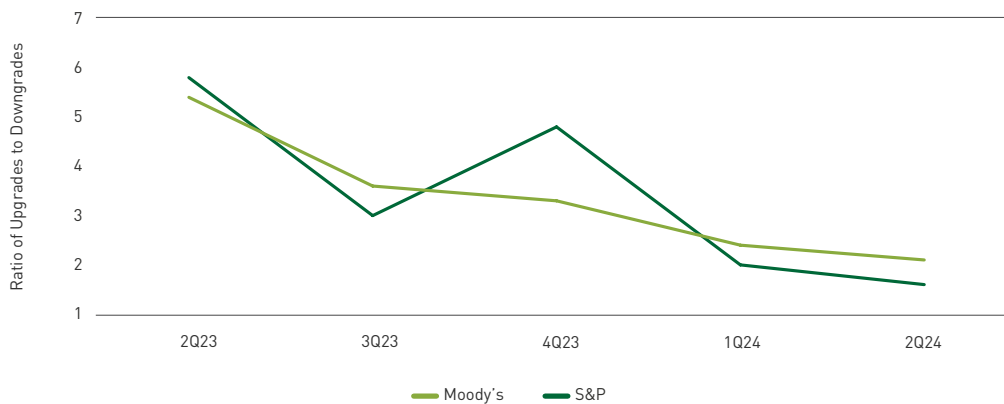
31. The SEC is currently developing the FDTA disclosure standards, with an initial estimated completion date of December 2024, and rulemaking to be in place by 2026. <https://www.bondbuyer.com/news/sec-attempts-to-calm-muni-market-over-fdta-implementation>

32. The timeline is likely to be delayed: https://www.bondbuyer.com/news/first-fdta-proposal-appears-to-be-delayed?utm_campaign=NL_BB_Daily_Briefing_07162024&position=1&utm_source=newsletter&utm_medium=email&campaignname=NL_BB_Daily_Briefing_07162024&oly_enc_id=4680A8275156A0N

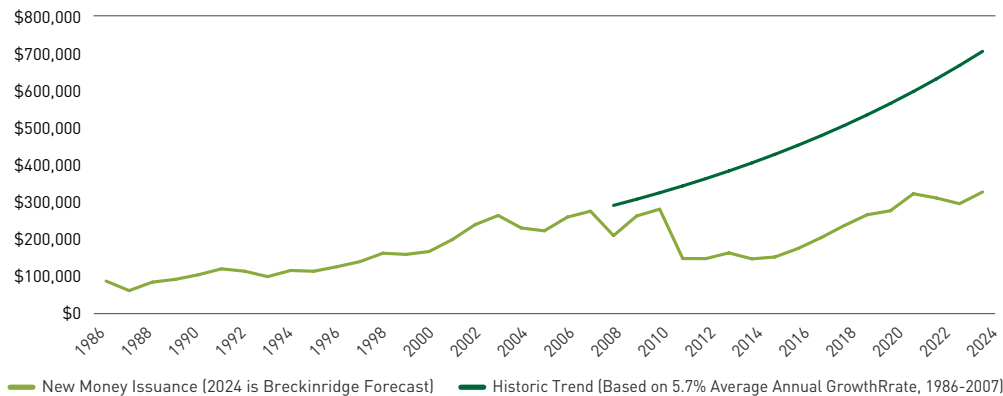
33. See GASB’s “Infrastructure Assets” project and related materials. Available at: <https://www.gasb.org/projects/current-projects>.

34. ICE purchased RisQ and Level 11 Analytics in 2021. Bloomberg was named a leader in climate financial data and analytics reporting in June 2024 in a report by Verdantix. More information available here: <https://www.bloomberglp.com/professional/insights/data/bloomberg-named-leader-in-verdantix-2024-climate-financial-data-analytics-report/>.

35. *Moody’s Investors Service* purchased Four Twenty Seven, Inc. in 2019. *Standard & Poor’s* purchased The Climate Service, Inc. in 2022.


FIGURE 6: THE PACE OF CREDIT IMPROVEMENT IS SLOWING


Source: Moody's Investors Service, Standard & Poor's, and Breckinridge Capital Advisors, Inc., as of 10/28/2024.

FIGURE 7: MUNICIPAL BORROWING IS WELL BELOW THE PRE-GFC TREND; ISSUERS HAVE CAPACITY TO FUND ADAPTATION PROJECTS, IF NEEDED


Source: Bond Buyer, Bureau of Economic Analysis, and Breckinridge Capital Advisors, Inc., as of 10/28/2024.

(4) The credit backdrop is returning to normal.

Incrementally, this process should elevate the relevance of physical climate exposure for the least prepared issuers.

As we outlined in our [2024 Municipal Bond Outlook](#), state and local governments' multi-year run of strong budget performance is becoming less consistent, as the era of extraordinary pandemic aid and tax collections ebbs. Notably, credit fundamentals remained strong this year, but the pace of public finance upgrades is slowing (See Figure 6).

The federal government's fiscal condition is also weaker, which could prove a drag on credit quality. As we noted in our [2024 Election Outlook: Tax-Risk Rising](#), rising federal borrowing costs and deficits increase the potential for adjustments to long-standing federal grant programs, like those for Medicaid or the Highway Trust Fund. The federal government's revenue needs may also crowd out state and local issuers' ability to raise fees or taxes of their own. The costs associated with adapting to physical climate risk will likely add to these challenges.

A more austere credit environment portends more borrowing for climate adaptation needs. This seems especially likely given that many issuers deleveraged over the past 15 years and have the capacity to borrow more. A substantial increase in new money supply, and municipal debt burdens, would merely return the market to its pre-2008 trend line (See Figure 7).

(5) There has been an uptick in climate-adjacent credit defaults and downgrades. Municipal Market Analytics (MMA), an independent research firm, counts 12 climate-related bond defaults since 2009.³⁶ That's a de minimus figure, in aggregate, but a material one in a market in which defaults are rare. Moreover, the incidence may be increasing. In just the last two years, Clyde, Texas, defaulted on certificates of obligation, in part, because of accelerating drought conditions, and the Paradise Redevelopment Agency (California) defaulted on tax increment financing debt impacted by the 2018 Camp Fire.^{37,38,39}

36. Municipal Market Analytics (MMA) references Clyde, TX as "the twelfth municipal borrower since 2009 whose impairment was at least partly blamed on climate change and/or a natural disaster" in its August 21, 2024 Default Trends report sent to MMA subscribers.

37. <https://www.bondbuyer.com/news/texas-towns-default-brings-downgrades-to-junk-bond-ratings>

38. <https://www.wsj.com/articles/paradise-the-wildfire-ravaged-california-town-warns-of-municipal-bond-default-11658493581>

39. https://www.fidelity.com/bin-public/060_www_fidelity_com/documents/fixed-income/moodys-investors-service-data-report-us-municipal-bond.pdf



Downgrades also seem more common. In October, *Standard & Poor's* placed three utilities as well as 12 counties in North Carolina and Tennessee impacted by Hurricane Helene on “credit watch negative”. The rating agency noted that “future investment in infrastructure hardening and adaptation may be required to address the rising incidence and severity of storms such as Helene.”^{40,41} In the same month, *Standard & Poor's* warned that capital needs at California water and sewer systems may “strain rate affordability” partly on account of climate risk.⁴² Similarly, a lack of affordable insurance worries *Moody's Investors Service*, which recently concluded that “local governments in many areas will face economic and tax revenue risk from rising weather-related costs and adaptation expenditures.”⁴³

SMALL ISSUERS ARE THE MOST AT-RISK IN THE NEAR TERM BUT STATES CAN HELP IN A NUMBER OF WAYS.

Breckinridge anticipates that climate-induced credit stress will manifest itself, first, among smaller issuers. Communities and utilities with smaller geographic footprints and/or smaller tax bases are more exposed to single event risk (like Helene) and generally less able to finance necessary upgrades.

State governments are likely to support vulnerable issuers in several ways, including through adaptation grants and similar programs, enhanced insurance backstops like those in Florida, Louisiana, and California, and conditioning certain forms of support on climate-ready building, zoning, and planning codes. We also expect, over time, that more small issuers will seek access to the market via bond banks or state revolving loan funds. These approaches can enable access to cheaper financing through pooled-risk vehicles and avoid the time, effort, and cost associated with additional climate disclosures. State approaches are likely to vary and to evolve in fits and starts.

Larger issuers with more diversified economies and geographic spread will likely be more insulated from medium-term climate stress. However, over time, even these jurisdictions may be pressured by the costs associated with building resilient infrastructure and the jurisdictional complications of upgrading infrastructure that often crosses regional lines.

Issuers that are willing to finance these upgrades and that work cooperatively with regional peers seem likely to outperform over the long-term. We anticipate that investors will favor issuers that demonstrate strong leadership, good long-term planning, regional coordination, and broad community support for adaptive projects.

For perspective, one can examine Breckinridge's hometown: Boston. It may cost up to \$3 billion to protect the coastline in Boston, MA.⁴⁴ On paper, this is an enormous amount. It is nearly double the city's reported \$1.7 billion in bonded debt.⁴⁵ However, Boston's tax base exceeds \$212 billion, and the city anchors a metro area with a GDP (gross domestic product) of \$504 billion.⁴⁶ In this context, \$3 billion is both affordable and would serve to protect the economic vitality and credit ratings of an entire region. As a matter of math, Boston could borrow the \$3 billion by itself at a 4% interest rate and pay it back over 30 years—and it would increase the city's debt service-to-revenue ratio from 4% to 8%.⁴⁷ That's not ideal, but we believe it compares favorably to many other U.S. cities.

Breckinridge's integrated approach to assessing climate risk and its experience in customizing municipal bond portfolios may be additive for climate-oriented investment objectives.

BRECKINRIDGE'S APPROACH

Breckinridge's integrated approach to assessing climate risk and its experience in customizing municipal bond portfolios may be additive for climate-oriented investment objectives. Each municipal bond in which Breckinridge invests receives a climate assessment as part of its overall risk weighting. The assessment balances each issuer's physical risk exposure against adaptation efforts, as well as traditional credit factors (like tax-base size or reserves). Moreover, Breckinridge can customize solutions based on an issuer's aggregate physical risk, if desired. These strategies may benefit investors if the market begins to price climate risk, an eventuality that we think will be more likely each year.

Senior Research Analyst Ruth Ducret also contributed to the development of this article.

40. U.S. Public Finance Water and Sewer Utilities Place on CreditWatch With Negative Implications, October 15, 2024, *Standard & Poor's*.

41. Various Western North Carolina And Tennessee Local Government Ratings Put On CreditWatch Negative After Hurricane Helene, October 17, 2024, *Standard & Poor's*.

42. "California Utilities Enter Period of Significant Capital Spending that May Strain Water and Sewer Rate Affordability," October 3, 2024, *Standard & Poor's*.

43. Rising insurance costs indicate growing climate risk state and local governments, September 12, 2024, *Moody's Investors Service*.

44. "Defending the Waterfront: Building a Resilient Coastline for Boston," *The Boston Foundation*, December 2022.

45. p. 53 of Boston's 2023 Annual Comprehensive Financial Report (ACFR).

46. Boston's 2023 ACFR and Bureau of Economic Analysis.

47. Breckinridge calculations based on disclosures in Boston's FY 2023 ACFR.



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