Implications of Environmental Protection Actions for Public Finance

Daniel G Garrett

Wharton School of the University of Pennsylvania

April 22, 2026

Prepared for the joint meeting of the NJ Senate and Assembly Environment committees on "Protecting Against Climate Threats — Resilient Environments and Landscapes"

Thank you very much to Chairman Bob Smith of the Senate Environment and Energy Committee for hosting this session and for inviting my comment on the public finance implications of NJ Protecting Against Climate Threats – Resilient Environments and Landscapes (NJ PACT - REAL) rules and regulations. My name is Daniel Garrett and I am a scholar of public finance and an assistant professor of finance at the Wharton School at the University of Pennsylvania. I am speaking today in my capacity as a private citizen and researcher who has spent a lot of time thinking and writing about how expensive it is for public entities to borrow money and want to note that I am not speaking on behalf of my employer.

States and municipalities in the US raise over $500 billion per year from investors to finance investments in durable infrastructure and ongoing operations, and these obligations total over $4.2 trillion right now. This public finance market is vital to think about in discussions about environmental rules and regulations for two reasons (Mishra et al., 2026):

1. The fiscal well-being and long-run solvency of public borrowers is impacted by climate threats and other environmental phenomena, so investors require more compensation when issuers face unmitigated climate threats.

2. Most state and local climate adaption in the US is and will continue to be financed by municipal bonds, so the price paid for access to finance directly impacts our ability to mitigate emerging threats or disasters.

Let me add the following caveat: Any impact on state and local borrowing that follows from climate regulation is only part of the fiscal benefit that spills over to investors through credit risk. Other fiscal benefits of having less climate risk on the ledger of the state accrue to tax payers and won't be measured by the market.

My testimony delves into the fiscal benefits of responsible environmental protection

and abatement of environmental threats and how these actions can be reflected in municipal bond markets. I want to be clear about is the following: taking actions to mitigate large and correlated property destruction and losses due to climate change, sea level rise, and other environmental phenomena is valued in the municipal bond market and can have a sizable fiscal impact even though this is only part of the benefit.

1 New Jersey Public Finance

Let me begin with some basic facts about the state of public finance in general and in New Jersey specifically.

Public borrowing is expensive, by which I mean that state and local entities pay larger than expected interest payments to investors for each dollar borrowed (Schwert, 2017). Interest payments are about $100 billion/year on the $4.2 trillion in outstanding state and local debt.[1] Of that $4.2 trillion total debt outstanding, $41.5 billion is owed by the state of New Jersey itself (this is $58.3 billion using the slightly broader Census definition), or about $4,400 for each resident. State agencies and local entities in NJ owe another $27.8 billion. Total interest payments reported in 2022 for NJ entities including the state amounted to almost $3.4 billion, which is on the same order of magnitude as judicial and corrections ($3.8 billion, variables E04, E05, E25, F04, F05, and F25) and 3 times larger than spending on fire departments ($1.1 billion, E24 and F24). This is a relatively large debt burden per capita within the US before considering legacy pension obligations, but this outstanding debt also has financed lots of positive investments in durable public assets that residents and visitors value, like the Newark lead pipe replacement program, recent improvements at the Atlantic City International Airport, and the Sci Tech City initiative in Jersey City.

[1] Numbers in this paragraph come from the Census of Governments, 2022, available at https://www.census.gov/data/datasets/2022/econ/local/public-use-datasets.html.

Borrowing is relatively more expensive when investors perceive that borrowing is risky, or if investors think there is a likelihood that they won't be paid back. Debt in New Jersey is a bit more expensive than in other states with less debt per capita or than other states that face less fiscal risks going forward despite the fact that NJ has never defaulted on a bond itself, unlike the neighbors to the west who defaulted in the panic of 1837.

Fiscal risks to a state, which I define as uncertain events that can lead to non-repayment events for investors, can manifest in many ways and unfortunately investors care more about the future than the past. The most obvious risk to investors is that the tax base repaying the state's debts, be it income earners, consumers, or property owners, can either leave or become unwilling or unable to pay for some reason. Investors often learn about risks in the public finance space through either their own due diligence, credit rating agencies, or both. Credit rating agencies are especially important given their regulatory role and changes in credit ratings generally lead to large changes in prices (Cornaggia et al., 2018).

So, what does a fiscal risk look like for a municipal entity that would lead to bond holders not being paid? For the state of New Jersey, the major sources of revenue are sales and income taxes, while property taxes are the major source for sub-jurisdictions and shocks to those revenue sources or necessary spending could be risks investors care about. Sometimes, things evolve slowly as in Detroit where residents, businesses, and investment left the city over several decades combined with fiscal mismanagement and pension promises that couldn't be met until there just isn't enough money to make payments. Other times, things fall apart quickly as in Orange County, CA, where investments in interest rate derivatives with public assets leads to failure when the market moved against those positions. The most famous environmentally precipitated financial crash of a municipal entity to my knowledge was Galveston, TX, which was

hit by a hurricane and tidal wave in September of 1900. Within two weeks, it was clear that the city government would no longer be able to pay their debts with the loss of infrastructure and tax base, so with the help of the state, the city underwent a massive debt restructuring.[2]

This last case in Galveston is related to a prominent risk for states: the risk that they will have to step in and fiscally support jurisdictions within the state. Gao et al. (2019) separate state policies on financial distress into two categories: "Chapter 9 states" who allow contained cities to go through the bankruptcy process on their own and "Proactive states" who take *proactive* roles in using state assistance and state-granted restructuring power to make sure that municipalities only use the bankruptcy code as a last resort. New Jersey is one of these proactive states. In general, these proactive states have a tradeoff that local municipalities are able to borrow more cheaply because they give less risk to investors, but states themselves may be riskier if they have to bail out or otherwise becoming fiscally entangled with many sub-jurisdictions at the same time.

2 Pricing of Sea Level Rise

The most prominent and studied risk that is newly being priced in the municipal market in the last few decades is that of sea level rise: places with the potential for more flooding or destroyed property if the sea level rises are facing higher borrowing costs and these costs have increased more over time as evidence for sea level rise has become more clear.

The most recent empirical exploration of whether sea level rise risk is priced is

[2]The full history with lots of narrative detail is described by https://houstonhistorymagazine.org/wp-content/uploads/2014/02/10.2-I-H-Kempner-and-the-Galveston-Commission-Government-Harold-M-Hyman.pdf.

Goldsmith-Pinkham et al. (2023). The basic quasi-experiment is the following: there are two school districts within the same county, and they both have similar spending per student and other characteristics except one has relatively more of its tax base in coastal flooding planes than the other. Around 2013, there was a large increase in many leading models for how much the sea level would rise with different warming scenarios. The authors then compare the borrowing outcomes of the two school districts within each county before the SLR estimates increase and show that the two districts with different amounts of coastal flood plane exposure have similar bond pricing before 2013. After the projections of SLR impact were updated negatively, Goldsmith-Pinkham et al. (2023) show that bond spreads begin to separate—school districts with more of their tax base exposed to SLR have bond prices that decline and the interest payments that investors require to hold their bonds increases.

The paper argues that a district having one standard deviation more (approximately 10 percentage points) of its tax base in coastal flood planes leads to a roughly 5 basis points (0.05%) annually in higher yields, implying that investors expect a 2–6% reduction in the present value of a coastal government's future cash flows.[3] If you want to turn this into a dollar value of fiscal impact, one needs to make a few other assumptions. The easiest way to turn this into an interpretable dollar value is with the "modified duration" relationship, which is an approximation of how price and yield are related. Bonds in NJ have an average modified duration around 6, which means that a 0.05% increase in yields is equivalent to a 0.3% decrease in price. Said differently, when promising the same interest payments to investors, a borrower facing a 0.05% higher interest rate will raise 0.3% less funds when promising the same future interest payments to investors.

These papers jump through lots of hoops to try to show why state and local bor-

[3]Other published estimates in the literature, like Painter (2020), suggest even larger effects and Mishra et al. (2026) argue that the pricing of this risk is still increasing in later years.

rowing gets more expensive, and I distill the arguments in the following way: Investors demand higher interest rates from coastal school districts not primarily because properties are already losing value, but because the range of possible futures has widened—if worst-case sea level rise scenarios materialize, enough of the local tax base could be destroyed to threaten repayment, and it's really hard to know how likely that is.

3 Mitigating Climate Risks and Bond Pricing

Considering that market participants seem to be pricing sea level rise, and pricing it more over time, it should be no surprise that actions to mitigate the impacts of climate risks including investments in flood resistant buildings may lead to investors perceiving less risk and require lower returns. This is a very challenging hypothesis to test because of potential reverse causality: is it lower costs that allow more climate adaption, or is it climate adaption that leads to lower municipal borrowing costs? Empirically, borrowers in the US taking on more climate friendly investments have lower borrowing costs, but I don't know of ongoing work that disentangles causality from correlation.

Instead, I turn to information from the agents that the market leans on most to learn information about repayment risk of state and local borrowing: the credit rating agencies (mostly Moody's, S&P, and Fitch in this space). Insofar as taking active mitigation efforts causally leads to lower climate and environmental risks, one should expect the credit rating agencies to cite mitigation efforts as positive credit factors. This is exactly what credit rating agencies have been doing.

On August 11, 2025, S&P upgraded New Jersey's main General Obligation debt from A to A+, which is a one notch increase in credit rating. The following is how they defended their rating in the second paragraph:

> Although physical risks are elevated given New Jersey's long coastal ex-

> posure and comparatively higher levels of air pollution, in part due to emissions from other states, the state actively works to manage these risks through strategic infrastructure investments, including decarbonizing transportation in areas with poor air quality and partnering with local governments and leveraging federal funding for climate resiliency projects. As a result, we view environmental and social factors as neutral within our analysis.
>
> S&P Global, August 11, 2025[4]

In my ongoing research (Garrett et al., 2025), neutral information can very much lead to positive pricing impact because it is a decrease in spread of potential things that investors are worried can happen. That is, neutral information is priced like one might imagine good information is priced: saying that there is potential for bad outcomes but there are actions being taken to avoid the worst of those bad outcomes is better than having no information and investors simply speculating about a large range of good and bad outcomes.

This is not just one rogue credit analyst at a woke credit rating agency. In their guidance, Moody's has listed physical climate risk (i.e., potential for losses due to flooding, fires, famine, trade disruptions, etc.) as a credit factor for public borrowers in the US since 2017. In their 2020 credit rating report for NJ, "[Moody's] says New Jersey's adoption of stronger building codes, especially along the state's 130-mile coastline, is 'credit positive' because it will reduce communities' exposure to sea-level rise and other harmful climate."[5] These are not agencies that make flippant statements nor that have political agendas, but they are cautious and reactive entities focused on

[4] https://www.spglobal.com/ratings/en/regulatory/article/-/view/type/HTML/id/3422456

[5] https://subscriber.politicopro.com/article/eenews/2020/02/20/nj-climate-policies-get-a-thumbs-up-from-moodys-018766.

predicting where investors face repayment risk and updating their models so issuers, investors, and regulators continue to trust them.

It's maybe worth noting that the difference of one rating notch is quite small in terms of expected default. For example, for Moody's between 1920 and 2008, bonds with a rating of A had average 5-year credit losses of 0.4% while going up 2 notches to AA, bonds had average 5-year credit losses of 0.14%. Both of these are ultimately very safe in the large scheme of the world, but two notches of ratings in the municipal space will lead to a annual pricing difference that is 19-33 basis points *per year* (Cornaggia et al., 2018). Said differently: very small changes in perceived risk can lead to much larger changes in pricing.

4 Concluding Remarks

Back to the issue at hand: is there any benefit to engaging in climate risk mitigation efforts like those included in the NJ PACT - REAL rules and regulations? There is a lot of nuance to comment on the costs, but there are some fiscal benefits.[6]

The physical risk associated with sea level rise is priced in the debts of coastal (and inland) communities, and that price makes it more expensive for the state to invest in other priorities or to make costly investments in mitigation. Any actions the state has to take to help mitigate risks in coastal communities (bailing out insurance companies, taking on municipal liabilities, etc.) leads to potential scenarios where repaying investors and maintaining safe and healthy communities are at odds and investors may

[6] An exact magnitude is hard to estimate and I have not done the math, but here's an example of how the math could work: if the state's 1-notch upgrade was marginally caused by ongoing climate risk mitigation efforts in the state, one simply needs to multiply (1) outstanding debt, (2) modified duration, and (3) the average pricing difference between A and A+ to estimate the fiscal benefit of these actions. That leads to \$58.3 billion $\times$ 6 $\times$ 0.001 = \$350 million. Of course, credit ratings are a confluence of many, many factors and the NJ PACT - REAL rules probably did not cause the recent credit rating increases on their own, so the fiscal benefit to the state through this borrowing cost channel on state debt would be below this number but greater than zero.

not be repaid. To that end, investors will require additional compensation to invest in the state's debt and thus borrowing for the state could be more expensive.

References

Cornaggia, Jess, Kimberly J Cornaggia, and Ryan D Israelsen, 2018, Credit ratings and the cost of municipal financing, *The Review of Financial Studies* 31, 2038–2079.

Gao, Pengjie, Chang Lee, and Dermot Murphy, 2019, Municipal borrowing costs and state policies for distressed municipalities, *Journal of Financial Economics* 132, 404–426.

Garrett, Daniel, Brian Gibbons, and Mahdi Shahrabi, 2025, Who labels and what's priced? evidence from third-party ESG assessments in the municipal bond market, Technical report, Working Paper.

Goldsmith-Pinkham, Paul, Matthew T Gustafson, Ryan C Lewis, and Michael Schwert, 2023, Sea-level rise exposure and municipal bond yields, *The Review of Financial Studies* 36, 4588–4635.

Mishra, Aayushi, Advait Arun, Evan Kodra, Erika Smull, Owen Woolcock, Tom Doe, Justin Marlowe, and Auroop R Ganguly, 2026, Physical climate risk creates challenges and opportunities in us municipal finance, *Nature Cities* 1–11.

Painter, Marcus, 2020, An inconvenient cost: The effects of climate change on municipal bonds, *Journal of Financial Economics* 135, 468–482.

Schwert, Michael, 2017, Municipal bond liquidity and default risk, *The Journal of Finance* 72, 1683–1722.