Department of Civil Engineering
College of Engineering and Applied Sciences

FALL 2022 SEMINAR SERIES

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Friday, November 18th, 1:00 – 1:55 PM
Frey Hall Room 201

Pricing Risk: Valuing Climate Adaptation Investments in Transit Infrastructure

Abstract

Climate change and sea level rise (SLR) are expected to increase the frequency and intensity of coastal flood events, posing risks to coastal communities and infrastructure. Recent experience (e.g., Hurricane Sandy) and research suggests that coastally adjacent transit systems are particularly vulnerable, yet the present literature and practice lack methods for estimating potential flood-related losses or their relation to uncertain future SLR. Consequently, present and future coastal flood risk to transit systems is neither well understood nor adequately priced. Addressing this gap, we construct a novel flood loss estimation framework for transit systems and demonstrate its application to estimate flood risk to Boston's rail transit system with SLR. We further apply this framework to estimate the flood risk reduction benefits of a set of climate change adaptation projects proposed by the City of Boston. Considering these project benefits and prevailing uncertainties, we employ a real options analysis (ROA) valuation framework to estimate the value of these projects to the regional rapid transit authority and explore the value of flexibly timing projects based on realized future SLR.
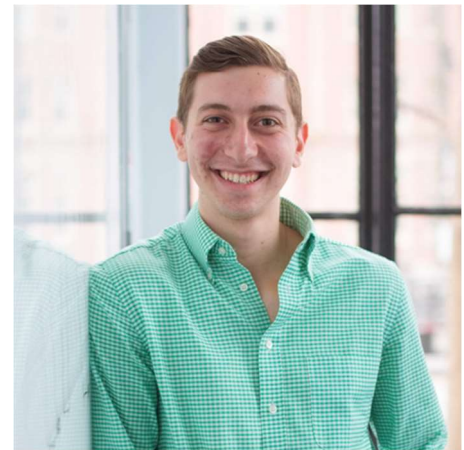
Speaker Biography

Michael Martello is a PhD candidate in the Department of Civil & Environmental Engineering at the Massachusetts Institute of Technology (MIT). Currently advised by Prof. Andrew Whittle, he

is a member of the MIT Transit Lab and JTL Urban Mobility Lab. He is also a Department of Defense SMART Scholar sponsored by the U.S. Army Corps of Engineers (USACE) New York District and an MIT Martin Fellow for Sustainability. His research focuses on developing tools to quantify the costs of climate change to infrastructure systems, methods of valuing climate adaptation projects for infrastructure, and decision support tools for prioritizing climate adaptation investments. Michael holds a S.M. in Civil & Environmental Engineering from MIT (2020) and B.S. in Civil Engineering from Manhattan College (2018).