

Project Title: Analyzing Willingness to Improve the Resiliency of New York City's Transportation System

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Hurricane Sandy revealed the higher-risk vulnerability to natural hazards of civil infrastructure systems in coastal megacities such as New York. In particular, critical deficiencies in the NYC metropolitan area's transportation system emerged after Sandy. Unfortunately, experts predict that future sea level rise and storms will exacerbate the problems caused by these deficiencies. There are thus several challenges to improving strength and resilience of transportation systems. In particular, preparedness, survival, and recovery require the identification of adequate funding sources to collect revenue for public investments to improve resilience of the systems under threat.

Traditional sources of funding for both recovering from disasters and preventing future damages are not only limited, but also do not account for benefit transfers of the externalities induced by the provision of resilient infrastructure. In principle, property owners should be willing to pay an amount equal to the perceived benefit, if this positive externality is internalized by them following some pricing mechanism. Monetizing these benefit transfers can be used as a tool not only to leverage scarce public resources, but also to achieve a socially optimal resource allocation. A key element is then the estimation of the **willingness to pay for supporting investments in resiliency**, because this measure can be exploited to determine the cost share the community is willing to cover to secure infrastructure systems as well as to receive the benefits from minimizing potential damage.

The goal of this is to analyze the community's willingness to pay for improvements in the resiliency to extreme events of the transportation system in New York City. This objective seeks to provide better tools for better informing planning investments to improve both resilience and security of transportation infrastructure and services.

Choice microdata was collected for over 1500 residents of the metropolitan NYC area, while aiming at advancing the state-of-the-art in choice modeling for addressing different attitudes toward risk. To determine the community's willingness to pay for improvements in the resiliency to extreme events of the transportation system in New York City, several logit-type models were estimated. A high degree of heterogeneity in preferences was determined, and the preferred model was a discrete-continuous heterogeneity mixture that allows for the derivation of nonparametric distributions of willingness to pay.

Using hypothetical scenarios of recovery, the willingness to pay as an annual for class 1 ranges from about \$15 to \$50, whereas for individuals who missed work and self identify as politically liberal the willingness to pay range from \$120 to \$775. For the mixture, the range of variation is \$75-\$450. In a contingent-valuation question, where respondents were asked how much they would pay to "support investments that would reduce the recovery time from 3 weeks to only 3 days", the average willingness to pay was \$192, with a standard deviation of \$305.

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University: **Cornell University**

