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Valuing Public Urban Street Trees and Their Environmental Spillover Benefits

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Abstract : This paper estimates the value of urban public street trees and their complementary and substitution value with other broader urban amenities and dis-amenities via the residential housing market. We estimate a lower bound value on a city's tree amenities under instrumental variable and geographic regression discontinuity approaches with an application to Lisbon, Portugal. For completeness, we also explore how urban trees and in particular public street trees impact house prices across the city. Finally, we jointly analyze the planting and maintenance costs and benefits of urban street trees. The estimated value of all public trees in Lisbon is €8.84M. When considering specifically trees planted alongside roads and in public squares, the value is €6.06M or €126.64 per tree. This value is conditional on the distribution of trees in terms of their broader density, with higher effects coming from the overall greening of larger areas of the city compared to the greening of the direct neighborhood. Detrimental impacts are found when the number of trees is higher near street canyons, where they may exacerbate the stagnation of air pollution from traffic. Urban street trees also have important spillover benefits due to pollution mitigation around €6.21 million, or an additional €129.93 per tree. There are added benefits of €26.32 and €28.58 per tree in terms of flooding and heat mitigation, respectively. With significant resources and policies aimed at urban greening, the value obtained is shown to be important for discussions on the benefits of urban trees as compared to mitigation and abatement costs undertaken by a municipality.

Keywords : urban public goods, urban street trees, spatial boundary discontinuities, geospatial and remote sensing methods
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