

Apr 15th, 1:00 PM - 2:30 PM

Measuring spillover effects of residential amenity improvement using spatial hedonic approach

Shruti Tandon
University of Nevada, Las Vegas

Follow this and additional works at: https://digitalscholarship.unlv.edu/grad_symposium



Part of the [Real Estate Commons](#), [Urban Studies Commons](#), and the [Urban Studies and Planning Commons](#)

Repository Citation

Tandon, Shruti, "Measuring spillover effects of residential amenity improvement using spatial hedonic approach" (2010). *Graduate Research Symposium (GCUA) (2010 - 2017)*. 8.
https://digitalscholarship.unlv.edu/grad_symposium/2010/april15/8

This Event is protected by copyright and/or related rights. It has been brought to you by Digital Scholarship@UNLV with permission from the rights-holder(s). You are free to use this Event in any way that is permitted by the copyright and related rights legislation that applies to your use. For other uses you need to obtain permission from the rights-holder(s) directly, unless additional rights are indicated by a Creative Commons license in the record and/or on the work itself.

This Event has been accepted for inclusion in Graduate Research Symposium (GCUA) (2010 - 2017) by an authorized administrator of Digital Scholarship@UNLV. For more information, please contact digitalscholarship@unlv.edu.

MEASURING SPILLOVER EFFECTS OF RESIDENTIAL AMENITY IMPROVEMENT USING SPATIAL HEDONIC APPROACH

Shruti Tandon, PhD Student

School of Environmental and Public Affairs, Greenspun College of Urban Affairs,
University of Nevada Las Vegas, Las Vegas, NV 89154-4030, shruti.tandon@csn.edu

Introduction

The purpose of this dissertation is to examine pecuniary and and technological spillover effects using alternative traditional and spatial econometric methods. In recent years development in spatial econometrics has shown that hedonic method cannot cope with the problems of spatial effects (spatial autocorrelation and spatial heterogeneity), which are inherent in the real estate data. When spatial effects are ignored, ordinary least squares (OLS) estimates are biased and inconsistent. Spatial lag models are one of the many spatial econometric methods used to capture the spatial dependence effects in the housing data.

Research Questions

- 1) Do properties undergoing residential amenity improvements impose positive spillover effects on the neighboring properties?
- 2) What is the nature of the spillover mechanism – is the externality pecuniary or technological and which of the two externalities pecuniary or technological dominate welfare estimation?
- 3) How do estimates of marginal willingness to pay (MWTP) for standard hedonics compare to that of spatial lag models?

Approach

Kim et al. (2003) measured the aggregate combined (direct and indirect spillover effects) welfare benefits of air pollution abatement on the housing values. They measured marginal willingness to pay for the spatial lag model .

Increases in the value of the property are a result of both direct effect and the indirect spillover effects. Following Kim et al., Small and Stimetz (2008) in a theoretical analysis suggested that only under very strong assumptions can spatial multiplier approach be used in welfare analysis; otherwise one needs to decompose the spillover effects into pecuniary effect (direct effect) and technological effect (indirect).

Hedonic Real Estate Model

$$P_i = P(S_i,N_i,E_i) + \varepsilon_i$$

Spatial Hedonic Lag Model

$$P = \rho WP + X\beta + \varepsilon$$
$$\varepsilon = \lambda W_\varepsilon + u$$
$$u \sim N(0, \sigma^2 I)$$

Marginal Willingness to Pay(Direct)

$$MWTP_{EQ} = \frac{\partial P}{\partial EQ} = \hat{\beta}_p$$

Marginal Willingness to Pay (Indirect)

$$MWTP_{Z_i} = \frac{\partial p}{\partial Z_i} = \hat{\beta}_{zi}(\frac{1}{1-\rho})$$

Variable Name	Description
<i>Dependent Variable</i>	
Price	Price of owner occupied property
<i>Structural Characteristics</i>	
Elevation	Elevation of the house
Acres	Lot Size
Yrbuilt/age	Age of the house
Heating	Indicator variable for central heating
Cooling	Indicator variable for central cooling
Bedrooms	Number of bedrooms
Bath	Indicator variable for more than 2 baths
Fireplace	Number of fireplaces
Pool	Indicator variable for pool
Totsqft	Interior living space
<i>Neighborhood Characteristics</i>	
Average distance to parks	Distance to the nearest park
Distance to highway	Indicator variable for home location within 0.25 km
Distance to highway	Indicator variable for home location within 0.25 - 1 km
<i>Environmental Characteristics</i>	
Average distance to schools	Average distance to schools in km
Median household income	Median household income (US\$)
College	% population in Census Tract
<i>Amenity Improvement</i>	
Amenity Improvement	Government induced amenity improvements

Expected Results

My hypothesis is that positive benefits from amenity improvements will spillover to neighbors. Technological externality associated with the amenity improvements will dominate the total spillover effect to appropriately estimate marginal willingness to pay.

References

Kim, Chong W., Tim T. Phipps, and Luc Anselin. (2003). Measuring the benefits of air quality improvement: a spatial hedonic approach. *Journal of Environmental Economics and Management* 45: 24-39.

Small, K.A. and Stemetz, S. (2008). Spatial hedonics and the willingness to pay for residential amenities. Economics working paper no. 05-06-31, University of California, Irvine, CA.

Acknowledgements

Wish to thank my advisors Associate Professor Djeto Assane, Department of Economics and Associate Professor Helen R. Neill, School of Environment and Public Affairs.

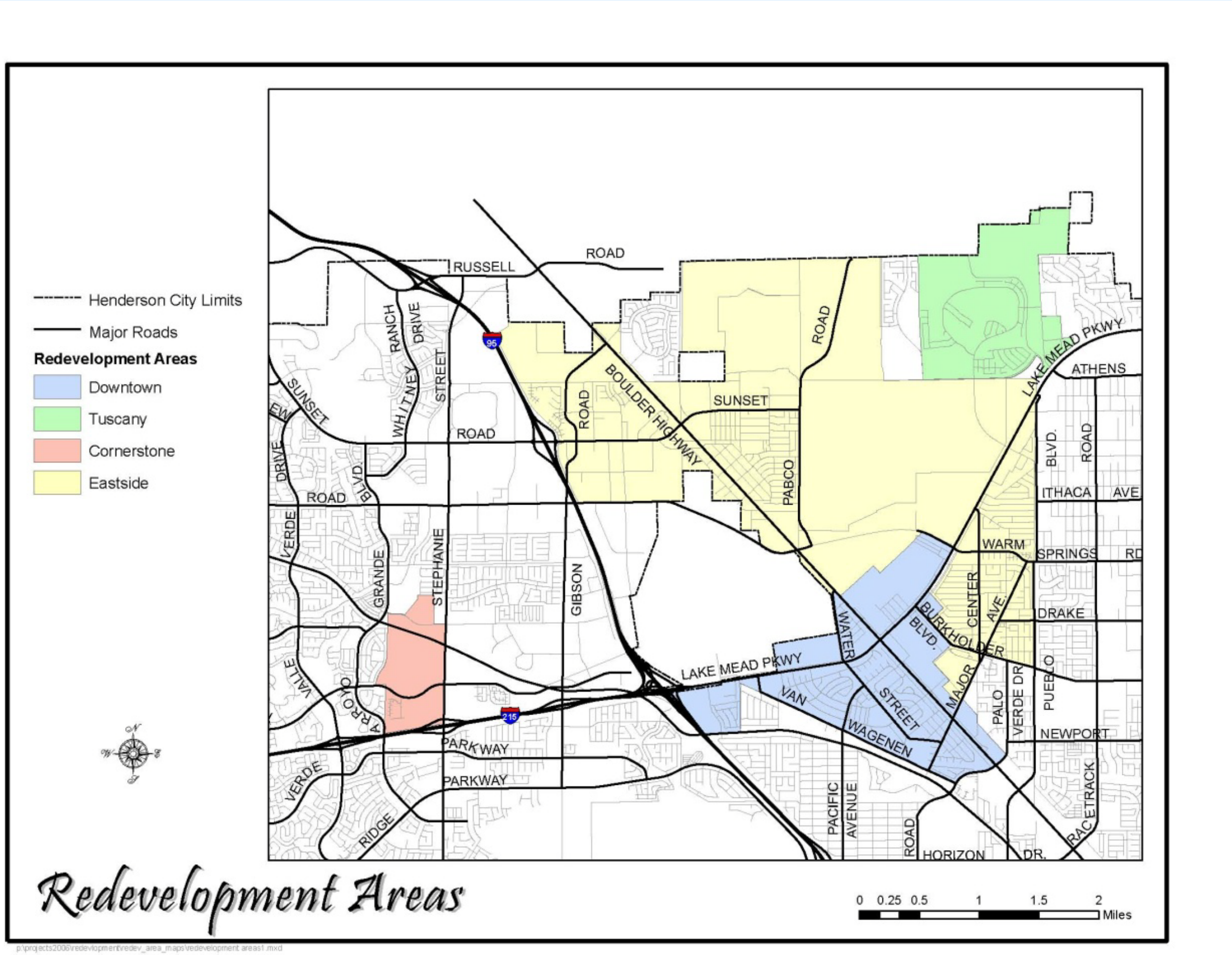


Figure 1: Redevelopment Areas in Henderson, NV (City of Henderson Department of Neighborhood Services, 2007)