Assessing the economic benefits and resilience of complete streets in Orlando, FL: A natural experimental design approach

Chia-Yuan Yu, Minjie Xu, Samuel D. Towne, Sara Iman

Urban and Regional Planning Program, School of Public Administration, University of Central Florida, Orlando, FL 32816, USA
Department of Landscape Architecture and Urban Planning, Texas A&M University, College Station, TX 77843-3137, USA
Health Promotion and Community Health Sciences, School of Public Health, Texas A&M University, College Station, TX 77843-3137, USA

ABSTRACT

Complete Streets are designed to allow for safe access and use for all (e.g., pedestrians, bicyclists, transit commuters, motorists) to improve mobility and accessibility. Retrofitting Complete Street designs acts as an intervention by increasing active transportation activity and providing safety benefits (e.g., reducing motor vehicle involved crashes and injuries); however there is insufficient evidence related to economic benefits of this redesign.

This study applied a natural experiment design to: (1) explore the economic benefits on single-family (SF) property value appreciation before-and-after the implementation of the Complete Street during the housing market boom (from 2000 to 2007), and (2) examine the economic resilience of Complete Street designs on maintaining SF property values during the housing market crash (from 2007 to 2011) at Edgewater Dr. in Orlando, FL. Propensity score matching was used to match intervention and control residences with similar building attributes.

On average, SF homes exposed to Complete Streets had 8.2% and 4.3% higher home value appreciation and home value resilience than their counterparts in the adjacent non-exposed control area during housing market boom and recession, respectively. Further, on average, SF homes exposed to Complete Streets experienced relatively higher, at 2.7% and 1.6%, home value appreciation and home value resilience than their control counterparts around the nonadjacent auto-oriented control roads during housing market boom and recession, respectively.

The implications of this study can inform local planning practice providing evidence that Complete Streets perform better than conventional street designs on maintaining a 'healthy' housing market in both economic boom and recession. The economic benefits found can be integrated with research that demonstrates public health and safety benefits of Complete Streets to address the current barriers in implementing Complete Streets and support for policies facilitating the implementation of Complete Streets nationally.

1. Introduction

Complete Streets are designed to be accessible for all users such as pedestrians, bicyclists, transit commuters, and motorists. The purpose of Complete Streets is to improve mobility and accessibility by enhancing safety and ease of travel, especially for active transportation use (McCann, 2005). Several US states have adopted Complete Street policies. For example, Winter Park Health foundation has worked with Smart Growth America to recognize specific barriers for local decision makers to implement Complete Streets.
Streets in Central Florida through a series of three Complete Streets implementation workshops (Smart Growth America, 2016). These workshops sought to educate stakeholders from diverse organizations on national best practices in implementation, including facilitating discussions regarding regulatory and cultural barriers and strategies to address those barriers (Smart Growth America, 2016).

Complete Streets may serve as a public health intervention as well. One US study examined the influence of Complete Streets with a light rail extension, more complete bike paths, and wider sidewalks on transit-related walking and non-transit walking and found that residents living near Complete Streets were more likely to have higher transit-related walking and non-transit walking than those living in other areas (Brown et al., 2016). Furthermore, Complete Streets may also provide safety benefits. A study examined the pre-post impact of Complete Streets on motor vehicle crashes and injuries in several California and Washington cities (Huang et al., 2002). They found that the percentage of crashes was 6% lower with Complete Streets. Thus, Complete Streets address both physical activity and traffic safety issues of great interests to policy makers and key stakeholders.

Limited attention has been spent investigating economic benefits related to Complete Streets. Complete Streets modify and improve the built environment for active transportation use, which can affect travel patterns of surrounding residents and adjacent businesses. These changes may bring benefits for retail use (e.g., creation of businesses and employment) with long-term “ripple effects” on property values (Litman, 2015, 2016; New York City Department of Transportation). Complete Streets tend to improve local access, safety, and environmental quality, which may also enhance economic efficiency and market performance (Litman, 2015). Complete Streets may improve land values and housing sale prices, generating more revenue from property taxes to finance transit projects and public services, yet true economic benefits associated with Complete Streets remains unclear.

Evidence suggests a positive relationship between walkable built environmental designs and property values (Dong, 2015; Leinberger and Alfonzo, 2012; Li et al., 2015). Some studies examined the impact of the implementation of transportation infrastructure on housing values and found proximity to public transit system were positively associated with real estate values (Cervero and Duncan, 2002; Duncan, 2011; Yan et al., 2013), yet limited studies have investigated the potential impacts of Complete Streets on property values. Additionally, two major limitations haven’t been well addressed in existing studies. First, most used cross-sectional designs, preventing causal effect evaluation (Hong et al., 2016). One approach to strengthen the study design is to analyze changes of economic outcomes before-after implementation to work towards evidence of causality (Gibbons and Machin, 2005). Second, most did not employ an intervention-control, thereby unable to control for the selection bias (Lewallen and Courtright, 1998). Moreover, the housing market is dynamic and conducting longitudinal analyses to cover both housing market booms and downturn could provide significant insights to comprehensively assess Complete Streets, especially for the Great Recession (2007–2011). Economic recessions have brought many negative impacts such as lower employment rates and less economic activity, a result related to the prevalence of obesity and increased amount of health care expenditures (Catalano, 2009; Ludwig and Pollack, 2009). Assessing the economic resilience of Complete Streets could provide another potential benefit to promote Complete Streets and active living.

To address the above research gaps, this study used a pre-post and intervention-control study design to explore changes in property values before-and-after the implementation of Complete Street (from 2000 to 2007) and to examine resilience in property values during the housing market recession (from 2007 to 2011) in Orlando, FL. To our knowledge, this is the first Complete Street intervention assessment on both a housing market boom and downturn using a natural experimental design. The results of this study can inform policy to further street retrofitting programs to promote active transportation.

2. Methods

2.1. Study setting and research design

Originally, Edgewater Dr. was designed as a four-lane road with a volume of more than 20,000 vehicles per day. This automobile-oriented road has limited space for pedestrians and cyclists, a design that experienced a crash occurrence almost every three days and crash-related injuries every nine days (Smart Growth America, 2016). Thus, the city of Orlando and the Florida Department of Transportation (FDOT) implemented a road diet to retrofit this road by providing space for sidewalks, bike lanes, and streetscape, to shape the corridor into a pedestrian-oriented street with lower speeding vehicles, better non-motorized infrastructure, and improved streetscape. This project resurfaced the 1.5-mile length of Edgewater Dr. between Par Street and Lakeview Street through the Neighborhood Horizon Plan from 2001 to 2002. The corridor was converted from four to three lanes with one travel lane in each direction and a center turn lane and bike lanes in both directions (City of Orlando City Planning Division, 2007). The study area for the intervention area is along the section of 1.5-mile Edgewater Dr. between Par Street and Lakeview Street. Fig. 1 shows the images of before-and-after intervention of Edgewater Dr.

A pre-post and intervention-control comparison was conducted to explore the changes in property values before and after the Complete Streets implementation during the housing market boom (2000–2007) and also to examine the effects of Complete Streets on resilience of property values during the housing market downturn (2007–2011) in Orlando, FL. For the pre-post study design, 2000 is one year before the intervention and set as pre-intervention year. In order to better capture the effect of Complete Street designs on dynamic housing market, 2007 and 2011 were chosen as two post-intervention points to represent the peak and bottom of housing market. Orlando is one of the top 10 U.S. cities hit hardest by the Great Recession that was affected by the housing collapse, and its median house price dropped 43.6% from a peak ($275,000) in 2007 to a low ($155,000) in 2011 (Arias et al., 2016; JP’s Real Estate Charts, 2014). This particular time frame and economic circumstance made Orlando a unique area to study the economic benefits and resilience of Complete Street designs on housing values during the housing market boom and downturn.

Two sets of intervention-control groups were defined as showed in Fig. 2.
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