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The relationship between transit rich neighborhoods and transit ridership: Evidence from the decentralization of poverty

Kyungsoon Wang [a, *], Myungje Woo [b]

[a] School of City and Regional Planning, Georgia Institute of Technology, 245 Fourth Street, NW, Atlanta, GA, 30332, USA
[b] Department of Urban Planning and Design, University of Seoul, 163 Seoulsiripdae-ro, Dongdaemun-gu, Seoul, 130-743, South Korea

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ABSTRACT

The concept of transit-rich neighborhoods (TRNs) has become a focus of more interest as it relates to rapidly growing and congested communities, and it has received national attention because of its contribution to smart growth in the United States. Although most investment in transit services has been concentrated in denser central cities, where most transit users, including those of low income, reside, the trend toward the decentralization of poverty has become evident in many metropolitan areas and underscored the need to improve suburban transit services. Many studies pertaining to transit ridership have focused on the physical characteristics of stations, their catchment areas, and equity issues for low-income riders, particularly in central cities, without accounting for the evolving socioeconomic characteristics of the neighborhoods being served. To address this issue, this paper categorizes TRNs based on changing socioeconomic and spatial characteristics and uses multiple regression to examine the relationship between types of TRNs and transit ridership in the Atlanta metropolitan area, focusing on the decentralization of poverty. The results show that suburban TRNs became more diverse in terms of income and race between 2000 and 2009, which suggests that investment in commuter rail transit is an important contribution to social and economic equality at the regional level. Furthermore, poverty rates in suburban areas, compared to those in their downtown and inner-city counterpart TRNs, positively influence the percentage of transit ridership. The increased use of suburban transit services suggests the potential presence of increased latent demand, which is further supported by the decentralization of poverty.

1. Introduction

As increasing transit ridership relieves traffic congestion and thus reduces greenhouse gas emissions and promotes a healthier lifestyle, compact and mixed land-use development and transit-oriented development (TOD) have increasingly been observed in rapidly growing, congested cities and received national attention for the Smart Growth movement. Since 1996, this movement has provided a framework for sustainable development, promoting compact and mixed land use, walkable and attractive communities, affordable housing, and various transportation options such as public transportation (Smart Growth Network, 2001). In addition, Americans are increasingly using transit services and expressing interest in living in areas well served by transit, so-called transit-rich neighborhoods (TRNs) (Pollack, Bluestone, & Billingham, 2010). In this study, we refer to a TRN as a neighborhood within a one-half mile radius[1] of a transit station, which includes block groups with various land uses. Our concept of a TRN is somewhat broad, including both transit-oriented development (TOD) and transit-adjacent development (TAD). While TOD generally strives to capitalize on new mixed-use developments around transit stations with a pedestrian- and bicycle-friendly environment (Transportation Research Board, 2002), TAD refers to the land adjacent to the transit stop; however, it fails to capitalize on the land or stimulate new mixed-use developments (Cervero, Ferrell, & Murphy, 2002). The growing desire for transit services, illustrated by the dramatic increase in public transportation ridership in U.S. metropolitan areas, is spurring the creation of more TRNs, perhaps

[1] Planners generally assume that approximately one-quarter of a mile (400 meters) to transit stops or stations is a comfortable distance for people to walk (Untermann, 1984), and about a half-mile (800 meters) radius of station areas captures variations in socioeconomic changes and quality of service for analyses (Hess & Almeida, 2007; Welch, 2013).

* Corresponding author.
E-mail addresses: kwang42@gatech.edu (K. Wang), mwoo@uos.ac.kr (M. Woo).

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in the hundreds in the next several decades (Pollack et al., 2010). To encourage and increase transit ridership, more than 80 cities and regions have already planned to establish new projects or add to existing transit systems (Belzer & Poticha, 2009). Such investment in transit services has been concentrated in denser central cities containing the majority of current transit users, including low-income groups. For example, the Metropolitan Atlanta Rapid Transit Authority (MARTA) stations are located in only two counties, Fulton and Dekalb, providing transit services to inner-city residents. Despite the growing demand for public transit systems, particularly in the suburbs of many metropolitan areas (McKenzie, 2013), possibly as a result of the recent decentralization of poverty (Lee, 2011) and employment centers (Brown, Thompson, Bhattacharyam, & Jaraszynski, 2014), the recent expansion plan of transportation, including transit services, for ten counties in the Atlanta region failed to gain support from voters in 2012 (Schmitt, 2012).

Although a large number of studies have examined transit ridership, they have provided little evidence that transit investment planning accounts for the recent decentralization of poverty, particularly in the suburbs. Many existing studies of transit ridership have focused on the physical characteristics of stations and their catchment areas (Zhao, Deng, Song, & Zhu, 2013), their urban forms (Ewing & Cervero, 2001), their distance to bus stops (Ewing & Cervero, 2010), and equity issues for low-income populations (Foth, Manaugh, & El-Geneidy, 2013; Welch, 2013), particularly in central cities. However, few have examined the impact of socioeconomic changes in TRNs that result from the decentralization of poverty from central cities to suburbs on transit ridership.

The purpose of this paper is to examine (a) changes in the neighborhood characteristics of six types of TRNs, neighborhoods within a half-mile radius of the 38 MARTA stations between 2000 and 2009 in Atlanta, Georgia and (b) the relationships among these changes according to geography and transit ridership, focusing on the effects of decentralization of poverty on transit ridership. The trend toward the decentralization of poverty may increase transit ridership in suburban neighborhoods and calls for increased demand for transit investment in such suburban areas in the Atlanta region.

This study begins with a review of the literature on major factors affecting transit ridership and theories of neighborhood change associated with TRNs. Then it describes the background of Atlanta MARTA stations, focusing on the scope of services and geographic boundaries, and examines the characteristics of the Atlanta Metropolitan Statistical Area (MSA) to show regional socioeconomic characteristics that might increase the demand for public transit. After describing the data and methods, it examines the characteristics of six types of TRNs and their neighborhood changes during the last decade, and then it presents a regression analysis that provides the results of the impact of the six types of TRNs as they interact with poverty regarding the use of public transit. The results show that most TRNs have experienced increasing diversity in terms of race, income, education, and labor force population and that low-income commuters living in outer-ring suburban TRNs are more likely to use transit than those living in other TRNs. In addition, they show that poverty is a significant factor associated with higher transit ridership within suburban TRNs, increasing the demand for transit services in suburban neighborhoods.

2. Transit ridership and changes in transit-rich neighborhoods (TRNs)

2.1. Factors associated with transit ridership

Studies have used regression models to identify major factors affecting transit ridership, classifying these factors into the physical characteristics of stations and the locations (e.g., central city, suburb) of neighborhoods and their socioeconomic characteristics.

The physical variables shown to affect ridership are the floor area of buildings, bicycle or car park and ride spaces, intermodal connections, land uses such as the number of education buildings, shopping centers, and entertainment venues, access to bus stops, station characteristics such as elevated or underground stations, and urban form such as density, diversity, and design (Cervero & Kockelman, 1997; Cervero & Radisch, 1996; Ewing & Cervero, 2010; Jou & Chen, 2014; Kang, 2010; Kuby, Barranda, & Upchurch, 2004; Soltani & Hoseini, 2014; Vandebona & Tsukaguchi, 2013; Wirasinghe et al., 2013; Zhao et al., 2013). Cervero and Kockelman (1997) found that density, land use diversity, and pedestrian-friendly design tended to increase non-auto travel. Similarly, accounting for the characteristics of neighborhoods, findings by Cervero and Radisch (1996) suggested that American neighborhoods with compact, mixed use, and pedestrian-oriented development exhibit a relatively higher share of non-automobile uses for work trips than those with low-density suburban development. However, Crane and Crepeau (1998) found no direct relationship between neighborhood design and non-work travel patterns. In addition, several studies have found that travel-related attitudes influence transit use (De Vos, Derudder, Van Acker, & Witlox, 2012; Schwanen & Mokhtarian, 2005; Van Acker, Van Wee, & Witlox, 2010). For example, residents of suburban neighborhoods, who prefer using their cars, are less likely to use public transit.

Neighborhood locations and proximity to some facilities and activities also affect transit use. Studies have found that public transit use is associated with proximity to transit and accessibility to destinations (Ewing & Cervero, 2010), and residents close to a city center tend to have short average trip distances (Næss, 2006, 2009). The location of neighborhoods is usually measured by the distance from a city center or the use of a dummy variable in which “1” denotes neighborhoods located within the central business district (CBD) (Zhao et al., 2013), which assumes that residents in neighborhoods close to a city center or downtown favor the use of transit services. Linking neighborhood changes and TRNs across geographical locations and time, Lin and Long (2008) analyzed the impact of the characteristics of residential locations such as urban, suburban, and rural areas on travel behaviors and revealed higher transit use in neighborhoods within the city center in which greater than 60 percent of the population is non-white and 53 percent of households have an annual income of less than $35,000.

In terms of socioeconomic characteristics, income, youth, vehicle ownership, and employment are associated with transit use (Brown et al., 2014; Brown & Thompson, 2008; Cardozo, Garcia-Palomares, & Gutierrez, 2012; Kim & Wang, 2015; Pagliara & Papa, 2011; Pollack et al., 2010; Tilahun & Fan, 2014; Welch, 2013). Pollack et al. (2010) examined neighborhood change between 1990 and 2000 with regard to 42 stations in 12 metropolitan areas. They compared changes in population, housing units and costs, household income, public transit, and car ownership by aggregating block group data from areas within a one-half mile radius of each station. They found that while the patterns of neighborhood change varied across transit-rich neighborhoods, they raised concerns about gentrification and equity: Residents in TRNs become wealthier; car owners become more common in area surrounding newly developed transit stations; and potential transit riders are being crowded out by car owners. Pagliara and Papa (2011) examined economic changes in catchment areas, those within a 500 m radius of newly built stations, and found that property values around stations are higher than those in station