



Different ways to get to the same workplace: How does workplace location relate to commuting by different income groups?



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ABSTRACT

We examine whether commonly-observed differences in commute behavior among different income groups are associated with the location of their workplaces. Using the Chicago metropolitan area as a case study, we classify six types of workplace locations to reflect the degree of employment centralization versus decentralization and the degree of employment clustering versus dispersion. Based on the 2008 Chicago Regional Household Travel Inventory, we found that low-income workers are more likely to work in centralized but dispersed workplaces, while high-income workers are more likely to work in employment clusters. The unequal distribution of workers in different workplaces, combined with distinctive commuting patterns to certain workplaces, partly explains commonly-observed commute differences, such as shorter-distance commutes and more public transit use by lower-income workers. Regression analysis shows that the association between income and commute mode varies by workplace, and, more importantly, commute mode has a greater association with workplace locations than with income. The results suggest considering workplace locations in empirical research on commuting inequalities and when establishing transportation and housing policies.

1. Introduction

Higher- and lower-income groups tend to travel to work differently in the United States: lower-income workers on average have shorter commute distances but longer commute times, and they are more likely to rely on non-automobile modes than higher-income workers (Renne and Bennett, 2014). Many factors contribute to these commuting differences, such as low-income workers' limited budgets and low automobile ownership rates. However, a gap remains in our understanding of commute disparities: to what extent are the locations of workplaces associated with the commonly-observed differences in commuting between income groups? In answering this question, we seek to bridge literature on commuting inequality with literature on the relationship between urban spatial structure and commuting. Both streams of literature have a long history, but they have not been sufficiently connected.

Investigating the association between workplaces and commutes is important because it provides a new perspective to address commuting inequalities. Policies such as discounted transit passes and other financial incentives aim to make transportation more affordable to low-income workers. Yet, if workers at various income levels are unevenly sorted into different workplace locations, baseline commute travel options for each income group may also be unequal. If this is true, then policies also

need to consider workplace-based strategies to meet the needs of low-income workers. In fact, in the U.K., the Greater London Authority has noted this issue and published a report on the disconnection between workers at different qualification levels and their workplaces (Ennis et al., 2009).

We use household travel survey data from the Chicago metropolitan area to answer three questions: How are the workplaces of different income groups distributed spatially? Do the commonly-observed differences in commute distance and commute mode between income groups vary by workplace location in a metropolitan area? And, to what extent are workplace locations associated with differences in commute modes among income groups?

The next section reviews literature on how workplace locations are associated with commuting behavior of different income groups. We then describe the data and methodology, including the classification of six types of workplaces in the study area. The results section includes findings based on a descriptive analysis of how different income groups are distributed across the six types of workplaces, a descriptive analysis of commute distance and commute mode by income and by workplace, and binomial logit models that estimate the association between workplaces and commute modes of different income groups. The paper concludes with policy implications.

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2. Literature review

2.1. Workplaces and commutes

Economic functions of various workplaces in a metropolitan area naturally vary. Urban economic theory suggests that the intra-regional urban spatial structure reflects rational decisions made by various people and organizations competing for a limited supply of land (Von Thunen, 1826). In a conventional monocentric metropolitan area where jobs concentrate in the Central Business District (CBD), land users who value agglomeration economies are willing to pay high land rent to locate in the center (Alonso, 1964), particularly high-income, high-skill jobs. The high land rent encourages density. In recent decades, the monocentric urban structure dissolved in many metropolitan areas as jobs suburbanized and employment clusters emerged in the suburbs. Yet, a familiar pattern emerged around these clusters: compared with surrounding low-density suburban areas, suburban employment clusters similarly attract jobs that value agglomeration economies (Anas et al., 1998).

Therefore, the contemporary intra-regional urban structure can be analyzed on two related but different dimensions (Anas et al., 1998): 1) centralization versus decentralization; and 2) clustering versus dispersion. The spatial distribution of employment opportunities can be classified in these two dimensions. The first measurement indicates the degree to which jobs are concentrated in a CBD or a central city versus suburban communities. In the U.S., decentralization has been the common trend for several decades. The second dimension denotes whether jobs are clustered in subcenters or dispersed in a low-density, relatively uniform fashion. The degree of clustering in U.S. metropolitan areas is debatable. Gordon and Richardson (1996), Lang and LeFurgy (2003), and Lee (2007) suggest that dispersion is more common than clustering, but much research still emphasizes and analyzes employment subcenters (Giuliano and Small, 1991; McDonald and Prather, 1994; Cervero and Wu, 1997; McMillen and Smith, 2003; Giuliano et al., 2007), because they affect labor markets and commuting patterns.

Commuting costs are an essential factor in shaping the urban spatial form of a metropolitan area. Urban economic theory suggests that when deciding where to live, households aim to maximize utility, making tradeoffs between commuting costs, land rents, and other housing amenities (Alonso, 1964; Muth, 1969; Mills, 1970); firms aim to maximize profits, and one of the strategies is to reduce transportation costs to potential workers (Marshall, 1920; Mills, 1972). As employment locations shift from the CBD to the suburbs, theoretical models have been developed to understand commuting to multiple employment centers (Timothy and Wheaton, 2001; Wheaton, 2004).

There is no consensus on the extent to which commutes to decentralized and centralized workplaces differ. The main reason is that workers could adjust their job and housing locations and eventually stabilize commute length or duration (Gordon et al., 1991; Clark and Kuijpers-Linde, 1994; Levinson, 1997; Crane and Chatman, 2004). Additionally, the existence of employment subcenters in decentralized places complicates commuting patterns (Wang, 2000).

Empirical research found that commute trips to the largest employment clusters—CBDs—tend to be longer than those to employment subcenters (Cervero and Wu, 1997; Sultana, 2002), and longer to employment subcenters than to dispersed workplaces (Giuliano and Small, 1991; Manaugh et al., 2010). Even without identifying employment centers, studies found that higher density at workplaces tend to be associated with longer commute trips (Cervero, 2002; Zhang, 2004; Chen et al., 2008) and lower share of automobile commutes (Chatman, 2003). Giuliano and Small (1993) contended that employment clusters need to draw workers from larger areas, thus requiring average longer commute trips than dispersed workplaces.

Transportation services available for different workplaces vary and consequently affect commutes. Transit systems tend to serve CBD-bound

travel (Thompson and Matoff, 2003). Decentralization of population and employment, on the other hand, is regarded as a primary cause of the decline in transit mode share (Cervero, 1989; Schwanen et al., 2001). But in the suburbs, employment subcenters can potentially ensure the minimum employment size that supports a competitive public transit system (Susilo and Maat, 2007). Brown and Thompson (2008) found empirical support that transit services to employment subcenters can attract transit riders. Meanwhile, it is challenging to organize public transit to dispersed workplaces (Jaroszynski et al., 2017).

This stream of literature identifies differences in commuting patterns to various types of workplaces, but it rarely connects workplace locations to commuting differences among population groups. For example, workers employed in the CBD tend to have long commutes, but do all CBD workers at different income levels have similarly long commutes? This is a question that we aim to answer.

2.2. Workplaces and commute inequalities

Although sufficient research has emphasized the connection between workplaces and commutes, the research that explores commuting differences among population groups tends to focus on residential locations or the simple (dis)connection between residences and workplaces, but rarely considers inherent commuting patterns associated with distinct workplace locations, suggested by the literature reviewed above. Shifting the emphasis to workplaces requires a readjustment of perspective (Shearmur, 2006).

Economic, social, and other factors significantly affect commuting behavior of different population groups (Hanson and Pratt, 1988). Urban economic theory suggests that household location decisions are made based on the tradeoffs between commuting costs, land rents, and other housing amenities (Alonso, 1964; Muth, 1969; Mills, 1970). With limited budget, low-income workers are more sensitive to the tradeoff between job proximity and housing price (Adair et al., 2000), while high-income workers can put more weight on housing amenities. Assuming exogenously-given workplaces, Pinjari et al. (2011) developed a simulation model which finds that lower-income workers prefer housing closer to their workplaces.

The second reason that low-income workers have different commuting patterns is associated with their low transportation mobility. For example, in the U.S., lower-income workers on average have shorter commute distances but longer commute time (Renne and Bennett, 2014), mainly because they rely on slow and inefficient public transit and non-automobile travel modes (Taylor and Ong, 1995). The lack of automobile mobility limits lower-income workers' job search ranges (Blumenberg and Ong, 2001), and they face more challenges to look for and acquire jobs distant from their residences. Glaeser, Kahn, and Rappaport (2008) recognized public transit services as a major reason that the poor concentrate in central cities. In a qualitative study, Boschmann (2011) even suggested that residential choices of working poor are made based on their mobility options but not their workplace locations.

Third, lower-income households face more residential location constraints, including social and institutional barriers, in addition to housing unaffordability. Kain's (1968) Spatial Mismatch Hypothesis (SMH) provides a conceptual framework to connect residential segregation with commuting differences among population groups: African Americans in the U.S. tend to be constrained in the inner cities and thus need to endure long commutes to reach decentralized jobs. The SMH was expanded to study economically disadvantaged groups, including welfare recipients (Ong and Blumenberg, 1998; Blumenberg and Manville, 2004) and the poor (Covington, 2009; Hu, 2014). Much SMH literature focuses on residential neighborhood characteristics (Jencks and Mayer, 1990; Preston and McLafferty, 2016) or residence-based job accessibility (Ihlanfeldt and Sjoquist, 1991; Shen, 1998; Cervero et al., 2002; Kawabata and Shen, 2006; 2007; Grengs, 2010; Hu, 2015). Providing circumstantial support to the SMH, Horner and Mefford (2007) found a narrower commute range for minorities than for whites, which they

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