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Informality and accessibility to jobs by public transit: Evidence from the São Paulo Metropolitan Region

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A B S T R A C T

Access to opportunities through public transport can have different impacts on individual's life especially in developing countries where opportunities are limited, job informality rates are high, and socioeconomic characteristics gaps are big. The aim of this paper is to explore the relationship between job informality and accessibility to employment by public transport in São Paulo Metropolitan Region (SPMR), Brazil. To do so, we calculate a cumulative-opportunity measure of accessibility to jobs for 633 areas within the SPMR. We use a multilevel mixed-effects logistic regression model to estimate the effect of job accessibility on the likelihood of being informally employed, controlling for individual and other area characteristics. To account for informal sector heterogeneity, two regression models are generated: one for the workers earning below minimum wage and one for the workers earning above minimum wage. The results show that accessibility to jobs is unevenly distributed across the region, largely concentrated in the core of the region, and especially in the high-income areas. The regression results show that for workers earning less than the minimum wage, a higher level of accessibility to jobs by public transport is associated with a lower likelihood of being a worker in the informal job sector. For informal workers earning more than the minimum wage, car ownership seem to be more relevant than transit accessibility in determining the likelihood of being part of the informal job sector. In light of these findings, increasing accessibility by public transport through either expanding transit services to areas with high informality rates to have a better access to formal jobs or supporting the decentralization of formal jobs may be a way to achieve reductions in informality rates, especially among those earning less than the minimum wage.

1. Introduction

In emerging and developing economies, access to opportunities is one of the main reasons why people move to cities. Areas with good access to opportunities in cities are generally more expensive as people are willing to pay more for housing located in areas with better access to opportunities and especially jobs, which makes it difficult and costly for a significant part of the lower-income population to reside in these areas. Also in many cases public transport provision, which can be a good tool to provide accessibility to jobs for low-income groups, tend to be biased against the less affluent areas while jobs are concentrated in central areas and areas with higher land values (Camara and Banister, 1993). The centralization of jobs and the lack of public transit service serving low income areas to reach these jobs are the major obstacles that such vulnerable groups face when trying to reach job opportunities in a region, which may result in more prevalence of informal employment among this group. Informal employment is generally characterized by contractual relations that do not comply with national labor laws. Informal workers often face more risky conditions than formal workers, they may receive a lower compensation, cannot be part of a pension scheme, have no record of their job experience, and are not eligible for subsidies and leaves (including transport subsidies). For the economy at large, the existence of informal employment also implies losses in terms of productivity, tax revenues and a heavy social protection burden (Perry, 2007).

Workers may be informally employed because of low accessibility through several channels. First, faced with costly commutes, they may be discouraged to commute to formal jobs and opt for informal occupations near or at home (Moreno-Monroy and Posada, 2014). Furthermore, workers with low accessibility to jobs are spatially constrained, which limits their job search to their local environment (Phillips, 2014; Zenou, 2009), in which informal occupations may be disproportionally present especially in low income areas. In large metropolitan regions with long commutes formal employers may discriminate against workers based on place of residency because of the effects of long commutes on productivity (Gobillon et al., 2007). These

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effects are more likely to occur if jobs are strongly concentrated in the city center, if the wage gap between the formal and informal sectors does not compensate for higher commuting costs, if home-based labor is prevalent, and if areas where lower-income individuals reside have poor accessibility to jobs.

The aim of this paper is thus to empirically explore the relationship between job informality and accessibility to jobs by public transport in São Paulo Metropolitan Region (SPMR), Brazil. To do so, we first calculate a cumulative-opportunity measure of job accessibility for 633 *Área Espacial de Ponderacão* (AEP) areas within the SPMR. AEP is similar to census tract approach in a developed country census, yet it is a little bigger in size. It is designed to give the necessary statistical robustness to the Population Census sampling strategy. We then use a multilevel mixed-effects logistic regression model to estimate the effect of job accessibility by public transport on the likelihood of being informally employed, controlling for individual and other area characteristics. In order to account for informal sector heterogeneity, we split our sample in two groups based on whether a worker earns less or more than the minimum wage. The study discusses the current patterns in the provision of public transport and contributes to the research on accessibility in emerging and developing countries. The findings of this study can be of relevance to planners and transportation agencies wishing to better understand the relationship between public transport provision in countries with segmented labor markets and significant presence of informal employment.

The paper is structured in 5 sections. The first section presents an overview of the literature on informality and accessibility by public transport. The SPMR context is then presented, followed by a description of the data and methodology. Next, the spatial patterns of accessibility by transit and informality are presented. These results are followed by an econometric analysis of the likelihood of being informally employed as a function of the level of accessibility to jobs by public transport while controlling for individual and area characteristics. We conclude the paper with a discussion of the implications of our findings.

2. Background

Our work relates to a strand of literature studying the determinants of informality at the worker level (Gong and Van Soest, 2002; Marcouiller et al., 1997). This literature suggests that characteristics such as a lower educational attainment, being young, and having less years of experience are associated with a higher probability of working in the informal job sector (Angel-Urdinola and Tanabe, 2012). Previous research analyzing the determinants of informal employment have focused on a mixture of personal, regional, and institutional characteristics (Almeida and Carneiro, 2009; Jonasson, 2011), but have not explicitly modeled the effect of city and neighborhood characteristics on informality rates (Moreno-Monroy and Ramos, 2015).

On the other hand, there is a rich and growing literature focusing on the measurement, causes and consequences of job accessibility on employment outcomes mostly in developed countries, which has not yet explicitly addressed informal employment due to its small percentage in developed world. Blumenberg and Ong (2001) found that long and unreliable commuting times by public transport negatively impact the ability of low-income populations to find work. Similarly, Kawabata (2003) found that low-skilled workers are more likely to be employed, and to be employed full-time, if they have better accessibility to jobs by Public transport. Sanchez (1999) and Tyndall (2015) found that, more generally, access to public transport results in higher employment rates in North American context. In the European context, similar conclusions have been drawn (Matas et al., 2010; Sari, 2015). This shows that previous research in developed countries focused on unemployment rates and their relation to public transport or accessibility to jobs. Meanwhile, in emerging and developing countries the job market is divided into two categories, formal and informal. Informal job sector in countries like Brazil can reach up to 50% of the job market in some cities. Accordingly, it becomes relevant to study the effect of accessibility by public transport on informal employment. It is important to note that informal employment is an outside option to formal employment and cannot be directly equated to unemployment. Unlike developed countries, many emerging and developing countries do not offer unemployment benefits, so many workers, especially those in the lower income categories cannot afford to be unemployed and have to find alternatives in the informal sector. Informality may be an attractive alternative for some workers seeking higher flexibility, more autonomy, and even shorter commutes. Accordingly informality may be seen as a matter of choice to some extent for some individuals, while for others it can be seen as the last resort to obtain a living wage (Günther and Launov, 2012; Maloney, 2004; Perry, 2007).

In the context of developing countries, informality of land tenure also plays an important role in the relationship between labor informality and job accessibility. Most large cities in emerging and developing economies host large informal settlements characterized by poor public infrastructure provision, difficult access to activity centers, and high incidence of informal employment. These areas emerge as a solution for the urban poor to reside in a low cost housing where regulations and taxation are generally not imposed. Yet government do not usually provide services to these areas on regular basis and they receive the lowest share of attention in many regions.

The combination of a disadvantageous location with respect to economic opportunities and lack of local transport infrastructure means that lower income workers are more likely to be “transport disadvantaged”, so that poor access to transport ultimately results in higher social exclusion (Hernandez and Titheridge, 2016). Along these lines, informal transport has appeared in some cities as an alternative to bridge the provision gap faced by the lower income population (Cervero and Golub, 2007). However, in more heavily regulated environments where informal transport networks disappear once they are integrated to the formal system, the transport options available to the lower income workers are in many cases limited to walking or cycling. Accordingly lower income workers are spatially constrained in term of jobs that they can access. A recent study analyzed the differential commuting patterns of formal and informal workers in Rio de Janeiro (Motte et al., 2016). The study found that informal workers commute with less frequency than formal workers and make shorter trips, and that this is related to the fact that informal jobs are more decentralized than formal jobs. Our study complements this literature stream by considering the relationship between job accessibility by transit and the probability of working in the informal job sector.

3. Area of study and data

3.1. Area of study

The area of study is the São Paulo Metropolitan Region (SPMR), the largest Brazilian metropolis with about 19.5 million inhabitants where on average 30% of the labor force was informally employed in 2010. The SPMR is geographically divided by the Tietê and Tamanduatei Rivers, running from the North-West to the South-East of the region (see Fig. 1). A subway system serves the center of the region, with a denser service west of the Tamanduatei River, around the expanded Central Business District (CBD), where higher-income and higher-job density areas are located. A rail system serves the region, characterized by a lower frequency and slower speed than the subway system. Dedicated bus lines also serve the region, implemented to compensate the lack of subway service. With respect to modal share in the region, there is a discrepancy in public transport use between low-income and high-income households. In 2007, 77% of the trips of low-income households were made using public transport modes, compared to 21% for high-income populations (Diretoria de planejamento e expansao dos transportes metropolitanos, 2008). This suggests a high public transport dependency among low-income households.