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Spatial restructuring and uneven intra-urban employment growth in metro- and non-metro-served areas in Copenhagen

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ABSTRACT

This paper addresses the wider benefits of major investments in urban transport and discusses the relevance of giving attention to time and geographical scale in the analysis of employment growth before, under and after the introduction of new urban transport infrastructure. Using descriptive statistics in combination with OLS modelling, the paper analyses the intra-urban employment growth by workplace in regard to the opening of the Copenhagen Metro in 2002. The study identifies strong employment growth in the case of Copenhagen and higher employment growth in metro-served areas compared to non-metro-served areas in the first ten years after the opening of the Metro. The study also finds that when zooming in on the local scale, employment growth has been unevenly distributed along the metro corridor leading to a spatial restructuring of intra-urban employment patterns. This highlights that geographical scale and time is of critical importance when addressing the development of employment in areas that have witnessed investment in infrastructure. Moreover, the paper shows that especially the existing urban structures of the built environment, supporting planning policies, the local economic context and the preconditions for the development seems to be of great importance when assessing intra-urban restructuring of employment.

1. Introduction

Following the rise of the knowledge economy, urban competition and large-scale urban development projects from the early 1990s, the wider economic impacts of investments in transport have gained increasing political and academic attention (Banister and Thurstain-Goodwin, 2011; Holvad and Leleur, 2015; Docherty and MacKinnon, 2013; Knowles and Ferbrache, 2016). Although diverse, theoretical and empirical findings support the hypothesis that especially agglomeration effects and labour market impacts can be substantial (Melo et al., 2013; Venables, 2007; Vickerman, 2007; Graham, 2007; SACTRA, 1999; Wangsness et al., 2016). This is also the case when addressing the geography of the labour market impacts. Improving internal transport accessibility does not just speed up connections that are already in place but potentially changes them and opens up new ones. Consequently, investments in urban transport infrastructure do not just support existing patterns and flows or trigger new developments, they also have a broader impact on a city's economic structures and flows (Scott, 2008; Graham and Marvin, 2001). Existing empirical research focusing on the direct impact of public transport investments on the labour market is limited in scope (Gibbons and Machin, 2006), and existing studies show rather divergent results, due to the different modes of transport that are the focus of these studies, as well as different local contexts and supporting planning policies.

Moreover, it is important to ask at what scale the impact is taking place (Beyazit, 2015; Meijers et al., 2012). Do infrastructural investments result in new economic activities, or do they have a more local re-distributional impact? From previous studies, we see divergent effects depending on the methodological approach and local context they adopt. Understanding the intra-urban impacts and the redistribution of economic activities is important because our current understanding of the wider economic impacts (e.g. agglomeration benefits and extensions of labour market catchment areas) are based on assumptions about the behavioural responses and focus on the aggregated regional or market scale (Banister and Thurstain-Goodwin, 2011; Vickerman, 2008).

To address some of these potential shortcomings in the existing literature, the main objective of this paper is to scrutinize how intra-urban employment structures change over time when a new large public transport investment is introduced. In this paper, we focus on the spatial restructuring of employment by workplace. We examine the intra-urban distribution of employment and local employment growth by considering the periods ten years before and after the introduction of the Copenhagen Metro in 2002. To highlight the methodological and

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spatial challenges, employment restructuring is analysed in two ways. First, we assess the employment restructuring by summarizing and mapping employment growth on various intra-urban scales. Secondly, we analyse employment growth in metro- and non-metro-served areas using OLS regression models. This will provide empirical evidence of intra-urban restructuring of employment by workplace to illustrate the importance of the intra-urban scale. The models do not aim at estimating the direct effect of large infrastructural investments on employment growth within an urban area or seek to establish clear links between these investments and employment changes. Rather they serve to demonstrate how employment growth has developed differently within and outside metro served areas since the metro line in Copenhagen was decided and introduced.

The remainder of the paper is structured as follows. In the following section, the links between investments in transport and the labour market are introduced in more detail, and earlier empirical findings are briefly reviewed. In the third section, the present case study of Copenhagen and the Copenhagen Metro and their context of development are presented. The following section introduces the data and the methodological approach chosen for the study. In the fifth section, intra-urban employment growth in Copenhagen between 1992 and 2012 is analysed, while the final section summarises and concludes the paper's findings.

2. Investments in urban transport and their links with the labour market

As globalization has developed, it has been increasingly realized that transport is a critical determinant of both the performance of the urban economy and the attractiveness of the city as a place to live and work. Apart from the apparently positive effects of these investments, their wider impacts have gained increasing political and academic attention (Banister and Thurstain-Goodwin, 2011; Knowles and Ferbrache, 2016; Vickerman, 2007). Studies have highlighted that, under certain conditions, urban public transport investments in light rail and underground metro systems can act as catalysts for urban development and redevelopment (Gospodini, 2005). However, despite the development potential, only a few studies have addressed the impacts ex-post.

In an extensive review, Gibbons and Machin (2006) stressed that existing research and studies specifically focusing on the impact on the labour market are limited in scope. According to Gibbons and Machin (2006), transport plays a three-way role in relation to labour markets, first, by affecting workers' behaviour and the labour supply; secondly, by affecting firms' decisions and the demand for labour; and thirdly, and as a result of these changes, by changing the equilibrium between supply and demand in the labour market. Two potential labour market impacts are widely acknowledged to occur when transport infrastructure is improved. The first relates to the overall expansion of the labour market catchment area. When transport accessibility is improved, workers are willing to commute longer distances, more people will enter the labour market, and jobs are potentially relocated to more accessible and higher productivity areas (Knowles and Ferbrache, 2016; SACTRA, 1999; Vickerman, 2007). Secondly, improvements in transport infrastructure influence spatial relationships, allowing potential agglomeration effects to occur (Graham, 2007; Venables, 2007; Melo et al., 2013). Agglomeration effects increase with the level of spatial proximity and concentration, and improving the transport network affects the level of concentration and density. This occurs either by increasing the effective density of an area by bringing workers and firms closer together or by relocating firms and/or workers from lower to higher productivity areas (Banister and Berechman, 2001; Wangsness et al., 2016).

Regarding the effects on local employment, previous ex-post studies of investments in urban rail-based public transport have shown mixed results. Some studies find evidence of positive employment impacts. In Atlanta in the USA, for example, Nelson and Sanchez (1997) found that employment near MARTA stations rose significantly. Green and James (1993) have found a similarly significant positive effect of the Washington metro, whereas Cervero and Landis (1997) found more mixed employment effects in the case of BART in San Francisco and Bollinger and Ihlanfeldt (1997) that found neither a positive nor a negative employment impact from MATRA. In European cities, ex-post studies also show mixed effects on employment. In a comparative study, Mejia-Dorantes and Lucas (2014) found an increase in employment twice the rate of London across all station catchment areas in the first year after the opening of the Jubilee Line Extension. In Madrid, a positive employment effect in the catchment areas of the Metrosur was also identified. In both case studies, a divergent development was present, indicating that employment growth was not taking place in all transit served areas. Likewise, Mayer and Trevien (2015) found an increase in employment in municipalities near Paris served by the Regional Express Rail, whereas Padeiro (2013) found more mixed effects in a study of transport investments in suburban Paris. In the case of Istanbul, Beyazit (2015) found an increase in employment in areas served by the metro following its introduction, but a smaller increase than in surrounding areas of the city.

Thus, despite an extensive theoretical and emperical literature, existing ex-post studies show rather divergent employment impacts. The mixed results can mainly be explained by the fact that different modes of transport were studied, as well as different local contexts and supporting planning policies. This indicates that context matters and that a range of necessary conditions needs to be in place to support a positive economic development (Banister and Berechman, 2001). Moreover, it may also serve as a reminder of the difficulties of isolating transport investments effects on the labour market. Accordingly, the present analysis do not aim at identifying direct effects of transport infrastructure investments on employment growth but rather point to how growth patterns differ between areas that have undergone transport investments and political attention versus areas that has not.

In line with this, the scale of analysis can be considered to be of the utmost importance when examining the links between economic development and transport investments. Currently, the literature mainly focuses on the overall regional employment impact or changes in areas of geographical proximity to the investments in question, and in some cases control areas are used to document changes. There is, however, a risk that, by only focusing on parts of the urban area, the general impact of transport investments is concealed. Therefore, it is important to be aware of the extent to which employment growth in, for example, metro-served areas is a result of general employment growth in a region, increasing employment only in metro-served areas, or a result of a wider restructuring of employment on an intra-regional scale. Thus, to understand better the relation between investments in transport and employment growth, the local, regional and intra-regional outcomes all need to be analysed.

In the remainder of this paper, the analysis and discussion will address the potential risk of overestimating the economic outcome of investment activities due to the relocation dynamics of intra-urban economic activity from, for example, non-metro-served areas to metro-served areas if only some parts of the relevant urban area are included in the analysis.

3. The case of Copenhagen and the Copenhagen Metro

The Greater Copenhagen Region is the largest city-region in Denmark. In 2012 it had close to two million inhabitants, while the City of Copenhagen (the central municipalities) had just about 0.7 million inhabitants. Before the opening of the metro, public transport in the region was based on an extensive bus network and “S-bane” commuter train routes connecting the central city to five suburban “Finger Plan”-corridors to the south west, west and north west, and two regional commuter train routes from Roskilde in the west and Helsingør in the