



# All aboard? Commuter train access and labor market outcomes<sup>☆</sup>



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## ABSTRACT

We investigate the impact of commuter train access on individual labor market outcomes. Our study considers the introduction of a commuter train on a pre-existing railroad in Sweden, considerably decreasing commuting times by public transit and hence increasing access to the regional employment center. Using difference-in-differences matching techniques on comprehensive individual panel data spanning over a decade, our intention-to-treat estimates show that the reform essentially had no impact on the earnings and employment development among the affected individuals.

## 1. Introduction

The importance of job access via public transit in improving the functioning of the labor market and strengthening the economic position of workers, is a topic receiving considerable political attention. The infrastructural investments required are substantial and relatively easy to compute. The gains are harder to estimate, and knowledge, for example about the labor market impact of changes in job access and commuting times, is limited. However, recent theoretical work points to the importance of transport modes for generating differences in economic outcomes across groups (Gautier and Zenou, 2010) and some studies argue that the availability of public transit is a key determinant for cross-group differences in geographical distribution (Glaeser et al., 2008).

We investigate these issues, studying the individual labor market effects of a commuter train considerably decreasing commuting times by public transit to the employment center for those living close to the pre-existing railroad on which the commuter train was introduced. *Uppståget* (the case we study), was inaugurated in the early 1990s, connecting locations north of the city of Uppsala, Sweden, to the local center and further to the greater Stockholm area. We argue below that

the institutional features suggest that the case is well suited for overcoming many of the methodological challenges typically present in this type of research.<sup>1</sup> While the location of the train was governed by a pre-existing railroad, the timing was related to a legal change. The train altered commuting opportunities and travel times for some areas, while leaving conditions unchanged for other areas included in the same local labor market. It can also be argued that—at least in a European context—we address the more policy-relevant margin: the effects of improving public transport rather than introducing it in a context where only private transport has been available previously.

Theory suggests a number of reasons why commuting opportunities may affect the employment and wages of individual workers. The literature is described in more detail in the next section, but let us here only point out a few potential mechanisms. First, shorter travel times or less expensive commutes may increase the optimal job search area (Gobillon et al., 2007) and may also decrease the reservation wage (Brueckner and Zenou, 2003; Coulson et al., 2001), leading to decreased unemployment. In other words, the effective labor market is increased, which should improve matching. Long commutes may also affect the productivity of workers, either because the commute itself requires a lot of effort (Zenou, 2002), or because the commute

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<sup>1</sup> Our approach is in line with the suggestions made by Gibbons and Machin (2006), in their literature study on transport and labor market linkages, on how to deal with the problems of endogeneity and to identify a causal impact of transport or transportation policy on labor market outcomes.

affects the flexibility between work and other commitments (Ross and Zenou, 2008). This may make employers reluctant to hire people living too far away, or induce workers to shirk, which increases the risk of unemployment.

Although there are a large number of empirical studies on the impact of job access on labor market outcomes following Kain (1968), it is only relatively recently that transport modes and transport infrastructure have been taken into account in this line of research.<sup>2</sup> There are thus some studies on the importance of car ownership or car access (e.g., Gurley and Bruce, 2005; Ong, 2002; Raphael and Rice, 2002; Shen and Sanchez, 2005) and a few studies focusing on job access by public transit. Some US studies suggest no or little relation between job access by public transit and employment (e.g., Cervero et al., 2002; Sanchez et al., 2004); whereas others find a positive association (e.g., Kawabata, 2003; Ong and Houston, 2002; Sanchez, 1999).

Evidence regarding the importance of job access by public transit is thus mixed and pertains mainly to the US. It is possible that the effects of new public transit infrastructure are different in Europe where the public transit network in and around cities is generally more extended than in the US. Matas et al. (2010) study the importance of job access by public transit in Barcelona and Madrid, Spain, and find a positive effect on women, primarily among the low-educated. Sari (2015) studies the introduction of a tramway line in Bordeaux, France. Comparing the unemployment rate before and after the construction of the tramway line, Sari find that the unemployment rate decreased more in neighborhoods located close to tramway stations than in other neighborhoods.

With the exception of Cervero et al. (2002) and Sari (2015), all of the above mentioned studies of the effect on job access by public transit on labor market outcomes rely on cross-sectional data. It is therefore difficult to tell to which extent the relations found are causal and to which extent they are driven by endogeneity in residential choice and public transit location.<sup>3</sup>

Cervero et al. (2002) use panel data on individuals and study how public transit access at one point in time is related to employment at a later point in time. Even so, residential choices in one time point could be endogenous to later labor market outcomes.

Sari (2015) also relies on panel data but combine this data with a quasi-experimental research design with a plausibly exogenous change in the public transit network. However, since the panel data used by Sari is on neighborhood aggregates, it is still difficult to tell whether the relation Sari finds between public transit access and unemployment rates is driven by changes in the employment status of individuals or by sorting.

Similarly to Sari (2015) we use the introduction of the commuter train *Upptåget* as a quasi-experiment. We do however combine this with individual level panel data. More precisely we use comprehensive individual panel data for the years 1985–1996, including detailed geographical information on residential and workplace location, as well as on labor market outcomes. We combine a difference-in-differences approach with matching methods to compare the development of labor

<sup>2</sup> Kain (1968) suggested that the high unemployment rate of African-Americans in US metropolitan areas was aggravated by the movement of low-skilled jobs from the central cities to the suburbs, worsening job access for African-American workers constrained to central cities by housing market discrimination (the spatial mismatch hypothesis). Since the study by Kain (1968) a large number of empirical studies have been carried out which attempt to test the relation between job access and labor market outcomes in general and the spatial mismatch hypothesis in particular. The collected evidence suggests that poor access to jobs does indeed lead to worse labor market outcomes (for literature surveys see Gobillon et al., 2007; Ihlanfeldt, 2006; Ihlanfeldt and Sjoquist, 1998; Zenou, 2009).

<sup>3</sup> Matas et al. (2010) try to account for endogeneity by studying both the full sample and only individuals who lived in the same place for 10 years, arguing that the latter's locations should be less endogenous. Similarly Kawabata (2003) argues that by only studying low-skilled workers endogeneity bias is reduced since low-skilled workers typically have limited resources to finance transaction costs associated with moving.

market outcomes for individuals living in treated and non-treated areas before the introduction of the train. To the best of our knowledge our study is the first to combine individual level panel data with exogenous variation in public transit access.

We find that the introduction of the commuter train essentially had no significant effects on employment probability or labor earnings for those individuals living in the treated area before the new commuter train was introduced. A large set of robustness checks and supplementary analyses confirm the impression that being offered access to the commuter train did not significantly alter the labor market development of the treated individuals as compared to the non-treated individuals.

The rest of the paper is organized as follows: in Section 2 we briefly present some theories as to why job access can matter for individual labor market outcomes. Section 3 describes the development of the commuter train *Upptåget* and defines the treatment group and the potential control group. Section 4 explains the empirical strategy and presents the data used as well as some descriptive statistics. The results from the empirical analysis are presented in Sections 5 and 6, and Section 7 concludes.

## 2. Theories

The introduction of the commuter train *Upptåget* considerably decreased commuting times by public transit from the stations towards the employment center of Uppsala city and further south towards Stockholm, and thus led to improved job access close to the stations. What does theory lead us to expect about the effect of the commuter train on individuals' labor market outcomes?

In the standard urban economic model developed by Alonso (1964), Mills (1967), and Muth (1969), housing and land prices decline with distance from the central business district (CBD) to compensate individuals for longer commutes. In this monocentric urban model, high-income workers consume more land and therefore choose to live where land is cheap, i.e., far from the CBD, while poor workers live close to the CBD.<sup>4</sup> In the model and versions thereof, for example including different transport modes (LeRoy and Sonstelie, 1983) and decentralized or multi-centric employment (e.g., White, 1976), the labor market is fully competitive, productivity and wages are given and there is no unemployment. Thus, although the models include a relation between job access and income, length of commute cannot affect individuals' labor market outcomes.

In the middle of the 1990s efforts began to combine urban economic models with labor economic theories and develop models in which workers' location (land market), as well as wages and unemployment (labor market) are determined in equilibrium (for a synthesis, see Zenou, 2009). While most of these models do not take transport modes into account, they may still be relevant at least to the extent that people rely on public transit.

One branch of this literature introduces spatial frictions to efficiency wage models (see e.g., Brueckner and Zenou, 2003; Ross and Zenou, 2008; Zenou, 2002, 2009; Zenou and Smith, 1995).<sup>5</sup> In some of these models work effort and thus productivity is allowed to vary with the length of commute, either because the commute itself requires a lot of effort (Zenou, 2002), or because the commute affects the flexibility between work and other commitments (Ross and Zenou, 2008). The implications of this for employment and wages depend on the ability of employers to observe workers' commuting costs and to anticipate workers' behavior. Within these models, the new and faster commuting opportunity could reduce work related fatigue and increase workers'

<sup>4</sup> The key condition for this is that the elasticity of land with respect to income is greater than the elasticity of the value of time with respect to income (see Becker, 1965). The validity of this condition has been questioned, see e.g., LeRoy and Sonstelie (1983) and Glaeser et al. (2008).

<sup>5</sup> For the initial efficiency wage model see Shapiro and Stiglitz (1984).

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