The impact of Accessibility on Labour Earnings

1 Introduction

A positive statistical relationship between some form of labour market accessibility and productivity is now well established (Rosenthal and Strange (2004) and Melo et al. (2013) review the empirical literature). Most empirical have used either employment density within a city or region or “effective density” which computed based on the Euclidean distances to existing workplaces. These measures, however, neglect that accessibility is a function of the transport infrastructure and the generalized travel costs of different modes. Proxy errors may therefore have been introduced in the estimations. Further approximation errors might be induced if applying the estimates to assess the impact of transport investments in appraisal, where the transport system is represented in great detail.

This paper estimates the impact of job accessibility on labour earnings using an accessibility measure with high spatial and demographic resolution, based on output from a state of practice transport model. The accessibility measure is therefore consistent with the transport CBA framework. Some of these benefits might not be captured by standard CBA, due to both distortive taxation and external agglomeration benefits (Lakshmanan, 2008; Venables, 2007). Moreover, study is based on micro level data of individual workers and applies fixed effects and instrumental variables to reduce endogeneity problems further.

Graham and Van Dender (2011), Graham (2007), and Rice et al. (2006) argue that more precise measures of transport accessibility would impose endogeneity problems. Congestion is more likely in areas where economic activity is high. So travel times are, in turn, more likely to be endogenous than distances. We argue, however, that deliberately misspecifying the model to avoid endogeneity problems may induce other biases that arise from proxy errors in the measurement of accessibility. We use micro data on individuals and workplaces in combination with a range of methods and recent achievements in the empirical literature on causal inference (e.g. Combes & Gobillon, 2014, and Baum-Snow & Ferreira, 2014, see also Angrist & Pischke, 2009, Pearl, 2000, and Manski, 2007) to reduce endogeneity in our estimation. We also propose an estimation strategy based on providing asymptotic bounds for the true parameter as a sensitivity test of our main analysis.

This paper is not concerned with the theoretical underpinnings of the estimated relationship between accessibility and productivity. These are reviewed in Duranton and Puga (2004), who summarizes the mechanisms under the headings: sharing, matching and learning.

Data

The information on socio-economic characteristics of all workers (age 20-64) and establishments (workplaces) for each year between 1995 and 2006 is obtained from administrative registers in Sweden coded on a geographic level of 250x250 square meters in built-up areas. The accessibility is computed for each zone coded in the transport
model and for two years, 1995 and 2006. These are based on travel times, travel distances and travel costs for four modes: car, public transport, cycling and walking. These are obtained from the national travel demand forecasting tool “SAMPERS” (Beser & Algers, 2002) and each zone is 0.1-1 km² in built-up areas. The accessibility measure is an approximation of the logsum. The values of time are obtained from the national value of time study (Börjesson & Eliasson, 2014).

The Model
We regress the temporal changes in labour income on the temporal changes in the accessibility for residents of each zone, while controlling for socio-economic variables and fixed effects at the individual level. The fixed effects control for arbitrary time invariant unobserved individual specific variables (such as ambition and ability) and their potential correlation with accessibility. We also consider time invariant place-specific characteristics by separating workers that have changed zone of residence (movers) and those who stay (stayers) in the estimation equation. Hence, reversed causality in the sense that improvements in transport infrastructure may attract more skilled workers is controlled for; i.e. spatial sorting is considered in the analysis.

Second, reversed causality, in the sense that higher local wages attracts more workers and jobs or that external shocks simultaneously affecting the number of jobs and wages, are reduced by decomposing the accessibility change into two variables: (i) accessibility change due to changes in the transport system (generalized travel costs) and (ii) accessibility change due to changes in the number of jobs. While the latter may be subject to reversed causality, the first variable is not, because changes in the number of local jobs or workers have no impact on this variable. Therefore we use (i) as an instrumental variable for the true change in accessibility. We argue that this instrument is not subject to substantial endogeneity because the only region in Sweden where there is significant congestion is the city of Stockholm, where the market share for public transport is 75% for commuting trips. Travel times for public transport commuting are not systematically affected by congestion to any large extent.

Results
We find elasticities of labour earnings with respect to accessibility arising from changes in the transport infrastructure in the range of 0.006-0.015. This is in the lower end of those found in previous literature, usually in the range 0.02-0.1 (Rosenthal and Strange (2004), Melo et al. (2009) and Melo et al. (2013) review the empirical literature). Our lower estimates could be an effect of the accuracy of the accessibility measure, the instrument variable or the use of micro level data. Our bounding strategy, however, tends to produce a rather wide interval for the true effect since the lower limit is 0.006 and the upper limit is 0.051.

In addition, we show that if the exclusion restriction is violated the resulting two-stage-least-squares estimator is inconsistent downwards. Hence, our instrumental variable provides a lower bound for the true parameter. We also show that applying (ii) as an instrumental variable for the true change in accessibility produce an upward inconsistency in the two-stage-least-squares estimator. Hence, this provides an upper bound for the true parameter. The two instrumental variables, thus, produce asymptotic bounds for the true parameter. We provide this information as a sensitivity test of our main analysis.
References


