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Title **Public Transport Accessibility and Employment**

Track General Papers

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Abstract This paper is based on work conducted as part of the Buses and the Economy II project funded by DfT and Greener Journeys. The work reported on here uses econometric models to analyse the impact of changes in public transport accessibility on the labour market and how this fits in with existing WebTAG guidance.

The effects of better buses emerge through changes in travel times, reliability, comfort or fares. The appraisal treatment of such impacts is well documented in WebTAG. It is when we come to the wider impacts on the economy that the application of the guidance to the local bus sector needs to be considered carefully.

Four sources of additional wider impact on economic efficiency are acknowledged in the guidance:- agglomeration impacts; output changes in imperfectly competitive markets; labour supply impacts; move to more or less productive jobs. Of these, the labour market effects are of most interest in our context. Currently the draft guidance of the DfT suggests Labour Supply Impacts should be relevant to most schemes. The framework by which these effects play out is as follows:

Firstly a change in commuting costs impacts on the wage net of commuting costs.

The change in net wage influences individuals' labour supply, the extent to which is determined by the labour supply elasticity.

Our approach can be seen to be adding to the existing literature on labour supply elasticity/employment sensitivity within the spirit of the current WebTAG framework.

Because this is a relatively unexplored area, to discover the appropriate mix of economics and geography, a multi-pronged approach is required. In order to estimate the impact of public transport accessibility on employment we construct and analyse two datasets.

Firstly, we construct a panel dataset of bus accessibility indicators (from bespoke data on journey times to large employment sites), labour market indicators and socio demographic information to examine effect of differences in public transport (primarily bus) service levels on Local Authority District (LAD) areas' labour market outcomes.

We estimate the model using a fixed effects approach to control for unobserved heterogeneity in labour market outcomes across areas and time varying measures of accessibility and labour market/ sociodemographic indicators at the LAD level. We show how OLS and random effects approaches are not appropriate in this context.

Secondly, we estimate a cross sectional model of employment utilising 2011 UK Census data at the Mid level super output area, giving 6786 observations on social and labour market measures for England, matched again to public transport accessibility data from the DfT. This data set allows us to investigate the relationship between spatial differences in public transport (and car) accessibility and differences in employment rates, controlling for other localised factors (such as population, car availability, qualifications, occupations etc). In

order to estimate this model we conduct OLS and fixed effects regression analysis.

We examine different model specifications and investigate the issue of simultaneity through the use of instrumental variable approaches to control for the endogeneity between public transport accessibility and employment.

For estimation of the employment impacts, we have kept within the spirit of the WebTAG framework, but have taken a rather more pragmatic approach tailored to the focus on public transport and the data available. There are several ways in which our approach differs in the detail to the current WebTAG framework:

We focus on accessibility (accessibility of areas to local employment centres) measures rather than Generalised Cost. This allows us to avoid complex calculations of generalised costs for zonal pairings. We are also directly estimating changes in employment with respect to changes in accessibility rather than wage. This by passes issues to do with estimation of share of GC in Wages.

We currently focus on estimation of employment impacts (numbers employed) rather than GDP although this could be imputed.

We estimate a sensitivity parameter which captures the responsiveness of employment to changes in public and private transport accessibility rather than the labour supply elasticity. Depending on the demand conditions, it seems reasonable to expect some extra workers might not actually be able to find work despite being willing.

We think that one labour supply elasticity/employment sensitivity figure may be over simplistic - In lower-skilled occupations, labour supply is elastic because a pool of labour is employable at a fairly constant market wage rate. As highlighted in the WebTAG guidance, a fixed value assumes a fixed ratio of male to female workers too, who have different elasticities. Our estimation approach has the flexibility to estimate different elasticity parameters for example for different area types, (metropolitan vs rural areas) and to check whether a 'one size fits all' elasticity figure is appropriate. A more segmented approach may avoid issues of aggregation bias from using one value.

Results on the panel data show that employment is more sensitive to changes in public transport accessibility in London and the Metropolitan areas, with lower sensitivity in other Towns/Cities, through to low and insignificant effects in rural areas. These differences may reflect different employment elasticities and/or differences in the importance of public transport in these areas. More work needs to be undertaken to unpick these results. Car accessibility appears to be less significant. Results from the cross section analysis show that the impact of accessibility is felt more amongst the highly dependent 16-24 age group than over the entire working age population.

The final part of our analysis shows how our results could be used for appraisal purposes. To illustrate this we use results from an additional modelling exercise to show how changes in bus service levels arising from a change in revenue support link to changes in employment using the parameters derived from our modelling. We also compare the magnitude of first order effects (eg user benefits and operating cost changes) with the wider impacts for the modelled scenarios.

The work we present and conclusions we derive are our own and do not reflect the views of DfT or Greener Journeys.