Journal of Transport Geography 56 (2016) 102–109

Contents lists available at ScienceDirect

Journal of Transport Geography

journal homepage: www.elsevier.com/locate/jtrangeo

The impact of regional commuter trains on property values: Price segments and income

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ARTICLE INFO

Article history:
Received 12 January 2016
Received in revised form 30 August 2016
Accepted 6 September 2016
Available online 16 September 2016

Keywords:
Hedonic price function
Price segment
Commuter railway
Two-stage quantile regression
Spatial lag

ABSTRACT

Using single-family home transactions and commuter rail data from 2014, we estimate hedonic price models using two-stage spatial quantile regression to capture variations across price segments. The results are significant and robust across different model specifications and across the different price segments, but the price effect of proximity to a commuter train station is strongest in lower price segments of the housing market. These price segment effects are also valid for proximity to highways, as well as for several other property attributes. Results also reveal that the largest of the three regional labour markets in our study has a greater effect on prices. Furthermore, the study introduces property-specific neighbourhood data from raster data, showing that population density has a negative impact on property prices at the neighbourhood level while population size has a positive impact at the municipal level.

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1. Introduction

Urbanization pressures worldwide have resulted in dramatic increases in property values in many major cities, with a concomitant lack of affordable housing (UN-Habitat, 2016). Some of these pressures on urban property markets can be alleviated by improved accessibility, which gives those living on the outskirts of cities and in rural areas better access to labour markets, thus making these locations more attractive to households. Accessibility is a widely used concept, resulting in various definitions and alternative ways of operationalizing the concept (Rietveld and Bruinsma, 1998; Geurs and van Wee, 2004). However, it is generally agreed that improved accessibility is beneficial to the labour market as it improves efficiency through better matching of job requirements and individual skills. Households also benefit since they can opt for an urban work location with probably higher wages and choose a nonurban residence location where prices are lower (So et al., 2001). It is thus important to understand how property markets and different types of transportation interact, and thus affecting accessibility.

Studies of how railway accessibility affects property prices report mixed results. The studies do, however, differ in several respects, not least in the types of rail system studied, which range from high-speed trains (e.g. Andersson et al., 2010; Chen and Hall, 2011) to light rail or metro systems (e.g. Pagliara and Papa, 2011) and commuter rail systems (e.g. Debrezion et al., 2011). Moreover, there are differences in the type of land or property included in the study, data availability and quality, modelling and, not least, the geographical context (for more details see Debrezion et al., 2007 and Mohammad et al., 2013). In a meta-study drawing on 57 US studies, Debrezion et al. (2007) found that commuter railway stations show significantly higher effects on property prices than other types of rail such as heavy railway or metro stations. In a more recent meta-analysis, Mohammad et al. (2013) also found that the impact of commuter rail on land and property values is higher than that of light rail transit. That study also found that the impact of railways in Asian and European cities seems to be higher than in American cities. In previous research, both beneficial effects of transport as well as disutilities were included (Bowes and Ihlanfeldt, 2001; Kilpatrik et al., 2007). Previous studies have compared the impact of highways and rail systems on property prices (Seo et al., 2014).

What most studies fail to acknowledge is that the impact may differ across price segments. The effect of improved railway transportation on housing prices may not be equally important for all households. For the most expensive houses, rail transit may be of lesser importance than it is to middle income households. Some studies do mention this issue (Bowes and Ihlanfeldt, 2001; Debrezion et al., 2007; Nelson, 1999), but to our knowledge there is little research on this theme.

The purpose of this study is to explore the effects of commuter trains and highways on residential property prices, with a special focus on how effects vary across market segments. We specifically model the segmentation of sales prices for single-family houses and the influence of different explanatory variables on each segment using quantile

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[1] The authors gratefully acknowledge the financial support from K2 The National Knowledge Centre for Public Transport.

http://dx.doi.org/10.1016/j.jtrangeo.2016.09.003
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regression techniques. In order to incorporate the spatial distribution of observations, we apply a two-stage spatial quantile regression (2SQR). There is also a methodological contribution from the study. In the model, two property-specific neighbourhood variables are developed through raster data in order to capture characteristics of the vicinity, thus generating measures that do not depend on administrative borders.

The geographic setting of this study is the Scania region in the south of Sweden and its regional commuter train system. The region is of interest for a couple of reasons. First, because the regional commuter train system has a strong position and is central for the functioning of the labour market. Commuting by regional train in the region almost tripled between 2000 and 2014 (Region Skåne, 2016). Second, most previous studies focus on smaller geographical areas and our aim is to provide an understanding for the regional context. Furthermore, no previous studies exist on this specific area. Fig. 1 presents an overview of the region, showing population density, the four largest cities, and railway and highway networks.

The paper is organized as follows. The following section provides a brief background to hedonic price models and the literature on the modelling of price segments through the use of quantile regression. This is followed by the results from a spatial lag model applied and adapted to quantile regression. The results confirm the expectation that preferences differ across different market segments.

2. Price segments and quantile regression

The changing consumption patterns across incomes are well established in demand studies. The Engel curve represents the fundamental microeconomic observation that the propensity to consume certain goods depends on the level of income of the consumer. Typically, the share of basic commodities decreases when income increases, whereas the share of luxury goods tends to increase with income. Roed Larsen (2006) found that the demand for transport differs across market segments. The share of income spent on petrol and public transport decreases as income increases, whereas air flights and leisure travel

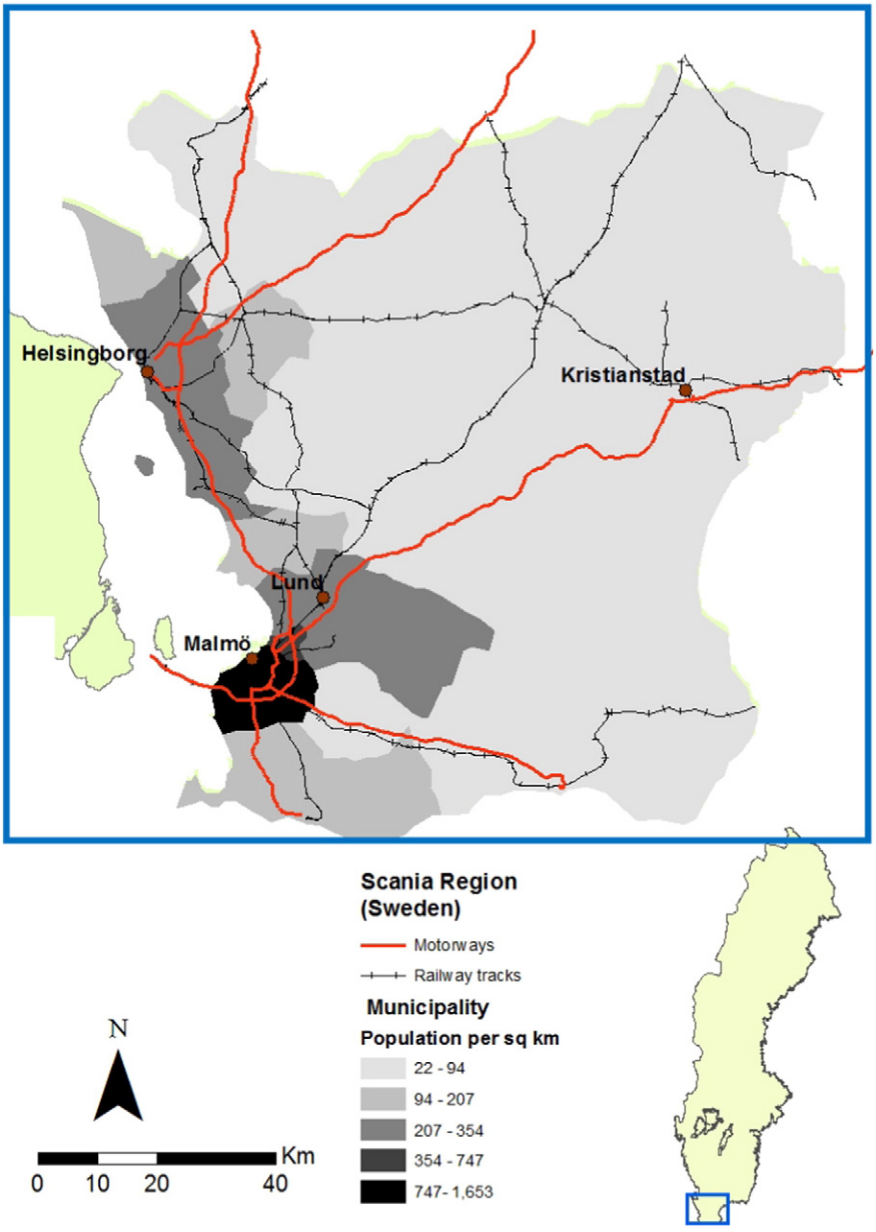

Fig. 1. Overview map of Scania.

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