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The suitability of hedonic models for cost-benefit analysis: Evidence from commuting flows

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ABSTRACT

We compare two estimates of benefits arising from the construction of new bridges in south-west Norway. One estimate comes from a hedonic property value model. Rather than follow an approach which is strictly theoretically correct, we adopt Rosen's simple first-stage approach. To investigate and validate whether this simplified approach gives a reasonable estimate, we compare it to an estimate derived from a travel demand model. We find that a variant of an ex post hedonic house price model gives very similar estimates to the estimates from the travel demand model. This supports a hypothesis that the simplistic hedonic approach is reasonable.

1. Introduction

One important function of economists is to provide guidance to policy makers on whether a particular investment should be undertaken. Usually, this advice will be given to decision makers within the public sector. One of the main problems of appraising projects within the public sector is that many of the costs and benefits will come in the form of local public goods, which are not usually traded in markets. A number of approaches have been developed to value such costs and benefits (Haab and McConnell, 2002). However, it is difficult to be confident that reliable estimates have been obtained. Despite many of these different approaches having a sound base in theory, all of them require certain assumptions to hold. It can be difficult to know the degree to which such assumptions have been met, as well as how important any deviations might be for the final result. One way of increasing the confidence in an estimate would be to compare it to an estimate of the same quantity derived using a different method and different data.

In this paper, we are concerned with capturing one of the benefits of a road investment project. In particular, we are interested in valuing the changes in labour-market accessibility brought about by the opening of two new road bridges connecting two islands. We take two different approaches to the valuation. Firstly, we use the standard approach of estimating the demand for commuting and then calculating the value of time savings for existing and new road users. Secondly, we use the hedonic property price approach to value this same public good. A similar result from both would give confidence that either method is appropriate for measuring such benefits.

Obtaining a similar result from the two methods mentioned above should not be surprising from theoretical perspective. When all of the assumptions of the underlying models are met, they should be measuring the same benefit. Of course, in

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reality, these ideal theoretical conditions are never met exactly. This leaves practitioners facing uncertainty about the best way to proceed. Both of the approaches adopted in this paper use a very simple approach to calculating the benefit, rather than the more demanding (and potentially impracticable) theoretically robust approaches. When we find that both approaches used here give similar estimates under these conditions, it suggests that a simple approach to benefit estimation can give reasonable approximations.

Surprisingly little research of this type has been undertaken to our knowledge (Kuminoff et al., 2010). Filling this gap is important, since both methods are used to help policy makers to make more informed decisions. It would be beneficial to practitioners to know how robust different valuation techniques are. It would also be useful to know when certain short-cuts can be taken with methods without compromising the results, given that such short-cuts are often taken without fully understanding their implications. It is vital to know when such short-cuts are likely to seriously undermine any estimates made. We believe our empirical approach of verifying an estimate by using two different methods is a good way to proceed in answering such questions.

The paper is structured as follows. Section 2 outlines the study area and the infrastructure which we consider. Section 3 provides the theoretical foundation for the benefit estimations which we carry out. We cover travel demand and hedonic models in this section. Section 4 provides some detail on how we estimate a commuting demand function and construct a demand curve. This is then used to estimate the benefit of the infrastructure improvement. Section 5 presents the empirical hedonic model we use and the housing data used to estimate it. This section also contains details on how we estimate the relevant benefits arising from the infrastructure improvement and the estimation results. Finally, Section 6 compares the two estimates and provides some concluding remarks.

In the hedonic house price literature, a local public good such as labour-market accessibility may also be called a locational attribute, characteristics or an amenity. These terms will be used interchangeably in the following sections.

2. The study area

The study area consists of the islands of Stord (which is divided into the two municipalities of Stord and Fitjar) and Bømlo. Both of these islands are situated off the coast of south-west Norway, and can be seen in Fig. 1. Stord can be classified as a semi-urban area, whereas Bømlo has a more rural character. The business activities in the region are mainly industrial, and

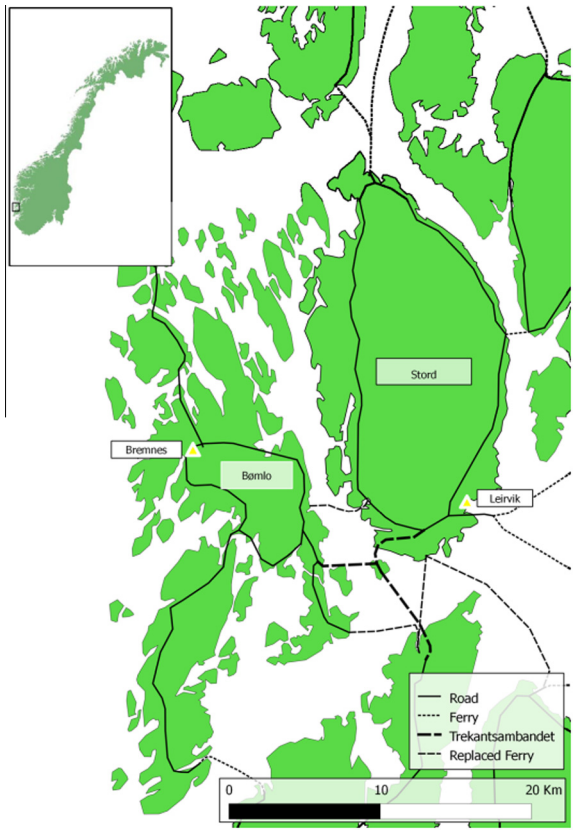

Fig. 1. The study area showing the administrative centres of Stord and Bømlo and the transportation network.