Chapter 10

Delivery Costs for Postal Services in the UK

Some Results on Scale Economies with Panel Data

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1. INTRODUCTION

A key assumption underpinning some of the most important issues in postal economics is that high fixed costs in delivery give rise to substantial economies of scale in the delivery network. For example, as Cohen and Chu (1997) make clear, fixed costs and the notion of economies of scale in delivery underpin two of the modern justifications for maintaining a letter monopoly. First, that the delivery network is a natural monopoly. Second, a letter monopoly is necessary to assure universal service at a uniform price. During the past decade a number of cost (or production) models have been estimated for the mail delivery activity of postal services in France and the US and the main conclusion drawn from this work is that this activity is indeed characterized by economies of scale (see for example, Rogerson and Takis (1993), Cazals, DeRycke, Florens and Rouzaud (1997), Cohen and Chu (1997), Roy (1999), Cazals, Florens and Roy (2001)). A further result derived from this literature is the importance of taking the heterogeneity of delivery offices into account when estimating returns to scale. For example, Cazals et al (2001) show that such estimates can be considerably higher when heterogeneity between delivery offices is taken into account.

This paper extends the literature on the estimation of economies of scale for outdoor delivery activity to mail services in the United Kingdom (Royal Mail). To this end we use a data set for a large representative sample of delivery offices in the UK observed for two years to estimate cost functions.

The panel dimension of these data allows us to take into account unobservable heterogeneity by specifying individual-specific effects. The cost function we consider is a relationship between outdoor costs of delivery (financial costs) and the output, defined as the quantity of delivered mail (number of items), and environmental characteristics. The environmental variables we include are the surface of the delivery area and the number of delivery points in this area. A log-linear functional form is then specified for the cost function.

In order to increase our control of heterogeneity factors between delivery offices we take into account an additional potential cost driver for delivery which is the proportion of total traffic delivered by town ('non rural') routes in each delivery office. This variable enters in a non-linear way in our cost model as we estimate cost functions for some stratifications of the sample with respect to different values for this proportion. We obtain results about the behaviour of economies of scale with these stratifications, showing that this variable is a useful way to capture heterogeneity in delivery offices. In order to emphasise the importance of the treatment of heterogeneity and the usefulness of panel data in dealing with this issue we test whether outdoor delivery cost models estimated with panel data encompass models estimated with cross-section data.

By reparameterising our estimated models we also give an alternative representation of this simple log-linear model, which provides useful insights in terms of postal policy and planning. In this model outdoor delivery costs can be expressed as a function of the number of delivery points, area and traffic per delivery point. This specification allows us to examine the relative importance of traffic and delivery point growth and their different impacts on economies of scale in outdoor delivery.

2. SPECIFICATION OF THE COST MODEL

We are interested in the estimation of an outdoor cost function for the mail delivery activity. Generally, a cost function is defined as a relation between the production cost, denoted by C, and the level of production, denoted by Q, (here the delivered mail volume), the prices of inputs, denoted by the vector P, and possibly some environmental (exogenous) variables, denoted by the vector X.

When data are available on these variables for n decision units, we can undertake an empirical analysis of this cost function, which can be written as follows:

$$C_i=f(Q_i, P_i, X_i, u_i), \qquad i=1,\ldots, n \tag{1}$$