

# Demand Models with Geolocalized Explanatory Variables

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(Very preliminary and incomplete version - Do not quote)

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## Abstract

The goal of this paper is to analyze econometrically the demand addressed to a particular service (post, bank, hospital, school,...) as a function of the spatial distribution of some explanatory variables (population, revenues,...). For each geographical zone  $i$ , we observe the level of the demand  $y_i$  and a function  $z_i(s)$  which represents the distribution of a variable  $z$  at a distance  $s$  of the location of the service for the zone  $i$ . We assume a linear model

$$y_i = \int_0^{\infty} z_i(s)\beta(s)ds + m + u_i$$

and we consider the case where  $z_i$  is exogenous ( $E(z_i, u_i) = 0$ ) or endogenous (using some instrumental variable) . We consider the case where  $z_i$  is observed continuously and the case where discretized approximation of  $z_i$  is only available. Large dimension requires that the least squares method should be modified by a penalization and we essentially adopt an L2 type penalty leading to a Ridge (or equivalently Tikhonov) estimation. The paper recalls the main theoretical results and presents simulations experiments. An empirical application to the demand for hospitals is also presented.