

# Point referenced methods and models for unemployment estimation

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Portuguese Labor force surveys, from 4th quarter of 2014 onwards, started geo-referencing the sampling units, namely the dwellings in which the surveys are carried. This opens new possibilities in analysing and estimating unemployment and its spatial distribution across any region. These labor force surveys choose, according to an preestablished sampling criteria, a certain number of dwellings across the nation and survey the number of unemployed in these dwellings. Based on these surveys, INE presently uses direct estimation methods to estimate the national unemployment figures. Recently, there has been increased interest in estimating these figures in smaller areas. Direct estimation methods, due to reduced sampling sizes in small areas, tend to produce fairly large sampling variations therefore model based methods, which tend to "borrow strength" from area to area by making use of the areal dependence, should be favored.

In this paper, we suggest modeling the spatial distribution of residential buildings (units) across Portugal by a Log Gaussian Cox process and the number of unemployed per residential unit as a mark attached to these random points. Thus the main focus of the study is to model the spatial intensity function of this marked point process. The comparison of methods based on direct estimation, areal counting processes as well as marked point processes will be given, particularly for 28 NUTS III regions of Portugal.

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