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## Stochastic Frontier Analysis of the Efficiency of Moroccan Municipalities

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### **Abstract.**

The basic idea of the efficiency analysis is the comparison between the Decision Making Units DMU (firms, for example) in order to know how the inputs are used to produce outputs. In this study, Parametric Stochastic Frontier Analysis (SFA) is adopted to estimate Technical Efficiency ( $TE_i$ ) of Moroccan municipalities using the production frontier. So, the error term is divided in to two independent components: the normal noise term  $v$  and the inefficiency term  $u$ , then  $\epsilon = v - u$ .

The corrected Ordinary Least Square (COLS) and Maximum Likelihood (ML) methods are used to estimate the production frontier. However, in presence of correlation between the noise and the inefficiency terms, estimators are biased and then copulas are included in the joint density of  $(v, u)$  to determine the likelihood function. Moreover, if an input  $x$  and the error term  $\epsilon$  are correlated, the use of Instrumental Variables is appropriate to eliminate the bias in such situation.

Analysis revealed that efficiency scores of the municipalities are greater than those of the Data Envelopment Analysis (DEA) and that only one municipality is efficient when  $u_i \sim N(m_i = z_i\delta, \sigma_u^2)$  truncated at zero, where  $z_i$  is a vector of variables which influence efficiency and  $\delta$  is a vector of parameters to be estimated. Furthermore,  $\rho_{v,u} = -0.82$  indicates that the use of the copulas is recommended.