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# A SEMIPARAMETRIC PANEL DATA ANALYSIS OF GREEN INVENTIONS AND ENVIRONMENTAL POLICIES

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## Résumé

Innovation is a primary engine of sustainable growth. It contributes to compensate the emission increases by enhancing environmental productivity. This paper provides a new econometric policy evaluation assessment of green technological patterns and estimates a green knowledge production by exploiting a 30 years' large panel dataset of high-income countries. Because the high degree of uncertainty surrounding the Data Generating Process and the likely presence of nonlinearities and latent common factors, it considers semiparametric panel specifications that extend the parametric multifactor error model and the random trend model and adopts a recently proposed information criterion for smooth model selection to compare these semiparametric models and their parametric counterparts. It is found evidence of a nonlinear inducement policy effect, occurring through R&D activities. In summary, the proposed semiparametric framework convey evidence on the existence of relevant nonlinearities, threshold effects and complementarities.

A first relevant result is that the effect of R&D, Human Capital and foreign R&D is characterised by relevant nonlinearities and thresholds.

Second, It is found that in order to unveil the significance and the endogeneity of the policy factor, non-parametric modelling is necessary. In fact, only non-parametric specifications allow disentangling average and cross country heterogeneous policy effects and drawing the relationships that exists between environmental policies on the one hand and R&D on the other hand. Following a sort of complementarity, in the flexible non parametric environment, estimates show that only if a country R&D investment and foreign R&D are jointly sufficiently high, then policies exert positive stimulus to innovation. Thresholds are revealed. In certain spaces of the innovation set, environmental policies can even be associated with a negative effect on green patenting if the stock of a country R&D is low.

The emergence of a potential and substantial complementarity connects a methodological issue (the heterogeneous policy effect) with a real world policy issue (the necessary R&D investments towards green technological development). The economic meaning is that those countries with too much low levels of domestic and foreign R&D are not providing a favourable setting for substantial policy inducement effects to appear.

**Mots-Clés:** Innovation, knowledge, environmental policy, policy assessment, policy heterogeneity, large panels, cross, sectional dependence, nonparametric regression, model selection.

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