Estimating the Causal Effect of Green Payments in Agriculture using The Coarsened Exact Matching

Danilo Bertoni[1], Daniele Curzi, Stefano Iacus[2] and Alessandro Olper[1,3]* ,

[1]Department of Environmental Science and Policy, University of Milan, Italy
[2] Department of Economics, Management and Quantitative Methods, University of Milan, Italy

[3] LICOS – Centre for Institution and Economic Performance, KU Leuven, Belgium

* Corresponding author: daniele.curzi@unimi.it

Abstract

This paper studies the effect of agri-environmental measures (AEMs) in improving greener farming practices. We focus on the quantification of the cost-effectiveness of AEMs, taking into account potential failures related to these kind of policy instruments, which may lead in particular to an adverse selection effect. Considering AEMs, adverse selection may occur when farmers that already accomplish AEMs commitments – or are close to accomplish them – are more likely to participate in the program, than other farmers that are far from accomplish the environmental requirements. Unfortunately, the latter, which have a lower initial (before policy) environmental quality, and consequently higher compliance costs, should be the real target of the policy measure. However, due to adverse selection they are less likely to participate.

The aim of this study is to give, from a methodological perspective, a contribution in addressing some of the identification problems that usually affect the impact evaluation of AEMs and by working at a sufficient large scale level to give a consistent external validity to our analysis. To do that, we make use of a new matching procedure called Coarsened Exact Matching (CEM), recently developed by Iacus et al. (2012), that allows to better control for selection bias. This new method improves the estimation of causal treatment effect on the treated (ATT) by reducing imbalance in co-variates between treated and control unites. We then applied d-i-d CEM estimator to quantify additional and windfall effects of AEMs implemented in the Rural Development Program (RDP) of the Lombardy region, during the 2007-2013 programming period.

We used data extracted from SIARL dataset, which is the electronic system used by the Lombardy Region to manage farm demands for all CAP subsidies. SIARL data allow to

identify farms participating in AEMs, and provide information at farm level about farm structure, farmer's characteristics and farm crops and livestock productions. These data have been used to identify farms participating to each AEM, farms' environmental performance indicators that we consider as the target of different AEM measures, and control used to match treated non-treated farms. Our analysis focuses in particular on three AEM schemes: 214_a on crop diversification, 214_c on grassland maintenance and 214_e on organic farming.

Preliminary results suggest that AEMs were apparently effective in improving farms' environmental performance. Focusing on the direct ATT, the results of AEM grassland maintenance and organic farming point to significant additional effects in a direction consistent with policy-maker expectations. The same can be said for most of the outcome indicators related to AEM crops diversification. Starting by these results the analysis can be developed in several directions such as estimating windfall effects and the cost-effectiveness of AEMs.

References

- Iacus, S.M., King, G., Porro, G. (2012). Causal Inference Without Balance Checking: Coarsened Exact Matching. Political Analysis, 20 (1), 1-24.