

Extended Abstract

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Paper/Poster Title	Examination the Effect of Participation in Agri-Environmental schemes(AES) on farms' applied technology and technical efficiency
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Abstract prepared for presentation at the 97th Annual Conference of the Agricultural Economics Society, The University of Warwick, United Kingdom

27th – 29th March 2023

Abstract	200 words max
<p>The agri-environmental schemes (AESs) of the European Union employ the highest share of the public budget allocated to rural development programs. Despite of this, only a few studies so far have attempted to empirically measure the actual impact of being subject to AESs on farms' applied technology and economic performance. According to the literature the expectation is that farmers are heavily affected by participation in AES, which may lead to a deep reorganization of the farm. However, this expectation haven't been empirically tested yet. Our first aim is – with the application of a second generation Random Parameter Production model– to test whether participation significantly change the production technology. Second, only some recent papers deals with the issue of selection bias in the case of comparison between participating and non-participating farms and there exist no study that apply quasy experimental method in panel data setting. Our second aim is to apply a recently introduced panel matching method to compare the technical efficiency of the examined groups. We use Hungarian FADN data for the examinations. Preliminary results suggest that participation has significant effect on the applied technology, but participation doesn't have significant effect on technical efficiency.</p>	
Keywords	Agri Environmental Schemes(AES), Random Parameter Model(RPM); technology;efficiency
JEL Code	Q12 see: www.aeaweb.org/jel/guide/jel.php?class=Q
Introduction	100 – 250 words
<p>The literature on AESs is quite extensive. However, most of it tries to analyse the factors affecting farmers' participation in agri-environmental contracts. Only a few studies so far have attempted to empirically measure the actual impact of being subject to AESs on producer behaviour at individual farm level using statistical or econometric approaches (Sauer et al., 2012). The expectation is that farmers are heavily affected by the participation in AESs, which may lead to a deep reorganization of the farm. However, this</p>	



expectation haven't been empirically tested yet. Our first aim is to test whether participation significantly change the production technology or not. Second, we apply a recently introduced panel matching method to compare the technical efficiency of participating and non-participating farms. Theoretical considerations suggest that agri-environmental measures have a negative effect on productivity as they impose constraints on input use. However, empirical evidence on the economic performance effect of agri-environmental payments is mixed. Our research provide additional insights to the investigation of this issue.

Methodology	100 – 250 words
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First, we apply a second-generation random parameter stochastic frontier production model (RPM) in order to test whether participation in AES significantly change farms' applied technology or not. In order to do so, in addition to the standard assumption of random parameter models, (ie. unobserved heterogeneity affect the applied technology), we assume that both unobserved and observed heterogeneity might affect farms technology and among the observed heterogeneity we focus on the average amount of AES subsidies farms received during the study period.

Second, for purposes of comparison of technical efficiency of participating and nonparticipating farms we apply a recently introduced panel matching method, introduced by Imai et al., 2021.

In the proposed approach, we match each participated farms with control observations in the same time period that have an identical treatment history up to the pre-specified number of lags (i.e., we construct a matched set). In addition, we use a number of standard matching and weighting methods (standard propensity score weighting and matching, covariate balancing propensity score (CBPS)) to further refine this matched set (and examine the robustness of the results) in order to satisfy that the treated and matched control observations have similar covariate values.

Finally, we estimate both short-term and long-term average treatment effect of participation.

Results	100 – 250 words
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Results suggested that the estimated RPM suits well to our data, the estimated parameters satisfy the criterias of theoretical consistency (monotonicity and quasy-concavity), hence they can be used to draw empirical conclusions. Our findings shows that both unobserved and observed heterogeneity has significant effect on production technology. Considering our first aim, our results confirm that participation has significant effect on the applied technology: it changes the marginal productivity of land and materials input of participating farms. However, participation in AES doesn't have neither short-term nor long term significant effect on technical efficiency. The results are robust to different lags and leads (we applied up to 3 and 5 lags and leads, respectively), related to the treatment history and long term effect.

Discussion and Conclusion	100 – 250 words
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In this paper we contribute to the literature by applying a second generation RPM to estimate AES effects on farm efficiency while considering selection bias occurring due to the voluntary nature of agreement based schemes.

Results suggest that participation in AES has more important effect on applied technology than technical efficiency. In other words, it appears that farms adjust their technology appropriately to the requirements of AES participation and with the adjusted technology works as efficiently as non-participated farms. There is no general agreement in the literature regarding the effect



of AES participation on farms' economic performance, however recent results with up to date methods tends to show insignificant effect. Our findings are in line with these results.