ECONOMIC AND ENVIRONMENTAL EFFECTS OF THE POST-2020 CAP REFORM PROPOSAL IN SPAIN: A FARM LEVEL ASSESSMENT

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Abstract

With the purpose of fostering better environmental performance of European farms, the CAP post-2020 reform will introduce new subsidy schemes to allocate direct payments that are conditional to environmental measures. In particular, the Commission's proposal for the CAP post-2020 introduces two layers of measures for achieving environmental objectives. First, “Enhanced conditionality” which will replace cross-compliance as the new, and more ambitious, minimum set of requirements for receiving Pillar I payments. Second, Member States are also asked to design a set of even more environmentally ambitious measures, referred to as “Eco-schemes”, which will be voluntary for farmers and will be funded through Pillar I. This study assesses economic and environmental effects of the CAP post-2020 reform at farm level in Spain. By using the Individual Farm Model for Common Agricultural Policy analysis (IFM-CAP), a set of scenarios of different levels of environmental ambition are simulated. The results show the trade-off between farmers’ income and environmental performance, suggesting that the provisions of the new CAP may be beneficial for the environment albeit at some cost to farmers.

Keywords: Agricultural policy, enhanced conditionality, eco-schemes, farm-level mathematical programming

1. Introduction

The European Union’s (EU) Common Agricultural Policy (CAP) has evolved over its successive reforms towards mechanisms based on farmers’ income support, i.e., direct payments (DP), that are conditional on the adoption of environmental measures by farmers. In the CAP 2013 reform, the so-called greening measures were introduced to foster the provision of public goods by agriculture incentivizing crop diversity, the conservation of ecological focus areas and the maintenance of permanent grasslands. However, the environmental benefits achieved by the CAP 2013 reform were more limited than expected [ECA (2017)]. With its new reform, the CAP post-2020 will introduce a more ambitious and decentralized policy, for which Member States (MS) will develop their own Strategic Plans according to their national and regional characteristics [European Commission (2018a)]. The CAP post-2020 will introduce the so-called “New delivery model”, which establishes the mechanism of allocation payments subject to the achievement of environmental and climate targets. Current CAP 2013 greening will be substituted by “Enhanced conditionality” requirements, which are the minimum set of requirements to which farmers need to comply for receiving DP. MS can propose more ambitious environmental measures that farms can adopt in a voluntary basis, which are called “Eco-schemes”. Farmers adopting “Eco schemes” would receive an additional per hectare payment [European Commission (2018a)].

Despite the lacking information about the implementation of these environmental measures in the national Strategy Plans, this paper attempts to assess the potential impacts of the CAP post-2020 on Spanish farmers’ income and environmental performance. To account for the uncertainty regarding the final implementation of the CAP in Spain, we analyse two policy scenarios built around the budget allocated to Eco-schemes that can offer insights on the possible impacts driven by the new CAP reform.

2. Methodology

2.1. The IFM-CAP model

The EU-wide farm model IFM-CAP (Individual Farm Model for Common Agricultural Policy Analysis) is used to assess the potential economic and environmental impacts of the CAP post-2020 reform in Spain. IFM-CAP is a static Positive Mathematical Programming (PMP) model that simulates the behavior of individual farms. It maximizes farmers’ expected utility of income under a set of resources and policy constraints at given prices, yields and direct costs. IFM-CAP also includes an environmental module that calculates a set of environmental indicators related to crop diversity, erosion and input expenditures per hectare. IFM-CAP uses data from the Farm Accountancy Data Network (FADN) for year 2012, which is

complemented with other external data sources such Eurostat and CAPRI model database, among others. The main advantage of this farm-level model is that it is suitable to assess CAP policy measures that depends on individual farm characteristics (e.g. specialization, size, cropping plans, location...), reducing aggregation bias inherent to agri-economic models operating at regional and/or farm type scales. For a complete description of the IFM-CAP model we refer to Louhichi et al. (2018). For Spain, IFM-CAP uses 8346 individual farms, which represent about 572 thousand farms and covers about 22.7 million hectares, representing about 96% of the total Spanish agricultural area.

2.2. Scenario analysis

In this research, we simulate two scenarios that differ on the level of environmental ambition of policy makers, reflected in the budget allocation to Eco-schemes. The first scenario of “high environmental ambition” (HiENV) assumes that 40% of the national DP envelope is allocated to Eco-schemes, while the second scenario considers “low environmental ambition” (LoENV), with only 10% of the national DP envelope allocated to Eco-schemes. The environmental measures considered in both scenarios are presented in Table 1, and their specification draws on the impact assessment for the CAP reform (European Commission, 2018b). DP budgets and the allocation to different type of payments are in line with the CAP reform legislative proposal (European Commission, 2018a). Both scenarios assume that 10% of the DP envelope is given to the first 30 hectares in each farm as redistributive payment and that the basic decoupled payment is capped at 100 thousand euros, after excluding wages paid. Scenario results are compared against a baseline scenario. The baseline includes (i) the CAP provisions introduced with the 2013 reform (greening measures and DP allocation), and (ii) price and yield trends of agricultural commodities for 2030 taken from the CAPRI model (Louhichi et al., 2018).

Table 1. Farm environmental measures in the scenarios (CAP post-2020 reform)

	Enhanced conditionality (mandatory)	Eco-schemes (voluntary)
Change of grassland area at regional level	0% (no change allowed)	-
Winter soil cover – winter crop, catch crops, mulching	90% of arable crop area	+10% additional catch crop area (100% total)
Fallow land	5% of utilized agricultural area	+5% additional fallow land (+10% total)
Cover crop between tree rows	90% of permanent crop area	-
Crop rotation	3 years	4 years

Source: Authors' own elaboration

3. Results and conclusions

As reported in Table 2, the Eco-scheme adoption rates among farms in Spain are 80.8% for HiENV scenario (the most ambitious scenario in terms of DP allocated to Eco-schemes) and 67.7% for the LoENV. At regional level, six regions present adoption rates over 90% in the HiENV scenario. Adoption for all remaining regions ranges from 50% to 90%.

The largest differences in adoption rates between scenarios are observed in Región de Murcia, Cataluña and Andalucía. An important reason is that these regions are more specialized in horticulture and orchards with high value outputs and, therefore, they would experience a higher profit loss due to Eco-scheme constraints. Indeed, farm specialization is a key determinant of adoption of Eco-schemes, as shown in Table 3. The farm type specialist horticulture presents the lowest adoption rate in both scenarios, followed by specialist wine and specialist orchards. This result suggests that, for these specializations, the Eco-scheme payments assumed in this research may not fully compensate for income losses from the adoption of voluntary measures.

Table 2 and 3 also report changes in income with respect to the baseline. Income is calculated as the difference between total revenues (output value and subsidies) and variable costs (e.g., fertilisers, pesticides, seeds, feeding), including the additional costs for complying with the environmental measures. At national level, results show a small decrease of farmers' income in both scenarios, of -1.1% for the HiENV scenario and -0.7% for the LoENV scenario. However, results are heterogenous across regions and farm types, since regions where farms are more specialized in arable and permanent crops activities (in

contrast to livestock farms) would experience the highest decrease in income. This finding can be explained by the fact that the modelled measures target directly crop activities and cropping land, and affect income through the production constraints they impose (e.g., rotation and fallow land obligations) and, more directly, through the additional costs from applying soil covers. On the contrary, the increase in income for farms specialized in animal activities is the indirect result of changes in crop production plans which may even stimulate increased on-farm feed production.

Table 2. Farm eco-scheme adoption rates and income changes per scenario by region

Region	Adoption rates (% over total farms)		Income (% change relative to baseline)	
	HiENV	LoENV	HiENV	LoENV
Spain	80.8%	67.7%	-1.1%	-0.7%
Galicia	79.8%	69.1%	2.5%	2.8%
Principado de Asturias	98.0%	94.7%	7.4%	7.5%
Cantabria	99.2%	97.7%	5.9%	6.3%
País Vasco	76.6%	72.8%	2.9%	3.0%
Comunidad de Navarra	94.6%	85.0%	1.0%	1.2%
La Rioja	65.7%	51.9%	-1.8%	-0.8%
Aragón	93.6%	86.6%	1.1%	1.5%
Comunidad de Madrid	91.4%	86.7%	3.5%	4.3%
Castilla y León	95.1%	88.2%	7.8%	8.3%
Castilla - La Mancha	83.6%	80.8%	4.1%	4.4%
Extremadura	75.9%	71.1%	1.1%	1.8%
Cataluña	86.5%	64.3%	-4.1%	-3.7%
Comunidad Valenciana	57.9%	45.3%	-7.8%	-7.1%
Islas Baleares	70.5%	58.7%	-8.0%	-7.2%
Andalucía	81.3%	59.6%	-8.8%	-8.4%
Región de Murcia	54.1%	27.3%	-3.1%	-2.6%

Source: Authors' own elaboration

Table 3. Farm eco-scheme adoption rates and income changes per scenario by farm specialization

Farm specialization	Adoption rates (% over total farms)		Income (% change relative to baseline)	
	HiENV	LoENV	HiENV	LoENV
Mixed crops	86.4%	75.2%	-1.6%	-0.7%
Mixed crops and livestock	91.1%	78.7%	8.0%	8.3%
Mixed livestock	90.7%	80.3%	7.6%	8.0%
Permanent crops combined	92.0%	70.3%	-1.0%	-0.2%
Specialist cattle	97.9%	89.9%	11.9%	11.9%
Specialist COP	89.2%	79.7%	-3.9%	-2.9%
Specialist granivores	73.8%	60.0%	-0.6%	-0.6%
Specialist horticulture	16.3%	11.4%	-7.4%	-6.9%
Specialist milk	96.3%	86.6%	2.5%	2.6%
Specialist olives	92.4%	71.1%	-13.4%	-12.9%
Specialist orchards - fruits	66.1%	53.0%	-3.7%	-3.1%
Specialist other fieldcrops	83.2%	66.4%	-11.2%	-9.8%
Specialist sheep and goats	92.1%	86.1%	10.5%	10.4%
Specialist wine	62.8%	48.2%	-1.6%	-1.2%

Source: Authors' own elaboration

Table 4 reports the average values of environmental indicators per scenario across Spanish farms. Shannon's index (SH) and Simpson's reciprocal index (SI) are used to assess crop diversity of functional crop groups (crops that are similar from an agronomic and ecologic point of view). Compared to the baseline, both scenarios show higher values for both SH and SI, which suggests that the CAP post-2020 can induce an increase in crop diversity (on average) at individual farm level. Although both indicators consider the two dimensions of crop diversity (richness and relative abundance) [Nagendra (2002)], SH confirms that farms tend to cultivate a higher number of different crops, while SI indicates that the dominance of some crops are reduced at farm level. The erosion index (ERO) is a dimensionless indicator that informs about the potential change in risk of erosion due to changes in cropping plans of farms. The indicator is based on the C-factors coefficients of the RUSLE equation [Panagos et al. (2015)]. ERO presents significant lower values for the scenarios than for the baseline, which confirms that the adoption of green covers (e.g., catch crops, covers in orchards) are effective in reducing erosion from cropping land. However, differences between scenarios are rather small. Finally, according to the indicators, input use at farm level is also reduced compared to the baseline, but input use levels are very similar in both CAP post-2020 scenarios. As IFM-CAP assumes Leontief technology with fixed input cost per hectare and crop, the decreasing input use is mainly driven by the greater share of fallow land imposed by Enhanced conditionality and Eco-schemes.

Table 4. *Environmental indicators at national level per scenario*

Indicator	Baseline	HiENV	LoENV
Shannon's index (SH)	0.694	0.789	0.773
Simpson's reciprocal index (SI)	1.774	1.941	1.907
Erosion index (ERO)	0.220	0.178	0.177
Pesticide expenditure (EUR/hectare)	398.7	382.2	383.8
Fertilizer expenditure (EUR/hectare)	284.2	270.8	272.1

Source: Authors' own elaboration

As a conclusion, the results show the trade-off between farmers' income and environmental performance that will arise from implementing the new CAP. These trade-offs have to be considered with caution as the model does not consider the potential long-term economic benefits derived from the environmental measures (e.g., increase in yields derived from the catch crop implementation) which may benefit economic and environmental performance. In addition, the scenarios are built around assumptions of budget allocations to Eco-schemes and, therefore, do not capture the full new CAP implementation in Spain (direct payment distribution, specific eco-schemes, etc.) which is currently being discussed in the CAP strategic plan. Despite this limitation, the results presented herein indicate that careful targeting and specification of farm measures can better address local specificities, improve environmental performance and mitigate some of the negative income effects.

4. References

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