

## Extended Abstract

Please do not add your name or affiliation

<b>Paper</b>	<b>Assessing the trade-off between SO1 and SO5 policy intervention through an ex-ante PMP-AB model: the case of Emilia Romagna Region</b>
--------------	---

**Abstract prepared for presentation at the 98th Annual Conference of The Agricultural Economics Society will be held at The University of Edinburgh, UK, 18th - 20th March 2024.**

<b>Abstract</b>	<b>200 words max</b>
<p>The flexibility granted by the new CAP Delivery Model enables EU Member States to customise the application of agricultural policy interventions according to the specific needs of each Member State. At the same time, the EU requires careful monitoring concerning the achievement of the 10 Strategic Objectives (SOs). This research aims to assess the existing trade-off between SO1 (Support viable farm income) and SO5 (Foster sustainable development).</p> <p>The trade-off is evaluated by conducting an ex-ante analysis to assess the potential impact of regional payments for organic conversion on farm viability and environmental sustainability, specifically regarding water consumption, use of fertilisers and pesticides.</p> <p>The impact assessment utilises an Agent-Based Model (ABM) implemented through a positive mathematical programming (PMP) approach. The efficiency of policy intervention is evaluated through the “Synthesis questions and judgement criteria” set by DG AGRI as a means to assess the effectiveness of the National Strategic Plans (DG AGRI, 2023).</p> <p>Preliminary results on SO1, for the 2021 FADN farms of Emilia-Romagna, show that organic farming payment increases farm income, especially amongst the smaller farms, generally considered being the most vulnerable ones, while farm net value added (FNVA) per AWU presents a lower inequality distribution.</p>	
<b>Keywords</b>	Q570 Ecological Economics; Q510 Valuation of Environmental Effects; Q18, Agricultural Policy
<b>JEL Code</b>	e.g. Energy: Demand and Supply Q41 see: <a href="http://www.aeaweb.org/jel/guide/jel.php?class=Q">www.aeaweb.org/jel/guide/jel.php?class=Q</a>
<b>Introduction</b>	<b>100 – 250 words</b>
<p>Under the ongoing Common Agricultural Policy (CAP), Member States (MS) have increased autonomy in selecting interventions deemed more beneficial for their agricultural systems and in formulating an appropriate national Strategic Plan for the period 2023-2027 (EC, 2023). Furthermore, the newly Delivery model, outlined in Regulation (EU) 2021/2115, emphasises the integral role of evaluating the effectiveness and efficiency of these interventions as part of Member States' evaluation activities. Additional specifications provided in the Commission</p>	

Implementing Regulation 2002/1475 mandate Member States to assess the contribution of their CAP Strategic Plans across dimensions such as effectiveness, efficiency, relevance, coherence, and added value.

This evaluation process should adhere to the Performance Monitoring and Evaluation Framework (PMEF) and must be developed by the Member State (EC, 2021) rather than the European Commission (EC).

This evaluation must address several pertinent issues, including i) the complexity of farm income-related economic concepts, ii) the demonstration of the CAP's net effects, iii) the utilisation of granular data, and iv) the adoption of methodologies that capture the behaviour of individual farmers under various policy scenarios, thereby accounting for the heterogeneity of impacts on farm structure.

According to the Intervention Logic of CAP, income support interventions represent the most CAP-powerful tool affecting SO1 objectives. Meanwhile, the application of strict environmental criteria and the support of a more sustainable agricultural system, such as organic farming, also impact farm income and its distribution among farm types reducing, potentially, the effectiveness of SO1. Hence, a potential trade-off between SO1 and SO5 should be considered.

#### **Methodology**

*100 – 250 words*

This study combines an ex-ante two-step PMP agent-based model (Baldi et al., 2013) with the set of indicators proposed by the PMEF (Agrosynergie, 2018; CSWD, 2011). The PMP-AB model integrates two approaches: while the ABM simulates farmers' behaviour in deciding on production plans and technologies based on their specific opportunity cost, the PMP approach calculates the variable cost per observed crop and the opportunity cost for fixed factors (such as land). The ABM model assumes a non-entirely rational behaviour of agents, tending to maximize their utility rather than their profit function (Nolan et al., 2009; Kremmydas et al., 2018). The PMP reproduces the observed production plan based on farmers' perceived cost structure (Paris and Howitt, 1998; Paris, 2015). Both methodologies accept opportunity cost as the main driver of production choices in changing technologies, activities, and production factors (Arfini and Donati, 2012; Reidsma et al., 2018).

The policy impact assessment is conducted by analysing specific results and output indicators (DG AGRI 2023) that reflect the economic farms' viable condition and their impact on natural resources, before and after the introduction of the policy intervention. To this end, the Commission suggests specific impact indicators related to different SOs (EU, 2023). These indicators are observed in different dimensions (by farm size) and at different scales (such as farm, Ha, AWU). Furthermore, to account for income disparities between farms, the Gini index is applied to all farms in the FADN sample (Severini and Tantari, 2012; Marino et al., 2021).

<b>Results</b>	<b>100 – 250 words</b>
<p>Preliminary results on SO1 indicate the granular behaviour of Emilia-Romagna FADN farmers, taking into account different policy interventions. The use of Coupled Income Support (CIS) and Basic Income Support for Sustainability (BISS) interventions represents the "reference scenario." Additionally, two policy scenarios are simulated: the "organic scenario," wherein regional payments for organic conversion are provided to encourage farm holders to adopt organic agricultural practices (Emilia Romagna RDP 2014-2022); and the "market price premium scenario," where organic crops receive a 20% price premium from the market. All scenarios consider the possibility of renting or leasing out land.</p> <p>Results from the PMP-AB model indicate a structural change in the agricultural system due to farms exiting, a shift towards more sustainable agricultural patterns, and an increase in FNVA for Emilia-Romagna's farms. The model offers input to assess the effectiveness of agri-environmental policy in achieving the objective of increasing the state of viable income.</p> <p>The Emilia Romagna RDP for organic agriculture is projected to increase FNVA by 16.4%, while a premium price would raise it to 17.0%. However, among farm categories, the increase in FNVA is not uniform and varies depending on the parameter used for comparison. Specifically, while the reduction of FNVA for farms is more pronounced, it is smaller for AWUs. Both aspects impact the efficiency of environmental policies on SO1.</p>	
<b>Discussion and Conclusion</b>	<b>100 – 250 words</b>
<p>A more articulated evaluation comes from analysing the concentration of added value among the farm types as the scenarios change and from the value of the Gini index. In this regard, the Emilia Romagna Region is characterised by concentrating over 79% of FNVA and 97% of farms in the first two deciles.</p> <p>Support for organic farming would further concentrate the FNVA to 81% with the same number of farms considered. The high concentration of FNVA per farm is well represented by the Gini index, which stands at 0.425 and reaches 0.440 and 0.445, respectively, in the two scenarios considered.</p> <p>The picture described changes significantly if FNVA per AWU is considered. The reference scenario shows how the first two deciles concentrate over 90% of the FNVA in 97% of the farms. However, introducing organic payments reduces the concentration of FNVA in the same deciles to 69%. The income inequality is represented by the Gini index, which is 0.22 in the reference scenario and 0.247 and 0.249 in the two organic-related scenarios.</p> <p>This last figure is significant as it shows that the concentration of added value is more evenly distributed among farm workers than among farms and the shift to organic</p>	

farming does not reduce the effectiveness and efficiency of CAP as it reaches all farmers without favouring some farm types to the detriment of others.

These results will be further compared with SO5 indicators to assess their trade-off with respect to environmental objectives and agricultural ecosystem services.