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High environmental value (HEV) certification: sharing of costs and risks among value-chain stakeholders

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ABSTRACT

We have recently witnessed the emergence of many farm certification schemes whose common objective is to identify and promote certain agroecological practices with a view to attaining environmental goals and meeting consumer expectations. Our study evaluated how farmers are economically impacted when adopting France's voluntary high environmental value (HEV) certification scheme. Focusing on multiple crop types and interacting with multiple stakeholders, we estimated the added costs and coordination requirements engendered by HEV certification. Our results show that these costs can increase in a crop-dependent manner. Thus, to further encourage the spread of the HEV certification scheme, it is essential to improve coordination and cost-sharing among value-chain stakeholders. In its latest CAP Strategic Plan, France proposed supporting HEV-certified farms via the European Union's eco-scheme instrument, which should provide an additional boost.

***Keywords**: Farm certification schemes; Haute valeur environnementale (HVE); Costs; Stakeholder coordination; Value chain.*

1 Introduction

Many farm certification schemes have emerged in recent years, and they share the common aim of identifying and promoting agroecological practices (Chever et al., 2022). Among them is France's high environmental value (HEV) certification scheme (*haute valeur environnementale* [HVE] in French), in which participation is voluntary and open to farmers across all agricultural sectors. It focuses on four key environmental areas chosen by the French Ministry of Agriculture: biodiversity conservation, plant protection, fertiliser usage, and water resource management. The certification process occurs at the farm scale and has three levels. Only the third level ("high environmental value") allows farmers to use HEV labelling[1]. To be and remain certified, farms must meet certain quantifiable environmental performance standards[2] (Bessou and Colomb, 2013, Bonvillain et al., 2020).

Created in 2012, the certification scheme's few early adherents were mainly winegrowers, who represented 80% of certified farms until January 2021. However, in 2017, farmers from other production sectors began signing on, and participation has since grown rapidly. Indeed, between January 2021 and 2022, the number of HEV-certified farms reached 24,827, an increase of 73%. This figure translates to around 6.4% of French farms with a combined surface area of at least 1.17 million hectares (French Ministry of Agriculture, 2022). Growth has been strongest for crop farms, which accounted for 7.8% of HEV-certified operations on January 1, 2022. This booming interest in the scheme primarily came about because of political support (i.e., the scheme is a governmental instrument for promoting the agroecological transition), as well as because of the adherence of certain value-chain stakeholders. While decisionmakers often rely on farm certification schemes to trigger transitions in agricultural practices, farmers remain reluctant to commit themselves[3]. One key factor behind this hesitancy is the uncertainty around the cost-benefit balance associated with the shift (Chèze et al., 2020, Ghali et al., 2022). Based on past research, external uncertainty tied to external events (i.e., yield losses and market variability) is a key driver behind farmers' decisions to change their production approaches (Lapierre et al., 2023, Ridier et al., 2016, Ridier et al., 2013). In these situations, policy incentives are less effective (Lefebvre et al., 2020).

This study has two parts. First, we briefly describe France's current landscape of certification schemes, and we identify the space occupied by HEV certification therein. Second, we explore the economic impacts faced by farmers and other value-chain stakeholders when adopting the HEV certification scheme. This work included evaluating the effects of yield losses and product marketability. Particular attention was paid to the importance of cost-sharing among value-chain stakeholders.

2 HEV certification within the broader landscape of farm certification schemes

Across the European Union (EU), there has been substantial growth in the number of farm certification schemes that promote sustainable agriculture[4]. Many of these schemes have been developed or supported by national governments, as a means of officially encouraging the adoption of agroecological practices (Chever et al., 2022). Some schemes are international, such as the EU organic certification scheme, the geographical indication (GI) scheme, the protected geographical indication (PGI) scheme, and the traditional specialities guaranteed (TSG) scheme (Sadilek, 2020). Others are national or regional (Sadilek, 2019). In France, there are five main governmental certification schemes: the organic agriculture (AB) scheme, the HEV scheme, level 2 environmental certification (*certification environnementale niveau 2*), *Label Rouge*, and *Label bas-carbone*. However, private-sector certification schemes are also experiencing tremendous growth. They may be individual—associated with a specific industry or a brand (e.g., Lu'Harmony for Lu brand products)—or they may be collective, such as schemes focused on sustainable winemaking (*Vignerons engagés en développement durable*), zero pesticide residues (*Zéro résidus de Pesticides*), or animal welfare (*Bien-être animal*). In general, all these schemes and their labels are more or less familiar to consumers, thanks to their certification statements and logos. That said, the AB scheme remains the most recognizable and therefore often serves as the consumer standard of reference (Dekhili and Achabou 2013).

HEV certification can follow two paths (*voie A* or *voie B*). We only consider Path A in this study, but we will briefly describe Path B for the sake of context. Path B requires farms to meet standards for two of the focal areas: (i)

[1]Processed products can only carry the HEV label if at least 95% of their raw materials come from HEV-certified farms (French Ministry of Agriculture, 2020).

[2]For a deeper discussion of environmental performance standards and result-based subsidies, see Bonvillain et al. (2020).

[3]In 2022, 14.2% of French farms were certified organic; 6.4% were certified HEV; and 11% were both. Only 4.6% of France's croplands are farmed using certified organic practices (Agreste, 2023).

[4]A document recently released by the European Parliament Committee on Agriculture and Rural Development noted that 198 certification schemes exist in the EU and main third countries (86% are in the EU; Chever et al., 2022).

biodiversity conservation (≥ 10% of useful agricultural area [UAA] must be dedicated to agroecological infrastructure or ≥ 50% of UAA must be dedicated to permanent grasslands) and (ii) fertiliser usage (input costs must correspond to ≤ 30% of total sales). This path is expected to be eliminated in the future as it favours specialized, high-value production systems and does not require significant changes in agricultural practices. Most of HEV-certified winegrowers followed Path B.

Path A, in contrast, requires farms to meet standards for all four of the focal areas: (i) biodiversity conservation, (ii) plant protection, (iii) fertiliser usage, and (iv) water resource management. To become certified, farmers must accumulate a score of at least 10 in each area, which can be achieved via different criteria and practices. To remain certified, farms are audited at least once every 18 months by a certification institution to ensure that threshold scores are maintained in the four focal areas (French Ministry of Agriculture, 2020).

This approach is systemic (Domallain and Roman-Amat, 2017) because HEV certification requires enhanced environmental performance at the farm scale. The scheme seeks to improve not only operational practices, but also the use of effective management tools and new technologies. The results are gauged against an environmental framework, resulting in a synergy that reinforces the scheme's strengths.

Some private stakeholders view HEV certification as an opportunity to ease agricultural systems through the ecological transition and to enhance the value of HEV-certified agricultural products. This study was performed in the context of the HEV Project in Beauce Val de Loire; it is a multi-collaborator effort funded by the regional government of Centre Val de Loire, a part of France that is covered in croplands. Funding also came from the EU. The project's aim is to encourage the adoption of the HEV certification scheme in Beauce Val de Loire by engaging with different stakeholders across different agricultural sectors. Among its many collaborators are the main stakeholders within the value chains studied, as well as research institutes (ESA in Angers) and technical bodies (Loiret Chamber of Agriculture).

The project was designed by a group of 48 farmers and a processor in the condiment industry (i.e., garlic, onions, shallots). Already involved in several quality initiatives and certification schemes (Global Gap, AB, Zero Pesticide Residues, IFS, BRC FOOD, GRASP), the group wanted to do more to boost agroecological practices and to further enhance the value of its members' various products via HEV certification. The project's collaborators are engaging with farms around HEV certification and seeking to increase the overall supply of HEV-certified products. They also want to enhance the value of HEV-certified products by diffusing information to multiple audiences, including consumers.

To become HEV-certified, farms commit to meeting HEV certification standards at all scales. The project's founding group of farmers produce a number of crops (e.g., cereals, potatoes, beets) that are highly representative of the main agricultural industries in Beauce Val de Loire. Thus, the farmers' diverse industry membership is an opportunity to foster transversal HEV dynamics within the region and to transform the entire value chain, starting with farm certification. The goal is also to grow networks so as to improve resource sharing (e.g., upstream, and downstream engagement, farm technical support, technical monitoring programmes, communication around products, investments).

The project's objective is to collaboratively evaluate the conditions and costs associated with adopting HEV certification standards within value chains of interest. Another goal is to generate a broader range of HEV-certified products. Many farmers are interested in marketing all their products under the HEV label and, more globally, undertaking the agroecological transition. Many processors and distributors are looking to develop outlets for HEV-labelled products.

3 Economic impacts of HEV certification: methodology

3.1 Data collection and analytical framework

Our study focused on four general types of crop production: cereal, onion, potato, and sugar beet systems. In spring 2021, we conducted surveys and interviews with farmers and downstream value-chain stakeholders associated with each industry. It is important to note that certain participants were collaborators on the research project. Two methodological approaches were used. In the first approach, we evaluated the farm-level impacts of HEV certification by analysing data for two distinct years: the year before and the year after certification. In the second, for some farms, we simulated the impacts of the different agroecological practices that farmers would need to adopt to become HEV certified. We conducted interviews with downstream value-chain stakeholders to better understand the additional costs and work engendered by HEV certification and to clarify where greater coordination is needed.

As certain products may come from a single farm but be transformed by different processors downstream, we needed a customized methodology for estimating how additional costs arising from HEV certification could be equally shared across products and, therefore, value-chain stakeholders. This methodology was refined at length via discussions with the project's different collaborators and has led to broader negotiation and coordination efforts, especially among product processors.

Project collaborators generated a list of 12 farms. Farmers at nine of these farms, all specialised in crop cultivation, agreed to be interviewed. Two of the farms were already HVE certified, and their experiences helped us to develop scenarios that could be applied in the cases of the seven uncertified farms. Each collaborator who participated in list creation also provided contact information for the farms' technical advisors, who could furnish guidance on technical issues in the field and the HEV simulations. The interviews were scheduled by email or phone in May and took place in June.

3.2 Assessing HEV-related costs for farms.

A key part of our study was estimating the additional costs faced by farms that become HEV certified. These costs can be broken down into six main categories: land-related costs; structural costs; labour costs; machinery costs; input costs; and irrigation costs (Table 1). Thus, total production costs per hectare can be calculated using the following formula: total production costs (€/ha) = sum of direct and indirect costs (€/ha) across the six main cost categories. We can use the total production cost to estimate the production cost of one tonne of product (Ait M Bark, 2009; Debois, 2006; Riffard and Odin, 2021): per unit production costs (€/T) = total production costs (€/ha)/yield (T/ha).

It is important to note that accurately estimating crop-specific total production costs is difficult because a wide range of very precise data are needed. However, farmers usually use this metric to assess the financial viability of crop systems. As a result, we estimated crop-specific total production costs for the farms studied.

This process relied on direct, detailed records provided by farmers and was based on the a priori allocation of costs to the different production systems, which can be arrived at via different analytical accounting methods. However, the latter are generally quite complicated, which means estimates are often available for a limited number of crops. In addition, these detailed analytical costs are generally exclusively available for certain specialised producers that function within small technical and economic networks and found within a specific geographical area (Desbois 2006). In this study, because of the region's relative homogeneity and limited number of focal crops and production system combinations, we were able to directly gather information related to farm production costs via our surveys. We then reconstructed the allocation of farm production costs using standard cost accounting.

For machinery and labour costs, it can be somewhat complicated to determine cost allocation because few farmers possess accurate data. Thus, we used the crop technical itineraries/practices employed by the farmers to allocate these costs among crop types as best we could (see below). For example, onions and cereals are produced via very different cropping systems, and adjustments must be made to neither under- nor overestimate machinery and labour costs for each. It is necessary to count the number of passes, consider the equipment being used (based on farmer data), and estimate the associated costs using the regional register of cost equivalents (*barème d'entraide*) (see Table 1). Our allocation decisions were also discussed with and validated by technical advisors and project collaborators.

3.3 Constructing the HEV certification scenarios.

After we had interviewed the nine farmers and collected the necessary data on their technical practices, expenses, and yields, we met with each farmer and their agricultural advisor to discuss which practices would need to change or be adopted for their farm to become HEV certified. This information was the basis for the HEV certification scenarios that we constructed.

This crucial process had four subtasks that centred on the scheme's focal areas:

- identifying practices to meet biodiversity conservation standards (e.g., based on crop number and cultivated surface area; the presence of animal species, including protected animal species),

- identifying practices to meet standards for water resource management (e.g., based on the irrigated surface area; presence of detailed irrigation records [usage of a decision-support tool, or DST]; implementation of water conservation practices),

- identifying practices to meet plant protection standards (e.g., based on the frequency of phytopharmaceutical treatments and compared to a regional reference and/or based on the surface area to be treated),

- identifying practices to meet fertiliser usage standards (e.g., based on global nitrogen balance; percent unfertilised UAA; percent UAA covered by legumes [as stand-alone crops or intercrops); DST usage; precise estimates of materials, soil cover).

Table 1.
Cost categories and data sources

Cost categories		**Data sources**
Land-related costs	Land leasing expenses Property taxes	Actual leasing price for total UAA Observed accounting records
Structural costs (fixed costs)	Building maintenance and repair	Observed accounting records
	Building depreciation	
	Material maintenance and repair	
	Return of capital	
	Transportation	
	Water, Gas, Electricity	
	Insurance	
	Professional fees	
	Other amortisations	
	Other supplies	
	Taxes	
	Financial costs	
	Other miscellaneous costs	
Labour costs	Remuneration of permanent and seasonal labour	Observed accounting records for each technical practice
	Social charges for labourers	Observed accounting records
	Social charges for farmers	
	Remuneration of family labour	Pay level of qualified tractor driver
Machinery costs	Depreciation	Observed accounting records (straight-line depreciation) Data related to crop-specific technical practices (per ha, per pass)
	Equipment maintenance	Observed accounting records *Barème d'entraide*[5] database (register of usage costs for each equipment type in €/h or €/ha)
	Repairs	
	Fuel	
	Work by third parties	
	Financial charges	
Inputs	Fertiliser	Accounting data observed specific to each technical practice per crop Regional database of input prices published by the Centre Val de Loire regional government (source: *L'indispensable* 2020)
	Amendments	
	Pesticides/chemicals	
	Seeds	
Irrigation	Irrigation water and equipment	
Total costs		€/ha
Yield		Annual crop-specific yield in tonne/ha
Production costs		€/tonne

In designing the scenarios to be simulated, we selected practices within each focal area that were carried out in accordance with Path A criteria. Some examples include allowing 5% of land remain fallow or establishing flower strips; adding a new cash crop or cover crop; eliminating a wheat growth regulator; applying half doses of fungicides to wheat and barley; buying a new sprayer; or constructing a new storage building.

The potential costs of the different scenarios were estimated using various databases containing information on technical practices and their associated costs (e.g., *barème d'entraide*, input prices) and by working with HEV-

[5]The *barème d'entraide* is a departmental document listing the cost equivalents for agricultural machinery alone as well as for machinery and labour combined. Its main goal is to establish balance sheets for shared labour. Here, we used the 2021 register provided by the Chamber of Agriculture for Centre Val de Loire.

certified farmers as well as agricultural advisors. We developed an Excel© tool using formulas or VBA code that we employed to estimate production costs; we then simulated the added costs engendered by HEV certification.

3.4 Estimating additional costs and potential value creation across the value chain.

Across agricultural sectors, value-chain stakeholders face complex organisational challenges for two key reasons: 1) large product numbers and 2) a reticence to disclose information about costs, mainly due to the threat of market competition. Since it was impossible to determine specific production costs, our aim was to work with various value-chain stakeholders to obtain general data regarding the additional costs engendered by HEV certification. Initially, we gathered this information via semi-directive interviews or a questionnaire, engaging in exchanges with those who have the greatest familiarity with HEV certification (i.e., processors who are already handling HEV-certified products). We then used this information to guide the next step, where we deepened our level of data collection.

First, we formulated hypotheses regarding yield losses and potential value creation, based on market variability. This work was performed in collaboration with value-chain stakeholders, including the farmers surveyed as well as various project collaborators. We established a reasonable range of likely yield losses: 0%, -5%, -10%, -15%, and -20%. We felt that -20% was a realistic maximum, based on past research where such levels have been seen in organic farming systems (Houpert and Botrel 2020). Thus, using the percent revenue lost due to decreased yields, we performed a first simulation in which revenue losses were equally distributed across all the focal crops. We also performed a second simulation in which revenue losses were distributed proportionally based on the crops' relative contributions. The first scenario was of particular interest because the objective would be to foster cooperation among value chains.

With regards to potential value creation, HEV-certified products are still relative newcomers to the market, and their added value can thus vary greatly. Indeed, not all HEV-certified products are necessarily labelled as such for myriad reasons, including size standards or insufficient demand. Thus, the smaller the percentage of products sold, the greater the value per tonne must be to compensate for lost income. We therefore carried out three simulations where the percentage of products marketed under the HEV label was 50%, 70%, or 100%.

4 Results

4.1 Impacts of HEV certification on total costs and production costs

We found that adopting the HEV certification scheme augmented costs in a crop-dependent manner. These increases were quite heterogenous, ranging from +€32.10/ha for spring barley to +€139.43/ha for rapeseed (Table 2). However, we also observed large standard deviations for all the crops, which was linked to farm heterogeneity. This heterogeneity was evident in the mean change in the total costs of the focal crops for each farm, which ranged from -4.2% to 16.4%. Moreover, it is important to notice that, for some crops, the number of farms sampled was too small. Those results should thus be interpreted with caution.

The main sources of the increases to total costs were as follows (Table 3):

1) Increased structural costs (mean: +6.6%, range: -0.7% to 22.5%). The greatest increase in structural costs was seen for farms that needed to make key investments (e.g., storage equipment and purchase of materials). Land-related costs and structural costs represented 29%, on average, of total costs (range: 15% to 42%).

2) Increased labour costs (mean: +10%, range: -5% to maximum +27.2%). Adopting HEV certification standards sometimes requires more manual labour, training time, and time spent on auditing, for example. It should be noted that once the transition phase has passed, these expenses will tend to decrease. Thus, when we assumed that preparation time is halved and that the cost of auditing is distributed over 3 years (i.e., 1 audit every 3 years), we estimated that the mean increase in labour costs would be equal to +7.5% (range: -5% to +19%). In both cases, labour represented 8%, on average, of total costs (range: 0.4% to 20%).

3) Increased machinery costs (mean: +6%, range: -10.9% to +20.3%). These figures were linked to the reduction in cultivated UAA. Because the same costs were distributed over a smaller surface area, they climbed on a per-hectare basis. The use of machinery also increased. Machinery costs represented 32%, on average, of total costs (range: 18% to 43%).

4) Decreased input costs (mean: -7.7%, range: -27.8% to +8%). Input costs were frequently but not always reduced when farms adopted HEV certification standards. For example, farmers can choose to buy pricier, more disease-resistant seed varieties or increase sowing density in the case of a semi-late season. Input costs represented 32%, on average, of total costs (range: 21% to 49%). It is important to highlight that, despite all the

changes required to attain HEV certification, the mean increase in total costs was only +1.5% (range: -8.1% to +9.7%; n = 9 farms; Table 3).

Table 2.
Mean total costs per crop. SD = standard deviation, pre HEV = before obtaining HEV certification, post HEV = after obtaining HEV certification

		Pre HEV				Post HEV				Variation (€/ha)
	No. of farms/crop type	Mean total costs (€/ha)	SD	Min	Max	Mean total costs (€/ha)	SD	Min	Max	
Durum wheat	8	€1,563.96	21%	€1,227.38	€2,186.78	€1,601.50	18%	€1,233.49	€2,127.40	€37.54
Soft wheat	8	€1,467.20	18%	€1,166.67	€1,981.24	€1,534.90	15%	€1,221.32	€1,884.83	€58.70
Sugar beet	7	€2,106.68	17%	€1,761.65	€2,630.00	€2,206.78	21%	€1,732.67	€3,052.24	€100.11
Spring barley	6	€1,445.41	16%	€1,235.00	€1,860.36	€1,477.50	11%	€1,300.67	€1,744.14	€32.10
Rapeseed	6	€1,551.72	17%	€1,313.00	€2,046.24	€1,691.15	12%	€1,355.34	€1,921.78	€139.43
Maize	4	€1,984.15	8%	€1,800.09	€2,125.21	€2,046.66	10%	€1,800.09	€2,266.94	€62.51
Onion	4	€4,619.40	15%	€4,024.42	€5,429.88	€4,702.82	12%	€4,131.42	€5,417.01	€83.42
Potato	3	€3,661.50	22%	€2,768.40	€4,315.45	€3,745.90	24%	€2,759.48	€4,573.53	€84.40
Winter barley	3	€1,465.43	16%	€1,220.64	€1,698.32	€1,568.61	23%	€1,171.97	€1,848.94	€103.18
High-protein wheat	3	€1,476.29	16%	€1,288.00	€1,731.00	€1,573.44	9%	€1,482.44	€1,732.88	€97.15

Table 3.
Percent change in costs within different cost categories and their contribution to total costs following the adoption of HEV certification standards.

	Land-related and structural costs				**Land-related and structural costs**		
% change at farm level	Mean	Min	Max	Contribution of structural costs to total costs post HEV	Mean	Min	Max
	6.6%	-0.7%	22.5%		29%	15%	42%
	Labour costs				**Labour costs**		
% change at farm level	Mean	Min	Max	Contribution of labour costs to total costs post HEV	Mean	Min	Max
	10.0%	-5.0%	27.2%		8%	0%	20%
	Machinery costs				**Machinery costs**		
% change at farm level	Mean	Min	Max	Contribution of machinery costs to total costs post HEV	Mean	Min	Max
	6.0%	-10.9%	20.3%		32%	18%	43%
	Input and irrigation costs				**Input and irrigation costs**		
% change at farm level	Mean	Min	Max	Contribution of input and irrigation costs to total costs post HEV	Mean	Min	Max
	-7.7%	-27.8%	8.8%		32%	21%	49%
	Total costs						
% change at farm level	Mean	Min	Max				
	1.5%	-8.1%	9.7%				

A general increase was also seen in mean crop-specific production costs (per T): +€1.38 for sugar beet, +€1.51 for onion, +€1.69 for potato, +€4.77 for spring barley, +€5.32 for durum wheat, +€6.69 for maize, +€7.19 for soft wheat, +€12.84 for winter barley, +€17.33 for high-protein wheat, and +€37.40 for rapeseed. However, there was substantial heterogeneity across farms, as is evident from the large standard deviations.

4.2 Impacts of HEV certification on farm revenue

For eight of the nine farms studied, HEV certification would decrease revenue (Fig. 1). This result was mainly due to the changes needed to meet biodiversity conservation standards, which require an increase in uncultivated surface area (creation of agroecological infrastructure: e.g., ponds, hedges, grass strips, fallow land). Indeed, the mean percentage of uncultivated surface area increased from 2% pre certification to 8% post certification (i.e., biodiversity conservation score of 8/10 points), resulting in a mean increase of 6%. This was not without consequence on farm revenue, which declined by 4.68% on average.

However, we did observe some differences among farms (Fig. 1). For most of the farms, revenue decreased, and costs either remained the same or increased. This outcome thus appeared to be the most likely result of HEV certification. For Farm 4, the increase in revenue was accompanied by an even greater increase in costs. On this HEV-certified farm, the farmer has undertaken progressive changes over many years, namely increasing uncultivated surface area and crop diversification, which allowed him to gradually work towards HEV certification without making any major changes. Farm 1 was the only farm for which the decrease in costs was greater than the decrease in revenue. This was the result of a simulation scenario, in which the farmer invested in newly released equipment that could more precisely apply liquid fertilizers and phytosanitary products. This choice allowed for a significant reduction in input costs. Since this category of expenses was the farm's weakest point, total costs were greatly reduced.

It should be noted here that prices and yields did not change before and after HEV certification, which means that the results were directly attributable to the demands of the certification process. With the mean increase in costs and the mean decrease in revenue, the situation is not economically favourable for farmers.

Becoming HEV certified also made farms more vulnerable. The reduction in phytosanitary treatments led to a greater probability of decreased yields in the case of pest infestations or extreme climatic conditions. We explored several scenarios to determine how decreased yields could affect farm profitability and the need for value creation. We will only discuss the scenarios that were retained by the project collaborators and value-chain stakeholders.

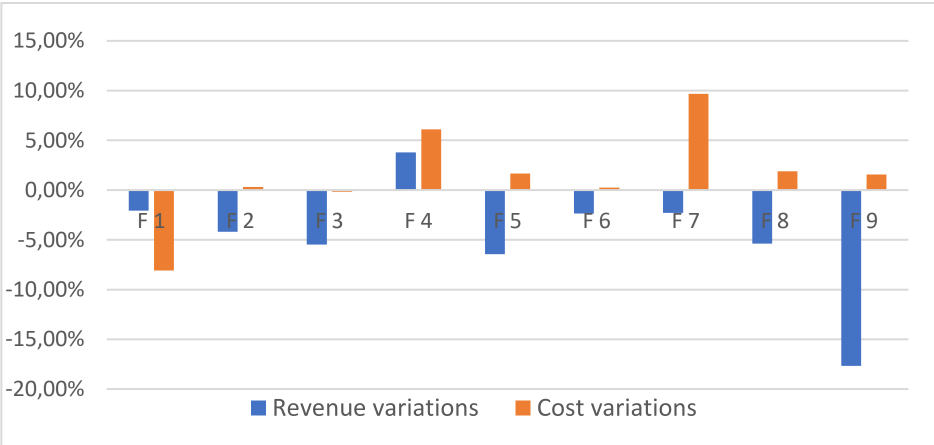

Figure 1. Percent change in revenue and total costs across farms (no. 1–9) due to HEV certification.

4.3 Value-chain coordination and product value creation

For each simulation scenario, we studied the effects of farm percentages of HEV-certified products: 50%, 75%, or 100%. The project collaborators and value-chain stakeholders felt that 50% and 75% were plausible values, whereas 100% was not, given currently insufficient demand (i.e., it represents a marketing risk). Thus, only the plausible scenarios will be discussed below. Furthermore, the project collaborators put forth that yields should realistically be expected to decrease by at least 10%, given the greater variability associated with HEV-certified production. They argued that mean yield losses were likely situated between those for conventional systems and those for organic systems; in the latter, yield is estimated to be 20% lower than in conventional systems (with much steeper losses for winter crops [e.g., -57% for soft wheat]) (Agreste, 2023). They also argued that it was fair to assume that farmers might experience four good years with average yields followed by a bad fifth year (e.g., extreme climatic conditions)[6], where yields were 50% lower than normal due to the reduction in phytosanitary treatments. Such would result in a smoothed 5-year mean of -10%. Thus, we constructed two scenarios: one scenario was optimistic (no loss of yield and a 75% increase in product value), and the other scenario was pessimistic (10% loss in yield and a 50% increase in product value).

[6]Lapierre (2023) conducted a similar analysis to account for external shocks when designing agri-environmental schemes.

Working with project collaborators, we also explored two scenarios of revenue loss distribution: one in which there was equal distribution among crops, and thus value chains, and another in which there was proportional distribution.

When revenue losses were equally distributed, we obtained very different results for the optimistic versus pessimistic scenario (Table 4). In the optimistic scenario, on average, the increase in product value would need to be +7% for sugar beets and potatoes, +13% for cereals, and 15% for onions. In the pessimistic scenario (which value-chain stakeholders viewed as more realistic), these figures were much higher: +34% for potatoes, +43% for cereals, +44% for sugar beets, and +51% for onions.

Table 4.
Equal distribution of revenue losses

		No loss of yield		Additional value creation required - optimistic scenario	10% loss in yield		Additional value creation required - pessimistic scenario
	Mean market value in France	50% increase in product value	75% increase in product value		50% increase in product value	75% increase in product value	
Durum wheat	209	10%	8%	**13%**	31%	23%	**43%**
Soft wheat	153	20%	15%		46%	34%	
High-protein wheat	200	19%	14%		44%	33%	
Spring barley	142	12%	9%		34%	26%	
Rapeseed	342	22%	16%		47%	35%	
Maize	139	21%	16%		55%	41%	
Beet	25	10%	7%	**7%**	44%	33%	**44%**
Onion	150	20%	15%	**15%**	51%	38%	**51%**
Potato	150	10%	7%	**7%**	34%	25%	**34%**

When revenue losses were proportionally distributed based on each crop's contribution, we again obtained very different results for the optimistic versus pessimistic scenario (Table 5). In the optimistic scenario, on average, the increase in product value would need to be +2% for potatoes, +13% for cereals, +13% for sugar beets, and +15% for onions. In the pessimistic scenario, on average, the increase in product value would need to be +27% for potatoes, +33% for onions, +39% for cereals, and +59% for sugar beets. Under these conditions, we observed more variability among crops, especially for cereals, where rapeseed needed a 32% and 69% increase in value for the optimistic and pessimistic scenarios, respectively.

Table 5.
Proportional distribution of revenue losses

		No loss of yield		Additional value creation required - optimistic scenario	10% loss in yield		Additional value creation required - pessimistic scenario
	Mean market value in France	50% increase in product value	75% increase in product value		50% increase in product value	75% increase in product value	
Durum wheat	209	10%	7%	**13%**	33%	24%	**39%**
Soft wheat	153	13%	9%		33%	25%	
High-protein wheat	200	%	6%		29%	21%	
Spring barley	142	10%	7%		32%	24%	
Rapeseed	342	43%	32%		69%	52%	
Maize	139	22%	16%		36%	27%	
Beet	25	17%	13%	**13%**	59%	44%	**59%**
Onion	150	20%	15%	**15%**	33%	25%	**33%**
Potato	150	3%	2%	**2%**	27%	20%	**27%**

We noticed that, when revenue losses were equally distributed, the additional costs were underestimated for sugar beets and rapeseed but were overestimated for all the other crops. This situation obscured disparities among crops but could promote better cooperation among agricultural sectors and value chains so that additional costs are more evenly shared.

5 Conclusion

Certification schemes are often seen as effective tools for encouraging the adoption of agroecological practices and the creation of higher-value agricultural products. In France, interest in HEV certification is on the rise, which has been fostering discussion about its impacts, costs, and benefits. Our study provides insight into the economic challenges that farmers face when becoming HEV certified, as well as the impacts that certification has on other value-chain stakeholders.

We found that, for crop farms, there were crop-dependent costs. The mean increase was +€79.85/ha across all our focal crops (range: +€32.10/ha for spring barley to +€139.43/ha for rapeseed). It was also quite interesting to note that France included the HEV certification scheme alongside the organic certification scheme in its recently proposed CAP Strategic Plan, describing both as tools to be supported by eco-regime payments. The inclusion of the HEV scheme means that it is consistent with and can contribute to EU climate and environmental legislation and commitments, including those laid out in the “Farm to Fork” and “Biodiversity” strategies.

The plan was much debated, and there were calls to clearly distinguish between HEV certification and organic certification, given that the latter has much more demanding standards with regards to fertiliser usage and plant protection. Ultimately, the French government decided to give the highest eco-regime payment (€110/ha) to organic farms. HEV-certified farms were rewarded with an eco-regime payment of €82/ha. Based on our results, this payment would barely cover the predicted increases in total costs; it ignores the impacts of yield losses and market risks. Even this decision was quite controversial because the payment amount was seen as too similar to that given to organic farms; furthermore, the HEV scheme was viewed as less environmentally ambitious (Aubert and Poux 2021). That said, Chever et al. (2022) highlighted that the HEV scheme is one of the few EU certification schemes to incorporate more than 36% of the 22 practices (options included) that the European Commission recommends be incorporated into eco-schemes.

In conclusion, the HEV certification scheme is unlikely to take off if no efforts are made to better distribute the additional costs generated by its adoption. At present, most stakeholders assume that yields will decrease by at least 10% and that it would only be worth selling 50% of production under the HEV label. It would also be necessary to create additional value from products (range: +34% to 51%, depending on the crop).

The scheme’s inclusion in France’s CAP Strategic Plan could help boost its spread. However, at the same time, the government’s subsidies could constrain the market value of HEV-certified products and limit the price paid by consumers.

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