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Strategic Changes of the Farming System in Italian Rural Areas

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Abstract: This article examines the evolution of Italian farms over the past decade and assesses whether their structural and economic transformations align with the prevailing patterns of agricultural development across different rural areas, as identified by the Italian institutions responsible for implementing rural policies. We conducted a comparative analysis based on repeated cross-sectional data covering the 2014-2020 programming period to evaluate changes in the structure of farms located in territories with different degrees of rurality. Using national microdata from the Farm Accountancy Data Network (FADN), we compared a set of farm characteristics observed in 2014 and 2023, which serve as two observational time points capturing strategic investment choices and behavioural adjustments across areas. The results indicate significant and articulated territorial differences in farm strategies and structural characteristics across the Italian rural continuum. Such complexity calls for a particular effort in enhancing a place-based approach to policy implementation, with targeted and selective measures tailored to the specific needs and potentials of rural areas.

Keywords: Rural Areas, Rural Development Programmes, Italian Agriculture, Agricultural Development, Farm Strategies, FADN

1 Introduction

Agricultural activities are relevant in policy actions to pursue rural vitality against marginalisation and abandonment and, more generally, a balanced territorial development. Particularly, in recent years, increasing attention has been paid in scientific and policy debates to multifunctionality and diversification of farm activities for the future of agriculture and rural development (Jansuwan, Zander, 2022). Accordingly, the Common Agricultural Policy (CAP) has long supported European farms and rural areas in achieving multidimensional sustainable development, encouraging the adoption of strategies for diversifying farms' activities and improving production quality (Giuliani, Baron, 2023; Herman, 2024).

Rural development policies are increasingly based on initiatives supporting farms to enhance their competitiveness and ensure the economic, social, and environmental sustainability of farming activities in rural areas (Frascarelli, 2020; Matthews, 2020; Baldock, 2020; Jansson et al., 2021). Rural development policies offer various opportunities to support rural areas through activities that go beyond agriculture in the strict sense. Among other things, they fund investments in non-farming activities and infrastructure, cooperation initiatives, and the creation of new rural businesses.

The underlying concept of the multifunctionality model typically refers to the agri-environmental and social feedback effects associated with specific biophysical conditions and farm-type models (Henke et al., 2022; Cimino et al., 2025). These models, in turn, stem from farm management decisions related to land allocation, adjustments in farm size, and the intensity of production. Such decisions are influenced by available crop and livestock technologies, farm resources, and choices to enter or exit the sector, or to fundamentally alter farm size, specialisation, or production intensity within the farming system (Peltonen-Sainio et al., 2018). These decisions occur regularly and are highly relevant to the overall impact of the agricultural system, as the resulting changes in the distribution of farm characteristics not only affect aggregate production at the market level but also alter the relative importance of farm-type-specific agri-environmental interactions.

This policy orientation has resulted in the coexistence of different modes of farm development, rather than the replacement of existing paradigms for agricultural and rural development (Bojnec, Knific, 2021; Ortiz-Miranda, Moragues-Faus, 2013). Therefore, modelling farm structural adjustments in an ex-post assessment exercise can enhance both the understanding and the validity of the estimated overall policy impacts. This is particularly relevant in the Italian context, where rural development policy is managed at the regional level.

Particularly, the common agricultural policy (CAP) has supported the process of development in rural areas, especially with the measures planned in the so-called second pillar of the CAP, enhancing the process of diversification, innovation, and quality of life in rural contexts. In Italy, the last two periods of pillar II of the CAP have seen a rather wide range of measures supporting agricultural activities, environmental issues, and the general conditions of life in non-urban territories. As shown in Table 1, from the planning period 2007-2013 to the next one, there has been a generalised increase in resources for rural development, not only because the second period was extended due to the COVID crisis, but also because more attention was given to the issue of agro-environmental issues and, more in general, to the vitality of rural territories. Within the resources devoted to rural development, environment and physical capital are the largest issues receiving support, while human capital sees a decline in relevance, together with measures explicitly devoted to forests. It must be noted that the goal of diversification becomes, in the planning period 2014-2022, a sort of horizontal goal that interests all the other posts of the programmed expenditure, so that there is a specific envelope of resources devoted to the issue. Nonetheless, diversification remains a relevant goal of CAP rural development policies in Italy, including the most recent planning period.

Table 1. Shares of resources of rural development policies in Italy (EU and national funds)

	Programmed expenditure 2007-2013	**2014-2022**
Total value (mio euro)*	17,651 (8,986)	27,904 (14,365)
	(%)	(%)
Human capital	5.9	0.9
Physical capital	30.9	42.6
Quality	0.8	0.8
Environment	41	36
Forests	8	4.7
Diversification**	3.9	-
Quality of life	3.4	3.8
Local development	4.4	7.9
Technical assistance	1.7	2.8
Special support for COVID	-	0.6
Total	100	100

*In brackets it is reported the EU-funded share is reported.
**In 2014-2022, the expenditure for diversification is not a specific item, but it is part of other measures.
Source: elaborations from data available at the Italian Rural Network (www.reterurale.it)

This study aims to assess how Italian farms have changed over the past decade and to determine whether their structural and economic transformations align with the key objectives of rural development policies. To this end, the study involves the calculation of specific indices representing five main strategic trajectories undertaken by Italian farms during the 2014-2020 programming period. These indicators are then comprehensively analysed to highlight differences over time and across territories.

Such indices are then referred to areas identified on the degree of "rurality" of Italian territories, following the classification used in the Italian regional Rural Development Programmes (RDPs). This approach is, in our view, both new and original, as it directly connects economic transformations to a policy framework targeting specific and clearly defined rural areas. Although the relationship between structural transformation and rural development has been widely studied (Shucksmith, Brown, 2016; Rivza, Kruzmetra, 2017), to the best of our knowledge, no previous research has explicitly linked these transformations to the specific typologies of rural areas defined by the implementation of rural and territorial policies. In our view, this approach is quite innovative since it is based on a "place-based" guidance to policy implementation, which the European Union is building its new support structure on, as evident in the current CAP features and in the discussion on the future reform (Zasada et al., 2015; Keller, Virág, 2021).

The use of areas deriving from the RDPs might have some conceptual and methodological limits in the way they are defined and measured (Mantino et al., 2022; Cattivelli, 2022), but they have the undeniable merit to be used in policy design and respond to a pragmatic planning need. Moving from them, we conducted the estimation of changes in the main features of farms belonging to different areas, with a specific look at the diversification of activities and differentiation of products, according to a well-established definition of multifunctional agriculture.

The Farm Accountancy Data Network (FADN) was used to extract information from a representative sample of Italian farms. For the purposes of this analysis, only two reference years were selected: 2014, representing the baseline situation, and 2023, reflecting the most recent available data. These two points in time allow for a direct comparison of key farm characteristics that capture the strategies adopted by farmers to compete in an evolving agricultural context.

To this end, we used several synthetic indicators grouped into five categories, serving as proxies for the development strategies that farms could adopt either independently or in combination. The categories are as follows:

1. **Farm diversification**, involving the introduction of additional on-farm non-agricultural activities;
2. **Crop diversification,** which entails cultivating a variety of crop species, is considered both a risk management tool and a more environmentally sustainable production approach;
3. **Product differentiation,** through the adoption of production techniques associated with quality certifications and organic farming;
4. **Increase in farm scale,** aimed at growing the physical or economic size of farms;
5. **Enhancement of human capital,** focused on improving farm management skills.

In addition, we included some indicators related to the amount of CAP aid received at the farm level.

The paper is organised as follows: Section 2 presents a brief analysis of the background and the most recent literature on the main indicators used to measure growth and competitiveness in rural areas. Section 3 presents our methodology and the data used. Results are discussed in Section 4, while Section 5 extends the discussion to previous work, highlighting the novelties of our results. Finally, Section 6 briefly concludes.

2 Background Literature

Italian agriculture is characterised by the coexistence of areas with a high degree of rurality, where the agricultural sector continues to play a vital role in the local economy, and highly urbanised regions, where agriculture holds only a marginal position. As a result, Italy has experienced a coexistence of different modes of rural development across its regions and territories (Ortiz-Miranda, Moragues-Faus, 2013). These contextual characteristics influence both the structural conditions and the development opportunities of farms, as well as their strategic choices and investment decisions in response to their competitive environment.

Productive diversification, adopted by farmers through the addition of non-agricultural goods and services to traditional farming activities, is a key component of the economic growth of small farms in marginal rural areas. Promoting farm diversification is considered one of the most effective strategies to mitigate risk, enhance agricultural productivity, and increase farmers' income. Consequently, it has gained recognition as a rewarding approach that helps farmers improve revenue stability and contribute to rural development (McElwee et al., 2010; Salvioni et al., 2020).

Crop diversification has also been identified in the literature as a strategy with significant economic implications, including risk management and cost savings, that can substantially improve farm performance. By cultivating a variety of crops that meet market demand at different times of the year, crop diversification strengthens farms' economic resilience by reducing the overall risk of income loss due to poor harvests in unfavourable years (Parrè et al., 2024; Mzyece et al., 2023; Makate et al., 2023; Piedra-Bonilla et al., 2020; Bellon et al., 2020).

Moreover, crop diversification can also be considered one of the most effective green agricultural strategies due to its potential ecological benefits, including increased biodiversity and enhanced variety in agricultural landscapes. It promotes the activity of beneficial soil bacteria, disrupts pest and disease cycles, and reduces the prevalence of weeds. Additionally, it improves land-use efficiency and crop output by enhancing the physical and chemical properties of the soil (Wezel et al., 2014; Garbach et al., 2017). Crop diversification has significant potential to address various agricultural and environmental challenges, including soil degradation, environmental pollution, and the impacts of climate change (Watson et al., 2017; Haughey et al., 2018). In recognition of these benefits, financial and policy support for crop diversification under the CAP has increased in recent programming periods.

Another way to assess structural change in farms operating within specific contexts is by observing shifts in farm size. While farm expansion is often seen as a desirable strategy - enabling economies of scale and scope, improving bargaining power along the value chain, and potentially enhancing economic sustainability - its broader impact on the local community remains unclear, and may vary depending on the territorial context.

Small farms are typical of the rural landscape in southern Europe, and especially in Italy (Ortiz-Miranda, Moragues-Faus, 2013; Henke, Sardone, 2022). They are crucial for global food security, producing between 50% and 75% of food calories consumed globally (IFPRI, 2019; Ricciardi et al., 2018; Samberg et al., 2016); provide key opportunities for employment and livelihoods (Lowder et al., 2016); represent a crucial part of rural communities and landscapes (Alexandri et al., 2015; Larson et al., 2016); and play an important role in environmental sustainability and supporting agricultural biodiversity (Boyce, 2006; Altieri, 2009).

On the other hand, large companies play a crucial role in the dissemination of new knowledge and technologies and in enhancing the international reputation of local food production. Their presence can therefore support the development of smaller farms operating in the same areas. Moreover, in the context of an increased demand for food and energy of growing populations worldwide, the expansion of large-scale commercial farming is seen as a potential solution to satisfy this demand (e.g., Deininger, 2013).

Another way to compete in the market is through product differentiation. Both product differentiation and quality are considered key strategies for farms to address the challenges of modern food markets, which are increasingly segmented into niches where consumer purchasing decisions are based not on price, but on perceived “quality” attributes. These attributes generate a willingness among consumers to pay a premium for certain products. Quality attributes can take many forms, such as geographical indications of origin, certifications of specific qualities, or trademarks. They may refer to production processes (e.g., organic, sustainable, or animal welfare-focused methods) or to characteristics of the supply chain (e.g., fair trade). Regardless of the basis for quality differentiation, the common feature is that consumers are willing to pay more for such products. In an era of eroding consumer loyalty and rising competition, not only in export markets but also in regional and domestic ones, quality-based product differentiation is becoming increasingly important for food and agricultural producers. Numerous studies have shown that nested markets offer an effective response to market failures. They support local food governance and promote sustainable territorial development through the collective management of common-pool resources (e.g., van der Pleog, Schneider, 2022).

Finally, the role of human capital in driving the economic development of farming systems has long been recognised. There is a rich body of literature highlighting the positive impact that higher education and younger age can have on managing a modern and innovative agricultural business (e.g., Pindado et al., 2018). It is widely acknowledged that the future of rural areas and communities is closely linked to young people’s willingness to engage in the farming profession, as agriculture represents an important opportunity for the vocational revitalisation of rural populations. Based on these considerations, numerous policy interventions have long aimed to encourage young people to take over the management of farms (Licciardo et al. 2024; Carbone et al., 2024). From a farm management perspective, the entry of younger individuals brings greater openness to innovation and a long-term vision that supports ‘patient’ investments, those whose economic returns are not immediate. Equally important for innovative farms is the presence of a farmer with sufficient education and training to address the challenges of global markets and to transform production processes in ways that reduce environmental impact and optimise the use of scarce resources.

3 Materials and Methods

As said in the introduction, the study aimed to evaluate the changes in farms’ strategies that happened over the CAP programming period, distinguished between the diverse types of Italian rural areas. For each area typology (as described in the following), we estimated the direction and magnitude of changes in farm strategies between 2014 and 2023, conducting a comparative analysis based on a set of indicators that approximate differences in development strategies of farms located across rural areas.

The analysis is based on data from the Italian Farm Accountancy Data Network (FADN), the only source of farm-level information on structural characteristics, production, and economic performance. FADN data are collected through an annual survey conducted on a random basis, using a sample that is statistically representative at the regional level. The survey includes only farms with an economic size of at least 8,000 euros in Standard Output (SO).

To examine whether the diffusion of specific farm strategies changed over time, the analysis focuses on two reference years, 2014 and 2023, which respectively represent the baseline situation and the most recent data available following the latest full programming period. FADN provides repeated cross-sectional data that are representative of the agricultural sector at the regional level. Although a limited share of farms is observed in both years, the analysis does not rely on a panel structure, nor does it aim to identify causal effects.

Instead, the two years are treated as two observational time points, allowing for a comparative assessment of changes in the average values of the strategy indicators across different degrees of rurality. Within this framework, the two-way MANOVA is used to test whether the multivariate profiles of farm strategies differ significantly over time, across rural areas, and in their interaction. This approach enables a comprehensive and descriptive evaluation of structural and economic transformations in Italian farms, without implying a pre-post treatment design or a difference-in-differences estimation.

MANOVA, a generalization of ANOVA, allows for the inclusion of multiple dependent variables and thus enables the analysis of multidimensional data within a single model. It is widely recognized as an efficient method for examining relationships and interactions among variables (e.g., Anderson, 2003; Morrison, 2005). The two-way MANOVA specifically allows the inclusion of two categorical independent variables (year and degree of rurality).

Indeed, two-way MANOVA assesses whether multiple dependent variables jointly differ across two categorical factors and their interaction. Its assumptions include multivariate normality, homogeneity of variance-covariance matrices, independence of observations, absence of multicollinearity among dependent variables, and adequate sample size. Although MANOVA assumes that dependent variables are continuous and approximately normally distributed, some variables in our study (e.g., education level) are discrete, and others (e.g., crop diversification, age) show departures from normality. Given the large sample size and the balanced group structure, MANOVA remains appropriate for describing and comparing average strategy profiles across rural areas and over time. Statistical inference relies on Pillai's Trace, which is widely recognized as robust to moderate deviations from normality and heteroskedasticity. Standard diagnostic checks, including univariate normality, variance homogeneity, and multicollinearity, were, however, conducted and are summarised in the results section.

To identify municipalities with varying degrees of rurality, we relied on the classification system defined in the Italian RDPs, as European regulations required that policy interventions were tailored to specific areas, prioritising beneficiaries and allocating financial resources according to the degree of "rurality". Based on a multi-phase territorial classification (National Rural Network, 2007), four broader categories of rural areas are used in the RDP programmes:

Urban and peri-urban areas (A): provincial capitals and municipalities where the rural population accounts for less than 15% of the total population.

Rural areas with intensive agriculture (B): predominantly lowland rural municipalities where more than two-thirds of the territory is classified as rural land, even in the presence of relatively high population density.

Intermediate rural areas (C): hilly and mountainous rural municipalities with relatively high population density and intermediate levels of socio-economic development.

Rural areas with development problems (D): Southern hilly rural municipalities and low-density mountainous municipalities across all regions.

Several indicators representing different farm development strategies, constructed as described in the following subsection, were used to analyse the changes that occurred in the areas during the study period. We used a two-way MANOVA with eight dependent variables (y_1–y_8) measured on farms located in four types of rural areas over two years (2014 and 2023). Specifically, y_1 represents the diversification of farm activities, y_2 the farming crop diversity, y_3 the presence of product quality certifications, y_4 the use of organic techniques, y_5 the economic size of the farm, y_6 and y_7 the age and education level of the farmer, and y_8 the percentage of CAP financing over the total production value.

The two design factors were time (1 = 2014, 2 = 2023) and area, indicating the type of rurality: (1) urban and peri-urban areas, (2) rural areas with intensive agriculture, (3) intermediate rural areas, and (4) rural areas with development problems. In summary, the model included two explanatory variables and eight response variables.

In the following sub-section, we will describe in detail the indicators used as dependent variables

3.1 Diversification Index

A synthetic diversification index (DI) (1), an inverse measure of the Herfindahl index (HI), was utilised to quantify each farm's diversification degree (Henke et al., 2022).

In detail, following the work of Li et al. (2016), the HI was defined using the following steps.

First, for each farm, we calculated the share of the value generated by individual on-farm activities, distinguishing between agricultural and non-agricultural activities, relative to the total value of all on-farm activities.

In the agricultural context, the Herfindahl Index (HI) is used under the assumption that an "activity" is defined as a homogeneous set of products or services that contribute to a farm's income. The term, therefore, refers to the various production lines or income-generating sources that constitute a farm's overall output and turnover.

In this study, strictly agricultural activities include, for example, the sale of agricultural products and self-consumption. Non-agricultural activities, by contrast, encompass a wide range of diversification strategies such as agritourism-related services (e.g., catering, accommodation, hiking, educational farms), contract work, renewable energy production, active rentals, as well as other broadening activities (e.g., artisanal or recreational services) and deepening activities (e.g., rental of non-agricultural equipment, provision of technical tools for processing and marketing, etc.).

In mathematical terms, the definition of HI is as follows:

$$P_{it} = \frac{A_{it}}{\sum A_{it}}, \tag{1}$$

A_{it} is the value of the ith activity at time t, $\sum A_{it}$ is the sum of the value of all products or activities of the farm.

Then, we calculated HI by the sum of the squared values of P*it*. Formally, for the farm *r* we have:

$$H_{rt} = \sum P_{it}^2, \tag{2}$$

Finally, we computed the Diversification Index (DI) as the complement to 1 of the concentration index (HI) and multiplied by 100 (3).

$$DI_{rt} = (1 - H_{rt}) * 100, \tag{3}$$

DI ranges from 0 to 100, with higher values indicating a greater diversification of farm activities, while values close to 0 reflect a strong degree of productive specialisation. In parallel, the transformed HI $(1 - H_{rt})$ serves as a complementary measure of diversification, displaying a direct relationship with its intensity. Specifically, the value of $(1 - H_{rt})$ increases as diversification expands and decreases as specialisation intensifies. A value of zero indicates complete concentration, i.e. when a single crop or activity dominates the farm's output, whereas values approaching one reflect a high level of diversification across multiple crops or activities.

3.2 Simpson Diversity Index

A second index that accounts for the changes in crop diversification in a farm's portfolio was included, using a measure of the number of species cultivated on the Utilised Agricultural Area (UAA).

To measure this, in line with Parré et al. (2024), a Simpson Index (SI) was calculated using the following formula:

$$\mathrm{SI}ri = \sum_{i=1}^{n} (\frac{UAAi}{UAAtotal})^2, \quad (4)$$

Where: SIji = Simpson Diversification Index for the farm *r*; *UAAi* = area dedicated to crop *i*; *UAAtotal* = total UAA on the farm; *n* = total number of crops.

SI ranges from 0 to 1. A lower value indicates greater diversification (i.e., fewer dominant crops), while a higher value indicates lower diversity (i.e., the dominance of a few crops).

To simplify interpretation, SI is often expressed as a Simpson Diversity Index (SDI) by subtracting it from 1 and multiplying by 100:

$$\mathrm{SDI} = (1 - \mathrm{SI}) *100, \quad (5)$$

In this form, higher values correspond to greater diversity.

HI and SDI are mathematically related measures employed to assess concentration, although they diverge in their interpretative orientations. HI quantifies the degree of concentration in agricultural activities, indicating whether production is predominantly allocated to a limited number of crops or distributed across a broader range. Conversely, SDI estimates the probability that two randomly selected production units pertain to different crops, thereby capturing the overall diversity of the agricultural system while accounting for the relative distribution of crop types.

The primary distinction between the two indices lies in their conceptual frameworks: HI concentrates on the production shares of individual crops, whereas the Simpson Index evaluates the structural diversity of the system, assigning greater weight to situations in which production is dominated by only a few crops. This characteristic makes the Simpson Index particularly effective for highlighting the degree of balance in crop distribution.

The combined application of the two indices provides complementary analytical insights. HI is especially sensitive to variations in dominant agricultural activities and enables the assessment of farm specialization, a key determinant of economic vulnerability and production efficiency. In contrast, SI offers a probabilistic perspective on diversification, emphasizing the uniformity of resource allocation across farms regardless of their scale.

Taken together, these indices allow for a more comprehensive evaluation of farm diversification strategies, capturing both the concentration of production resources in core activities and the overall breadth of the production portfolio.

3.3 Product Differentiation

A Quality Index (QI) was calculated as the ratio of the sales value of certified products to the total sales value, as formalised below:

$$QI_r = \left({Certified_r}/{Total\ sales_r}\right) * 100, \quad (6)$$

Where $Certified_r$ denotes the value of certified product sales (in euros) of the *r* farm, while $Total\ sales_r$ represents the total sales value (in euros) of the *r* farm.

The QI ranges from 0 to 100, with values closer to 100 indicating a stronger competitive positioning of farms within product market networks, based on the quality attributes of their offerings.

To capture product differentiation strategies, we also included the variable "organic production", which reflects the farm's degree of compliance with organic production standards. This indicator is treated as continuous and measures the extent of organic management practices adopted on the agriculture holding and serves to identify transitions toward more environmentally sustainable production systems. By doing so, it helps explain farms' access to specialized market segments where higher price premiums can typically be obtained.

3.4 Economies of Scale

The change in farm size was included as a proxy for farm development aimed at improving production efficiency through economies of scale. The total economic size of the farm was measured using the total Standard Output (SO), expressed as the natural logarithm of its value.

SO is a variable available in the FADN database and is calculated based on the regional average monetary value of agricultural output at farm-gate prices, per hectare or per head of livestock. Specifically, a regional SO coefficient is assigned to each product, representing an average value over a five-year reference period. The overall economic size of a farm, expressed in euros, is determined by summing the SO values for all hectares of crops and heads of livestock.

The Standard Output is used to classify agricultural holdings according to both types of farming and economic size. Accounting for the quantity and type of crops cultivated and animals raised, it reflects the theoretical turnover that a farm could generate.

Consequently, changes in SO may reflect either an expansion (or contraction) of the farm's production base, in terms of cultivated area or livestock numbers, or a shift in production specialisation.

3.5 Human Capital

Additional explanatory variables were included to capture the quality of human capital involved in farm management, as proxied by the age and educational attainment of the farm head. Education was measured using an ordinal variable ranging from 1 to 6, corresponding to levels from "no qualification" to "doctoral degree". Moreover, a continuous variable representing the farmer's age (in years) was also included. The inclusion of human capital proxies reflects the structural changes occurring within the farming sector, where managerial skills and educational background increasingly influence farm performance and adaptation capacity. Age and education of the farm head capture generational renewal and knowledge acquisition processes, both key drivers of innovation, diversification, and sustainable management practices.

3.6 CAP Support

To account for the role that CAP interventions may have played in supporting farms as they adapted their strategies, we included the amounts received by the FADN sample farms under both the first and second pillars of the CAP. Specifically, we calculated each farm's degree of dependence on public support (*CAPD*), defined as the ratio of CAP financing to the total production value. This variable has a dual interpretation: a high degree of dependence may signal a potential vulnerability, as farms could be more exposed if public funding decreases, but it may also indicate that CAP interventions have facilitated structural changes and modernization in farm management and production strategies. The CAP dependence was measured with formula (7):

$$CAPD_i = \left({Total\ CAP_i}/{Total\ production_i} \right) * 100, \quad (7)$$

Where: $Total\ CAP_i$ is the value of CAP financing, in euros; $Total\ production_i$is the total value of production, in euros.

$CAPD_i$ spans between 0 and 100, with values approaching 100 indicating a greater contribution of CAP payments to the farm's production value, as observed on average across the areas.

Let Y_{ijk}denote the vector of dependent variables for farm i in area type j and year k. The MANOVA model can be written as:

$$Y_{ijk} = \mu + \alpha_j + \beta_k + (\alpha\beta)_{jk} + \varepsilon_{ijk}$$

where:

- Y_{ijk}= vector of dependent variables (all indicators described above)
- μ= overall mean
- α_j= effect of Rurality (Area type $j = A, B, C, D$)
- β_k= effect of Time ($k = 2014, 2023$)
- $(\alpha\beta)_{jk}$= interaction effect between Rurality and Time
- ε_{ijk}= residual error term

The MANOVA tests whether the mean vectors of the dependent variables differ across levels of Rurality, Time, and their interaction.

Table 2 summarises all variables and indicators used in the analyses to proxy the main farm strategies.

Table 2. Description of dependent variables used in the analysis to proxy the farm strategies

Strategies	Variable name	Description	Values
Diversification of farm activities	Y1, DI	Inverse measure of the Herfindahl index to quantify a farm's diversification	Continuous variable, ranging from 0 to 100%
Farming diversification	Y2, SDI	Crop diversification in a farm's portfolio is measured by a Simpson diversity index	Continuous variable, ranging from 0 to 100%
Product diversification	Y3, QI	Index measured by the sales value derived from the certified products over the total sales value	Continuous variable, ranging from 0 to 100%
	Y4, Organic	Presence of organic agriculture on the farm	Continuous variable, ranging from 0 to 100%
Size of farm	Y5, SO	Economic size of the farm, measured by the total Standard Output	Continuous variable, value in thousands of euros
Human capital	Y6, Age	Age of farmers	Continuous variable, in years
	Y7, Edu	Educational levels of farmers	Levels equal: 1 - No education; 2 - Elementary school; 3- Middle school; 4 - High school; 5 - University Degree; 6= Post-university and Doctorate
CAP subsidies	Y8, CAPD	Financing dependence on CAP	Ratio of the amount of CAP financing over the value of the production of farms.

Source: authors' elaborations on Italian FADN data

4 Results

4.1 Descriptive Analysis

This section presents a comprehensive overview of the main patterns emerging from the descriptive statistics, highlighting how synthetic indicators related to diversification, product differentiation, farm size, human capital, and CAP support have evolved across the different rural areas over the decade. The analysis focuses on the comparative dynamics observed between 2014 and 2023, providing an integrated interpretation of structural, economic, and socio-demographic changes within the agricultural sector.

The descriptive analysis relies on the information reported in Table 3, which summarizes the main structural and socio-demographic characteristics of approximately 10,500 farms in 2014 and nearly 11,000 in 2023. The sample distribution across territorial categories, urban/peri-urban areas, intensive agricultural areas, intermediate rural areas, and areas with development challenges, remains broadly stable over time. Intermediate rural areas consistently represent the largest share of observations, followed by areas facing development constraints.

Table 3. Descriptive statistics

Years	2014 Number	%	2023 Number	%
Sample observations	10,544	100	10,980	100
Urban and peri-urban areas (A)	413	3.9	507	4.6
Rural areas with intensive agriculture (B)	2,855	27.1	2,849	26.0
Intermediate rural areas (C)	4,090	38.8	4,223	38.5
Rural areas with development problems (D)	3,186	30.2	3,401	31.0
Variables	**Mean values**	**Standard deviaton**	**Mean values**	**Standard deviaton**
Y1, DI	23.9	20.5	24.9	20.8
Y2, SI	41.0	26.6	44.9	26.5
Y 3, QI	2.5	14.2	6.1	21.0
Y4, Organic	1.5	10.7	6.3	20.3
Y5, SO	188.0	781.1	208.2	817.0
Y6, Age	53.9	13.8	56.0	14.2
Y7, Edu	3.3	0.9	3.6	0.8
Y8, CAPD	13.7	24.8	12.2	20.8

Source: authors' elaborations on Italian FADN data

Regarding farm strategies, the mean values of several key variables increase between 2014 and 2023. Notable growth is observed for the specialization index (Y2), the quality index (Y3), the incidence of organic farming (Y4), and the economic size measure (Y5). These patterns suggest relevant structural changes, possibly linked to evolving market conditions, growing attention to product quality, and the wider adoption of environmentally oriented practices. Some variables, particularly Y5, display substantial standard deviations, indicating marked internal heterogeneity across farms.

Socio-demographic indicators have also evolved over the decade. Farmers' average age (Y6) increases slightly, confirming the progressive ageing of the agricultural workforce. Conversely, education levels (Y7) improve modestly, pointing to a gradual enhancement of human capital. The average value of Y8, measuring the intensity of CAP direct support per hectare, decreases over time, suggesting a reduced relative reliance on direct payments.

A closer examination of the strategic variables highlights additional trends. The diversification index (Y1), while still exhibiting relatively low values, shows a modest increase, with more pronounced dynamics in intermediate and marginal rural areas. Organic farming expands across all territorial types, with the largest increases recorded in urban/peri-urban areas and in areas with development challenges. Despite the higher costs and lower yields typically associated with organic practices, their widespread adoption may reflect a stronger environmental orientation among farmers, including those operating smaller holdings.

Changes in farm size further support these trends. The increase in Standard Output (Y5) is more substantial than the marginal rise in utilized agricultural area, suggesting that economic growth is driven more by increases in production value than by physical expansion. This pattern is particularly evident in areas with development challenges, where both the average farm size and the dispersion of values rise, indicating deeper structural adjustments.

Human capital indicators show a dual dynamic: ageing is accompanied by an improvement in educational attainment. The share of farmers with only compulsory education declines, while those holding a secondary school diploma increase. However, the share of university-educated farmers remains low, potentially limiting the sector's capacity to adopt more knowledge-intensive innovations.

Overall, the evidence from Table 3 indicates that the decade under analysis was characterized by significant transformations in production strategies, product quality, organic adoption, human capital, and economic performance. dynamics suggest a general process of adjustment and modernization across farms, although structural constraints, particularly related to generational renewal and continued dependence on public support, remain evident. The next paragraph presents estimates of the changes in strategies that occurred in the period analysed for farms belonging to the different types of rural areas.

4.2 Multivariate Analysis

A multivariate analysis of variance (MANOVA) was conducted to examine the effects of Rurality (typology of rural areas - A, B, C, and D), Time (2014, 2023), and their interaction on the combined set of dependent variables. As we have already reported in the methodology, the types of areas are: Urban and peri-urban areas (A); Rural areas with intensive agriculture (B); Intermediate rural areas (C); Rural areas with development problems (D). The years 2014 and 2023 were taken to compare the pre- and post-programme period of CAP. All the indicators described above are included as dependent variables in the MANOVA model.

Before estimations, standard diagnostic checks were conducted, including assessments of normality, homogeneity of variances and covariance matrices, and multicollinearity among the dependent variables. Standard diagnostic checks are reported in Table 4. However, inference with MANOVA is based on Pillai’s Trace, which is robust to violations of normality and covariance homogeneity.

Table 4. Diagnostic checks for MANOVA assumptions

Assumption	Diagnostic test / assessment	Result	Implications for inference
Univariate normality	Shapiro-Wilk tests	Rejected for all variables (large N)	MANOVA robust; Pillai’s Trace used
Homogeneity of variances	Levene-type tests	Partially rejected	Groups sufficiently balanced
Equality of covariance matrices	Covariance structure diagnostics	Minor deviations detected	Pillai’s Trace robust
Multicollinearity	Pairwise correlations	No severe multicollinearity	MANOVA appropriate
Independence of observations	Sampling design (FADN)	Assumption satisfied	—

Note: diagnostic tests are reported for completeness. Given the large sample size, normality tests have high power and tend to reject the null even for minor deviations. Statistical inference in the MANOVA relies on Pillai’s Trace, which is robust to violations of normality and covariance homogeneity.
Source: authors' elaborations

In Stata, the MANOVA command automatically computes four multivariate test statistics (Pillai’s Trace, Wilks’ Lambda, Hotelling-Lawley Trace, and Roy’s Largest Root), which assess the overall effect of the independent variables on the combined dependent variables, providing different approximations of multivariate significance.

MANOVA does not explicitly model unobserved farm-level heterogeneity, and, in principle, the presence of the same units of the FADN samples in more than one wave may weaken the assumption of independence across observations. However, in the present application, the FADN data are best characterised as repeated cross-sections rather than a panel, as the two waves are approximately a decade apart, and only a relatively small fraction of farms (about 20%) is observed in both years.

To further address the independence issue of the samples, we conducted a robustness check by re-estimating the MANOVA after excluding farms that appear in both years. The results remain qualitatively unchanged, indicating that the presence of repeated observations does not materially affect the main findings.

Results of MANOVA showed, first, that the overall model was statistically significant across all multivariate test statistics (Wilks' λ = 0.8, F (49, 109, 207) = 72.3, p < .001), indicating that the predictors collectively explained a significant amount of variance in the outcome variables. There was a significant main effect of *Rurality* (Wilks' λ = 0.9, F (21, 61,8) = 79.5, p < .001), suggesting that rural and non-rural groups differed significantly on the combined dependent measures. The main effect of *Time* was also significant (Wilks' λ = 0.9, F (7, 21, 510) = 145.1, p < .001), indicating substantial changes from the pre- to post-assessment. Importantly, the *Rurality* × *Time* interaction was significant (Wilks' λ = 0.9, F (21, 61, 766) = 8.4, p < .001), showing that the pre-post differences varied by rural status. Taken together, these results indicate that both rurality and time exerted significant multivariate effects on the dependent variables, and that the pattern of change over time differed across rural and non-rural groups.

Table 5 reports the linear prediction of marginal effects for all the estimated equations. These margins represent the estimated mean values for each combination of year and degree of rurality (interaction term), derived from the multivariate regressions. Their role is descriptive: they summarize average differences in each farm strategy profile across rural areas and over time, thereby providing an intuitive link between the statistical results and the research question, without implying forecasting or causal interpretation.

Table 5. Margins after MANOVA of interaction term (Rural # year)

Dip var	Area	Years		Difference of margins
		2014	2023	
Diversification Index (DI) (%)	Urban and peri-urban areas (A)	20.9	19.3	-1.6
	Rural areas with intensive agriculture (B)	22.1	20.3	-1.8
	Intermediate rural areas (C)	24.5	26.1	1.7
	Rural areas with development problems (D)	25.1	28.2	3.0
Simpson Diversity Index (SDI) (%)	Urban and peri-urban areas (A)	39.5	42.4	2.9
	Rural areas with intensive agriculture (B)	41.9	48.8	6.9
	Intermediate rural areas (C)	44.8	47.9	3.1
	Rural areas with development problems (D)	35.5	38.5	2.9
Quality Index (QI) (%)	Urban and peri-urban areas (A)	2.5	7.7	5.3
	Rural areas with intensive agriculture (B)	2.6	4.9	2.3
	Intermediate rural areas (C)	2.9	6.3	3.5
	Rural areas with development problems (D)	2.1	6.6	4.6
Organic Index (BIO) (%)	Urban and peri-urban areas (A)	2.0	8.4	6.4
	Rural areas with intensive agriculture (B)	1.0	3.5	2.5
	Intermediate rural areas (C)	1.6	5.9	4.3
	Rural areas with development problems (D)	1.7	8.8	7.0
Standard Output (SO) (.000 euro)	Urban and peri-urban areas (A)	214.8	182.3	-32.5
	Rural areas with intensive agriculture (B)	359.6	368.1	8.5
	Intermediate rural areas (C)	138.3	173.0	34.7
	Rural areas with development problems (D)	94.7	121.9	27.2
Age of farm head (years)	Urban and peri-urban areas (A)	56.6	57.5	0.9
	Rural areas with intensive agriculture (B)	55.3	58.3	3.0
	Intermediate rural areas (C)	54.0	56.4	2.4
	Rural areas with development problems (D)	52.1	53.5	1.4
Educational level (ED) (ranging from 1 to 6)	Urban and peri-urban areas (A)	3.2	3.7	0.6
	Rural areas with intensive agriculture (B)	3.3	3.5	0.2
	Intermediate rural areas (C)	3.3	3.6	0.2
	Rural areas with development problems (D)	3.3	3.6	0.3
CAP economic dependence (%)	Urban and peri-urban areas (A)	12.6	8.1	-4.5
	Rural areas with intensive agriculture (B)	11.8	8.2	-3.6
	Intermediate rural areas (C)	14.6	13.4	-1.2
	Rural areas with development problems (D)	14.4	14.7	0.2

Source: authors' elaborations on FADN data

To describe results, when the dependent variable is the farm's activity diversification index (indicating the percentage of production value of diversified activities over the total production value), the areas with higher diversification level are the Intermediate rural areas (C) and Rural areas with development problems (D), which already in 2014 had a percentage of approximately 24 and 25%, respectively. Moreover, while the differences between years are negative for Urban and peri-urban areas (A) and Rural areas with intensive agriculture (B), which both reduce the index by almost two percentage points, they are positive for C and mostly for D areas, which respectively increase the index by about 2 and 3%. These results show that Italian farmers located in areas with a higher degree of rurality increasingly consider diversification to develop their business and as a mitigating economic risk strategy. Previous works have demonstrated that the activation of each diversification dimension is influenced by both internal and external factors, encompassing farmers' characteristics, the farm structure, and territorial features, including regional and spatial patterns (e.g., Guarin et al., 2020).

Our results suggest that farms situated in remote rural areas can more easily activate beneficial synergies between agriculture and other activities, often linked to tourism. In fact, in coherence with several studies (Mann, 2009; Mazzocchi et al., 2020; Meraner et al., 2018), these results indicate that farmers in remote areas are more inclined to diversify their production by engaging in non-farming activities such as agritourism, energy production, and direct sales. The overall magnitude of these differences is quite significant. Since the income of remote communities heavily depends on agriculture, promoting diversified and efficient farms is crucial. Under certain conditions, such diversification may also help mitigate depopulation in these regions (Pagliacci, Fasano, 2003; McNamara, Weiss, 2005).

The results relative to the diversity crop index show that farms located in areas B and C prefer this strategy, presenting the highest index level (ranging from 42 to 45% in 2014); urban and remotely rural areas show slightly lower levels of index, which range from 35 to 40% in the same year. Moreover, passing from 2014 to 2023, we can see that farms belonging to all areas chose a crop diversification strategy to enhance resilience and reduce the risks of monoculture.

To illustrate, the major benefit of both diversification of activities and crops in agriculture is income stabilisation. Compared to other economic sectors, agriculture is subject to multiple risks, including dependence on weather conditions that affect yields and income. However, diversifications in crops and non-farming activities try to solve two aspects of agricultural risk: crop diversification reduces risks from weather and commodity price fluctuations (Kurdyś-Kujawska et al., 2021), while the diversification of activities helps lessen farmers' reliance on agricultural activities (Grilli et al., 2024; Bartolini et al., 2014). Our results suggest that farm behaviours are due to the different territorial context: the use of crop diversification is easier in very fertile areas with more favourable climate conditions for a wider range of crops, which coincide with the plains areas (areas B and C), while the presence of hilly and mountainous landscapes allow more likely the exploitation of farm activities linked to rural tourism (area D).

About the quality indices, linked to geographic certifications, we can see that in 2014, the percentage of certified agricultural production across all areas was around 2-3%. However, there is a noticeable increase compared to the baseline period, indicating a growing adoption of certification as a business strategy. The most notable increases occurred in Area A (urban and peri-urban zones) with about a 6% rise, and Area D with just under 5%. This suggests that certified products are gaining importance, particularly at the two ends of the rural continuum, urban/peri-urban areas and more disadvantaged, less developed territories (Area D). Overall, obtaining certification is challenging for farmers, particularly when they lack financial, technical, human, and physical resources. Achieving certification often requires access to premium markets, which can be difficult without adequate capital and support (Asfaw et al., 2009; Guo, Zhang, 2013). Moreover, the return on investment in agrifood quality certification is a long-term process and may be insignificant for farmers, being the premium price for the products is often retained by the final links in the value chain, which also disincentivises farmers from adopting certifications (Sanders, Xiao, 2010; Snider et al., 2017).

Our results showed an increase in all areas. In particular, the higher increase in urban/peri-urban areas (A) can be explained by the proximity to markets and consumers who are more attentive to product quality and traceability. Farms in these areas have a greater incentive to certify their products to differentiate themselves in local markets, which are often characterized by higher purchasing power and sensitivity to quality. For Area D (more disadvantaged or less developed rural areas), the certifications can serve as a tool to access higher-value markets and enhance the competitiveness of local products, helping to overcome structural difficulties in the territory.

The probability of finding farms that use the organic method in the post-program period (2023) increases significantly for all types of areas, in particular for areas A (urban areas) and D (which include the Italian intermediate and marginalised rural areas), with growth rates of 6% and 7%, respectively. Although slightly lower, the growth was still notable in the other two zones: intensive agricultural areas (B) recorded about a 3% increase, while intermediate rural areas (C) showed a 4% rise in organic practices. So, the strategy based on product differentiation has been reinforced in all areas, and specifically for urban and marginalised rural areas, focusing both on organic farming and on Geographical Indications.

Adopting organic certification is particularly challenging for small farms, as they incur lower yields and higher costs than conventional practices and are unable to retain much of the added value. However, organic farmers tend to have a stronger environmental orientation and may place less emphasis on immediate economic gains. This could help explain the widespread adoption of organic practices, even among the smaller farms that are prevalent in areas A and D.

From Table 5, a general upward trend in average SO is evident in all areas except the urban areas (A), indicating an overall improvement in the economic performance of agricultural holdings. Given the way the SO indicator is constructed, improvements in the economic dimension may stem from both a broadening of the production base and the introduction of more profitable crops and livestock.

Area C, characterised by an intermediate degree of rurality, and D, typically less developed and more disadvantaged, show the most substantial increase. Area B, known for its intensive agricultural systems, also records an increase, although to a more moderate extent. In contrast, Area A (urban) shows a marked decline, suggesting a significant reduction in the production scale of farms located in these territories.

The average age of farm heads increases across all area types between 2014 and 2023. The rise is particularly pronounced in Rural areas with intensive agriculture (B), where the average age increases by 3 years, followed by Intermediate rural areas (C) (+2.4 years). More moderate changes are observed in Rural areas with development problems (D) (a little more than 1 year) and in Urban and peri-urban areas (A), where the increase is less than one year. Overall, these findings suggest a widespread ageing of farm managers, with the most substantial demographic shifts occurring in more agriculture-intensive and structurally stronger rural areas.

When comparing areas within the same year, clear differences emerge in the average age of farm heads across territorial categories. In 2014, the highest average age was observed in urban and peri-urban areas (A, 56.6 years), decreasing progressively in more rural contexts: 55.3 years in rural areas with intensive agriculture (B), 54 years in intermediate rural areas (C), and reaching the lowest value in rural areas with development problems (D, 52.1 years). This gradient persists in 2023: the oldest farm heads are again found in areas A (57.5 years), followed by B (58.3 years), C (56.4 years), and finally D (53.5 years). In both years, therefore, farm heads tend to be older in more urbanized or structurally stronger agricultural areas, while the most peripheral rural areas with development issues display comparatively younger demographic profiles.

However, we can affirm that generally, despite the measures of the CAP aimed at supporting generational renewal, the entry of younger farmers seems to remain limited, and ageing continues to affect most rural areas. The increase is particularly significant in areas where agricultural activity is more intensive, possibly reflecting higher capital requirements and structural barriers that make farm succession more difficult.

The educational level of farm heads shows an overall improvement across all area types over the period considered, highlighting the transition from middle school to high school diploma. The increase is most pronounced in Urban and peri-urban areas (A), where the average ED score rises by 0.6 points (as the average level passes from 3.2 to 3.7), suggesting a stronger uptake of education and training opportunities in these territories. More modest increases are observed in Rural areas with intensive agriculture (B) and Intermediate rural areas (C), as well as in Rural areas with development problems (D). Overall, the results indicate a gradual upgrading of human capital in agriculture, although the pace of improvement remains uneven across territorial contexts.

These findings point to a gradual enhancement in human capital, with better-educated agricultural entrepreneurship. Nevertheless, the limited presence of university-level education may still pose a barrier to innovation and modernisation.

This contrast between demographic ageing and improved education levels reveals a complex dynamic: while farmers are increasingly better educated, the lack of generational turnover risks undermining the transfer and renewal of knowledge and skills. The pronounced transformations observed in area D in both age and education profiles could reflect the effects of local policy interventions, socio-economic pressures, or more volatile demographic and structural shifts.

Finally, the figure below illustrating the CAP subsidies equation highlights notable differences in the economic dependence of farms on CAP payments across rural areas in 2014. In areas A, B, and C, this dependence increased significantly over time, converging toward the levels historically observed in area D. By contrast, farms in area D displayed a stable index, with no meaningful change between 2014 and 2023.

5 Discussion

The study highlights how these farms have adopted various diversification strategies that differ across regions and play a key role in promoting sustainable development. Farms are increasingly expected to contribute to sustainable development, ensure nutritional security and food stability, mitigate climate change, enhance resource-use efficiency and land management, and support social cohesion and economic growth, among other goals.

These evolving expectations have significantly influenced farmers' behaviour and the way they conduct their activities. The results indicate that Italian farms have embarked on diverse paths of strategic transformation, strongly shaped by territorial characteristics. These dynamics can be interpreted in light of the recent literature on agricultural multifunctionality and the role of territorial policies in supporting structural adaptation (Van Huylenbroeck et al., 2007; Wilson, 2008; Bojnec, Knific, 2021) as well as the literature on new entrepreneurial models in agriculture (McElwee et al., 2012; Condor, 2020).

Recent studies on entrepreneurship in agriculture explain the differences in farm structures and entrepreneurial behaviours mostly in terms of physical and economic size, labour, and product specialisation. With specific reference to Italy, works have also focused on specific structural dynamics of farms, especially on innovation, multifunctionality and on the relationships between primary productions and the production of public goods and eco-services, and the relative support policies (Devitiis, Maietta, 2013; Salvioni et al., 2013). More recently, another wave of studies was possible thanks to the extension of data to new economic, social and environmental variables, which have introduced new aspects in explaining territorial differences, for example market relationships and diversification of on-farm activities in functional terms, on a policy base or looking at the territorial differences (Mantino, Vanni, 2018; Salvioni et al., 2020; Henke, Sardone, 2022).

The increase in diversification indices (DI and SDI) reflects RDP policy goals aimed at enhancing farm resilience and income stability through activity diversification (Salvioni et al., 2020; Parrè et al., 2024). The growing diffusion of organic farming - particularly in urban areas - represents an adaptive response to local market opportunities and rising consumer demand for sustainability-oriented food systems (Bellon et al., 2020; Makate et al., 2023; Cimino et al., 2025).

At the same time, the limited changes in farm size (measured in SO and UAA) suggest that structural transformation has not been driven by scale expansion but rather by internal reorganisation strategies. This pattern is especially evident in marginal areas, where land constraints and lower competitiveness have led farms to focus on quality differentiation and the valorisation of local identities (Hebinck et al., 2014).

More concerning is the ageing of the farming population, which continues to represent a structural weakness despite improvements in education levels (Pindado et al., 2018). This underscores the urgent need for targeted generational renewal policies and efforts to increase the attractiveness of farming careers, particularly in regions at risk of abandonment.

Overall, the findings support the view that Italian agriculture is evolving toward a multifunctional model, in which production is increasingly integrated with the provision of environmental and social services (Knickel, Renting, 2002).

However, to the best of our knowledge, the existing literature does not provide estimates of how farm strategies change across different types of rural areas characterized by varying degrees of rurality.

Overall, our results highlight significant territorial differences in farm strategies and structural characteristics across the Italian rural continuum. Farms in more remote and disadvantaged rural areas (C and D) show higher levels of activity diversification, often combining agricultural production with non-farming activities such as tourism, while crop diversification is more prevalent in fertile, intensive agricultural areas (B and C). Adoption of quality certifications and organic practices increased in all areas, particularly in urban/peri-urban areas (A) and disadvantaged rural areas (D), reflecting both market opportunities and the need to enhance competitiveness. Economic performance, measured by the SO indicator, improved mainly in intermediate and disadvantaged rural areas, while urban farms experienced a decline. Across all areas, farm heads are ageing, especially in intensive agricultural areas (B), although educational levels are gradually rising, indicating a more skilled but older farming population. Finally, dependence on CAP subsidies has increased in most areas, except for historically dependent rural areas (D), where it remained stable. These findings suggest that territorial context strongly shapes farm strategies, with diversification, certification, and CAP support, playing key roles in fostering resilience and competitiveness, particularly in more rural and structurally weaker areas.

The territorial differentiation revealed by our analysis further underscores the importance of a place-based approach to CAP implementation, with policies tailored to the specific needs and potential of rural areas.

6 Conclusions

For a long time, the CAP has aimed to become more attuned to local territories, adapting its policies to the local specificities. With the new CAP and its revised delivery model, it becomes increasingly important to understand the specific roles that different types of areas can play, along with their main effects on economic performance, income diversification, and product differentiation, particularly in addressing land abandonment and marginalisation.

Given that the new CAP focuses on the performance capacity of targeted areas rather than on their ability to absorb public expenditure, it is crucial to develop specific indicators that can measure the impact of CAP measures on the primary sector and rural areas (Scown, Nicholas, 2020).

Furthermore, the capacity of agriculture and rural territories to establish linkages with other sectors and areas is also key to designing and implementing coherent and effective development strategies. This is clearly underscored in recent vision documents from the European Commission concerning the future of the agri-food system and rural areas in the EU (European

Commission, 2024 and 2025). New functions are being assigned to different areas, shaped by contextual factors, emerging demands from citizens and taxpayers, and the involvement of both traditional and new stakeholders in the agricultural and rural sectors.

Our study on Italian rural areas is particularly insightful, in our view, due to the high degree of territorial heterogeneity in Italy, where remote areas coexist with more productive zones, peri-urban areas exhibit strong internal differentiation, and mountainous regions face risks of depopulation and abandonment. Agriculture in these contexts continues to demonstrate a certain level of diversification and product specialisation, leading to a variety of strategies that are, to varying degrees, influenced by public policy.

Our findings indicate a complex and nuanced response within each type of area, revealing new directions and objectives in agricultural and rural development, particularly with regard to combating abandonment and marginalisation. These responses include a strong focus on income diversification, product differentiation, and the provision of sustainable services to society as a whole.

Finally, our results highlight the importance of competitive strategies over others and reveal the diverse development trajectories pursued across different areas. However, further research incorporating additional variables that influence farm-level behaviour and local dynamics would help to better capture the structural changes currently affecting the agricultural economy in rural regions. Another relevant issue for future work on the matter is to link the quantity and quality of support specifically devoted to different rural areas. This would clearly help to analyse and assess the effectiveness of the various policy measures on the heterogeneity of rural areas. However, this is not simple given the criteria of classifications are mostly based on administrative boundaries rather than on functional ones and requires direct on-field surveys. Despite these important constraints, our analysis offers place-based results which can be a good baseline for the development and implementation of targeted and tailored policies.

References

Alexandri, C., Luca, L., Kevorchian, C. (2015): Subsistence economy and food security–the case of rural households from Romania. Procedia Economics and Finance 22: 672-680. https://doi.org/10.1016/S2212-5671(15)00282-8.

Altieri, M.A. (2009): Agroecology, small farms, and food sovereignty. Monthly Review 2009 61 (3): 102-113. https://doi.org/10.14452/MR-061-03-2009-07_8.

Anderson, T.W. (2003): An Introduction to Multivariate Statistical Analysis. 3rd ed. Wiley, New York.

Asfaw, S., Mithöfer, D., Waibel, H. (2009): EU food safety standards, pesticide use and farm-level productivity: The case of high-value crops in Kenya. Journal of Agricultural Economics 60 (3): 645-667. https://doi.org/10.1111/j.1477-9552.2009.00205.x.

Baldock, D. (2020): Locating the CAP in an escalating green agenda. Italian Review of Agricultural Economics (REA) 75 (3): 13-18. https://doi.org/10.13128/rea-12704.

Bartolini, F., Andreoli, M., Brunori, G. (2014): Explaining Determinants of the On-Farm Diversification: Empirical Evidence From Tuscany Region. Bio-Based and Applied Economics 3 (2): 137–157. https://doi.org/10.13128/BAE-12994.

Bellon, M.R., Kotu, B.H., Azzarri, C., Caracciolo, F. (2020): To diversify or not to diversify, that is the question. Pursuing agricultural development for smallholder farmers in marginal areas of Ghana. World Development 125: 104682. https://doi.org/10.1016/j.worlddev.2019.104682.

Bojnec, Š., Knific, K. (2021): Farm household income diversification as a survival strategy. Sustainability 13: 634. https://doi.org/10.3390/su13116341.

Boyce, J.K. (2006): A future for small farms? Biodiversity and sustainable agriculture. In: Boyce, J.K., Cullenberg, S., Pattanaik, P.K., Pollin, R. (ed.): Human development in the era of globalization: Essays in honor of Keith B. Griffin: 83-104. https://www.elgaronline.com/view/1845425936.00013.xml.

Carbone, A., Carillo, F., Ciaian, P., Sardone, R., Antonioli, F., Cardona, J.T. (2024): Does the European Union Start-Up Aid Help Young Farmers to Innovate and to Join Networks? Agriculture 14: 177. https://doi.org/10.3390/agriculture14101772.

Cattivelli, V. (2022): Delimiting Rural Areas: Evidence from the Application of Different Methods Elaborated by Italian Scholars. Land 11 (10): 1674. https://doi.org/10.3390/land11101674.

Cimino, O., Giarè, F., Henke, R. (2025): Periurban Agriculture and Organic Farming: Investigating Synergies and Policy Implications. Land 14 (4): 690. https://doi.org/10.3390/land14040690.

Condor, R. (2020): Entrepreneurship in agriculture: a literary review. International Journal of Entrepreneurship and Small Business 40 (4): 516-552. https://doi.org/10.1504/IJESB.2020.109013.

Deininger, K., Denys, N., Sudhir, K.S. (2013): Are mega-farms the future of global agriculture. Policy Research Working Paper 6544. The World Bank, Washington D.C. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/681891468337772168.

Devitiis, B., Maietta, O.W. (2013): Regional patterns of structural change in Italian agriculture. In: Oertiz-Miranda, D., Moragues-Faus, A., Arna Ite-Alegre, E. (eds.): Agriculture in Mediterranean Europe. Between old and new paradigms. Emerald, Bingley, UK: 173-215. https://doi.org/10.1108/S1057-1922(2013)0000019015.

European Commission (2025): A Vision for Agriculture and Food Shaping together an attractive farming and agri-food sector for future generations. COM (2025) 75 final. Brussels. https://agriculture.ec.europa.eu/overview-vision-agriculture-food/vision-agriculture-and-food_en.

European Commission (2024): Strategic Dialogue on the Future of EU Agriculture. A shared prospect for farming and food in Europe, Brussels. https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/committees-and-expert-groups/strategic-dialogue-future-eu-agriculture_it.

Frascarelli, A. (2020): Direct Payments between Income Support and Public Goods. Italian Review of Agricultural Economics (REA) 75 (3): 25-32. https://doi.org/10.13128/rea-12706.

Garbach, K., Milder, J.C., DeClerck, F.A.J., Montenegro de Wit, M., Driscoll, L., Gemmill-Herren, B. (2016): Examining multi-functionality for crop yield and ecosystem services in five systems of agroecological intensification. International Journal of Agricultural Sustainability 15 (1): 11-28. https://doi.org/10.1080/14735903.2016.1174810.

Giuliani, A., Baron, H. (2023): The CAP (Common Agricultural Policy): A Short History of Crises and Major Transformations of European Agriculture. Forum for Social Economics 54 (1): 68-94. https://doi.org/10.1080/07360932.2023.2259618.

Grilli, G., Pagliacci, F., Gatto, P. (2024): Determinants of Agricultural Diversification: What Really Matters? A Review. Journal of Rural Studies 110: 103365. https://doi.org/10.1016/j.jrurstud.2024.103365.

Guarín, A., Rivera, M., Pinto-Correia, T., Guiomar, N., Šūmane, S., Moreno-Pérez, O.M. (2020): A new typology of small farms in Europe. Global Food Security 26: 100389. https://doi.org/10.1016/j.gfs.2020.100389.

Guo, S., Zhang, J. (2013): Analysis on farmers' livelihood capital vulnerability. Economic Survey (3): 26-30 (in Chinese). https://doi.org/10.15931/j.cnki.1006-1096.2013.03.012.

Haughey, E., Suter, M., Hofer, D., Hoekstra, N.J., McElwain, J.C, Lüscher, A., Finn, J.A. (2018): Higher species richness enhances yield stability in intensively managed grasslands with experimental disturbance. Scientific Reports 8 (1): 15047. https://doi.org/10.1038/s41598-018-33262-9.

Hebinck, P.G.M., Schneider, S., van der Ploeg, J.D. (eds.) (2015): Rural development and the construction of new markets. Routledge, London.

Henke, R., Cimino, O., Vanni, F. (2022): The role of diversification in the revenue composition of Italian farms. Italian Review of Agricultural Economics (REA) 77 (1): 25-38. https://doi.org/10.36253/rea-13209.

Henke, R., Sardone, R. (2022): The 7th Italian Agricultural Census: new directions and legacies of the past. Italian Review of Agricultural Economics (REA) 77(3): 67-75. https://doi.org/10.36253/rea-13972.

Herman, E. (2024): Sustainable Agriculture and Its Impact on the Rural Development in EU Countries: A Multivariate Analysis. Land 13 (7): 947. https://doi.org/10.3390/land13070947.

IFPRI (International Food Policy Research Institute) (2020): Global food policy report: Building inclusive food systems. IFPRI synopses 9780896293694, Washington, DC.

Jansson, T., Nordin, I., Wilhelmsson, F., Witzke, P., Manevska-Tasevska, G., Weis, F., Gocht, A. (2021): Coupled agricultural subsidies in the EU undermine climate efforts. Applied Economic Perspectives and Policy 43 (4): 1503-1519. https://doi.org/10.1002/aepp.13092.

Jansuwan, P., Zander, K.K. (2022): Multifunctional farming as successful pathway for the next generation of Thai farmers. PLOS One 17 (4): e026735. https://doi.org/10.1371/journal.pone.0267351.

Keller, J., Virág, T. (2021): A drop in the sea or catalyst for change: diverse effects of the place-based approach in Europe. European Planning Studies 30 (5): 860-878. https://doi.org/10.1080/09654313.2021.1928047.

Kurdyś-Kujawska, A., Strzelecka, A., Zawadzka, D. (2021): The Impact of Crop Diversification on the Economic Efficiency of Small Farms in Poland. Agriculture 11 (3): 250. https://doi.org/10.3390/agriculture11030250.

Larson, D.F., Muraoka, R., Otsuka, K. (2016): Why African rural development strategies must depend on small farms. Global Food Security 10: 39-51. https://doi.org/10.1016/j.gfs.2016.07.006.

Li, L., Bellotti, B., Komarek, A. (2016): Structural change and agricultural diversification since China's reforms. Bio-Based and Applied Economics 5 (2): 113-130. https://doi.org/10.13128/BAE-16366.

Licciardo, F., Henke, R., Piras, F., Zanetti, B. (2024): The setting-up.measure to support generational renewal in agriculture: the Italian experience. World 5: 1130-1147. https://doi.org/10.3390/world5040057.

Lowder, S.K., Skoet, J., Raney, T. (2016): The number, size, and distribution of farms, smallholder farms, and family farms worldwide. World Development 87: 16-29. https://doi.org/10.1016/j.worlddev.2015.10.041.

Makate, C., Angelsen, A., Holden, S.T., Westengen, O.T. (2023): Evolution of farm-level crop diversification and response to rainfall shocks in smallholder farming: Evidence from Malawi and Tanzania. Ecological Economics 205: 107736. https://doi.org/10.1016/j.ecolecon.2022.107736.

Mann, S. (2009): The Nature of the Diversified Farm Household. Technical report. Forschungsanstalt Agroscope Reckenholz-Tànikon ART. https://core.ac.uk/download/pdf/6435293.pdf.

Mantino, F., De Fano, G., Asaro, G. (2022): Analysing the Policy Delivery System and Effects on Territorial Disparities in Italy: The Mechanisms of Territorial Targeting in the EU Rural Development Programmes 2014-2020. Land 11 (11): 1883. https://doi.org/10.3390/land11111883.

Mantino, F., Vanni, F. (2018): The Role of Localized Agri-Food Systems in the Provision of Environmental and Social Benefits in Peripheral Areas: Evidence from Two Case Studies in Italy. Agriculture 8 (8): 120. https://doi.org/10.3390/agriculture8080120.

Matthews, A. (2020): Promoting climate action in the future Common Agricultural Policy. Italian Review of Agricultural Economics (REA) 75 (3): 19-24. https://doi.org/10.13128/rea-12705.

Mazzocchi, C., Orsi, L., Ferrazzi, G., Corsi, S. (2020): The Dimensions of Agricultural Diversification: A Spatial Analysis of Italian Municipalities. Rural Sociology 85 (2): 316-345. https://doi.org/10.1111/ruso.12291.

McElwee, G., Bosworth, G. (2010): Exploring the strategic skills of farmers across a typology of farm diversification approaches. Journal of Farm Management 13 (12): 819-838. https://irep.ntu.ac.uk/id/eprint/3994.

McElwee, G., Smith, R. (2012): Classifying the strategic capability of farmers: a segmentation framework. International Journal of Entrepreneurial Venturing 2012, 4 (2): 111-131. DOI: 10.1504/IJEV.2012.046517.

McNamara, K.T., Weiss, C. (2005): Farm Household Income and On-and Off-Farm Diversification. Journal of Agricultural and Applied Economics 37 (1): 37-48. https://doi.org/10.1017/S1074070800007082.

Meraner, M.B., Pölling, B., Finger, R. (2018): Diversification in Peri-Urban Agriculture: A Case Study in the Ruhr Metropolitan Region. Journal of Land Use Science 13 (3): 284-300. https://doi.org/10.1080/1747423X.2018.1529830.

Morrison, D.F. (2005): Multivariate Statistical Methods. 4th ed. Duxbury, Belmont, CA. https://agris.fao.org/search/en/providers/122621/records/6473968f3ed73003714ccec6.

Mzyece, A., Amanor-Boadu, V., Ng'ombe, J.N. (2023): Strategic value of crop diversification among farmers: New insights and measurement. World Development Sustainability 3: 100090. https://doi.org/10.1016/j.wds.2023.100090.

National Rural Network (2007): National Strategy Plan for Rural Development. https://www.reterurale.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/342.

Ortiz-Miranda, D., Morages-Faus, A. (2013) (eds.): Agriculture in Mediterranean Europe. Between old and new paradigms. Emerald, Bingley, UK. https://doi.org/10.1108/S1057-1922(2013)0000019016.

Pagliacci, F., Fasano, F. (2023): Does the Presence of Inner Areas Matter for the Registration of New Geo-Graphical Indications? Evidence From Italy. Bio-Based and Applied Economics 12 (2): 127-139. https://doi.org/10.36253/bae-13628.

Parré, J.L., Chagas, A.L.S., Arends-Kuenning, M.P. (2024): The effect of farm size and farmland use on agricultural diversification: a spatial analysis of Brazilian municipalities. Agricultural and Food Economics 12: 27. https://doi.org/10.1186/s40100-024-00323-9.

Peltonen-Sainio, P., Jauhiainen, L., Sorvali, J., Laurila, H., Rajala, A. (2018): Field characteristics driving farm-scale decision-making on land allocation to primary crops in high latitude conditions. Land Use Policy 71: 49-59. https://doi.org/10.1016/j.landusepol.2017.11.040.

Piedra-Bonilla, E.B., Cunha, D.A., Braga, M.J. (2020): Climate variability and crop diversification in Brazil: an ordered probit analysis. Journal of Cleaner Production 256: 120252. https://doi.org/10.1016/j.jclepro.2020.120252.

Pindado, E., Sánchez, M., Verstegen, J.A.A.M., Lans, T. (2018): Searching for the entrepreneurs among new entrants in European Agriculture: the role of human and social capital. Land Use Policy 77: 19-30. https://doi.org/10.1016/j.landusepol.2018.05.014.

Ricciardi, V., Ramankutty, N., Mehrabi, Z., Jarvis, L., Chookolingo, B. (2018): How much of the world’s food do smallholders produce? Global Food Security 17: 64-72. https://doi.org/10.1016/j.gfs.2018.05.002.

Rivza, B., Kruzmetra, M. (2017): Through economic growth to the viability of rural space. Entrepreneurship and Sustainability Issues 5 (2): 283-296. https://doi.org/10.9770/jesi.2017.5.2(9).

Salvioni, C., Henke, R., Ascione, E. (2013): Structural and economic dynamics in Italian diversified farms. Bio-based and Applied Economics 2 (3): 257-275. https://doi.org/10.13128/BAE-13094.

Samberg, L.H., Gerber, J.S., Ramankutty, N., Herrero, M., West, P.C. (2016): Subnational distribution of average farm size and smallholder contributions to global food production. Environmental Research Letters 11 (12): 124010. https://doi.org/10.1088/1748-9326/11/12/124010.

Sanders, R., Xiao, X. (2010): The sustainability of organic agriculture in developing countries: Lessons from China. The International Journal of Environment, Cultural, Economic and Social Sustainability 6 (6): 233-243. https://doi.org/10.18848/1832-2077/CGP/v06i06/54845.

Scown, M.W., Nicholas, K.A. (2020): European agricultural policy requires a stronger performance framework to achieve the Sustainable Development Goals. Global Sustainability 3(e11). https://doi.org/10.1017/sus.2020.5.

Shucksmith, M., Brown, D.L. (eds.) (2016): Handbook of Rural Studies. Routledge, London & New York.

Snider, A., Gutiérrez, I., Sibelet, N., Faure, G. (2017): Small farmer cooperatives and voluntary coffee certifications: Rewarding progressive farmers of engendering widespread change in Costa Rica? Food Policy 69: 231-242. https://doi.org/10.1016/j.foodpol.2017.04.009.

van der Ploeg, J.D., Schneider, P. (2022): Autonomy as a politico-economic concept: Peasant practices and nested markets. Journal of Agrarian Change 22 (3): 529-546. https://doi.org/10.1111/joac.12482.

Van Huylenbroeck, G., Vandermeulen, V., Mettepenningen, E., Verspecht, A. (2007): Multifunctionality of Agriculture: A Review of Definitions, Evidence and Instruments, Living Reviews. Landscape Research 1 (3). http://lrlr.landscapeonline.de/lrlr-2007-3.

Watson, C., Reckling, M., ... , Stoddard, F. (2017): Grain legume production and use in European agricultural systems. Advances in Agronomy 144 (1): 235-303. https://doi.org/10.1016/bs.agron.2017.03.003.

Wezel, A., Casagrande, M., Celette, F., Vian, J.F., Ferrer, A., Peigné, J. (2014): Agroecological practices for sustainable agriculture. A review. Agronomy for Sustainable Development 34: 1-20. https://doi.org/10.1007/s13593-013-0180-7.

Wilson, G.A. (2008): From ‘weak’ to ‘strong’ multifunctionality: Conceptualising farm-level multifunctional transitional pathways. Journal of Rural Studies 24 (3): 367-383. https://doi.org/10.1016/j.jrurstud.2007.12.010.

Zasada, I., Reutter, M., Piorr, A., Lefebvre, M., y Paloma, S.G. (2015): Between capital investments and capacity building—Development and application of a conceptual framework towards a place-based rural development policy. Land Use Policy 46: 178-188. https://doi.org/10.1016/j.landusepol.2014.11.023.