Economia agro-alimentare /
Food Economy

An International Journal on Agricultural and Food Systems

Vol. 23, Iss. 3, Art. 3, pp. 1-24 - ISSN 1126-1668 - ISSNe 1972-4802
DOI: 10.3280/ecag3-oa12769

Ten years after: Diffusion, criticism and potential improvements in the use of FADN for Rural Development assessment in Italy

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Abstract

This article aims to contribute to the debate about the Farm Accountancy Data Network (FADN), on how to make it more usable, useful and reliable, both for research users and practitioners when studying policy assessment. Ten years ago, the Italian National Rural Network published a highly relevant report about FADN data use for Rural Development policy evaluation, providing a wide range of examples of its application. The report had the merit of providing a comprehensive and systematic overview of FADN uses for evaluation for the first time and not only for impact assessment. From this experience, this paper examines how the different Managing Authorities in Italy have used FADN data for the evaluation of the current 2014-20 Rural Development Programmes: how actually the database has been used in the Annual Implementation Reports, with a focus on indicators for competitiveness assessment. The paper highlights some recommendations, considering the next programming period and the application of the so-called New Delivery Model.

Article info

Type:
Article
Submitted:
07/05/2021
Accepted:
20/09/2021
Available online:
12/01/2022

JEL codes:
Q18, Q12, D04

Keywords:
FADN
Evaluation
CMEF
Rural Development

Managing Editor:
Lucia Briamonte,
Luca Cesaro,
Alfonso Scardera

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Introduction

The evaluation always involves a judgment of the interventions according to their effects on the needs they aim to satisfy. It is a systematic tool which provides evidence for decision-making and improves effectiveness, usefulness, and efficiency. Moreover, the evaluation contributes to improve transparency, learning and accountability (Cagliero & Cristiano, 2013).

As known, there is a wide range of methodologies that can be applied, depending on several issues (as type and approach of evaluation, data availability, specific topics, …); so, it is possible to state that there is not a single method that can provide a right evidence, but only a deliberate choice of suitable combination of methods could lead to sounding answers to evaluation questions (European Commission, 2014). However, the main challenge is always to find good counterfactual/control/benchmark. The next big question is: which are the data sources that can positively and reliably be used in evaluation exercises?

In terms of quality and *a priori* expectations, any data source is better than another: assessment objectives and information availability should guide analysis and choices. Different sources mean different information: i) monitoring data and administrative ones are exclusively focused on beneficiaries; ii) official statistics concern a region, a population, or a sector; iii) direct surveys, both on beneficiaries and non-beneficiaries' side, are high costly in time, money and human resources.

The Farm Accountancy Data Network (FADN) can be used for different tasks of Common Agriculture Policy (CAP) analysis (context description; justification of support) and assessment (ex-ante, thematic, ongoing, ex-post evaluations) and provides a wide range of useable indicators and indices, the structural ones (e.g., the intensity of inputs) and the economic ones (e.g., labour productivity, the impact of support, etc.). However, FADN data requires some care and caution (European Commission, 2021a and 2021b).

In 2011 the Italian National Rural Network (NRN) published a report on FADN use for Rural Development policies' evaluation (Cagliero *et al*., 2011), providing a broad overview of its potential uses and describing several and concrete examples of its application. The report aimed to give account of a wide range of different FADN uses, not only for impact assessment or context analysis, but providing, for the first time, a full and comprehensive overview of its uses. That document has the merit of having triggered an important debate on the concrete possibilities of using FADN in evaluation exercises in the community of researchers and evaluators, but also involving the various Managing Authorities and the Commission services.

Ten years after that experience, this article aims to analyse the use of FADN, in light of evaluation activities of the 2014-20 Rural Development Programs (RDP). The analysis is based on the 2019 Annual Implementation

Reports (AIR) and it focuses on evaluation results related to the Common Evaluation 27 (CEQ): "To what extent has the RDP contributed to the CAP's goal of fostering agricultural competitiveness?". The objective is to highlight any methodological developments adopted by the Independent Evaluators to answer this impact evaluation question, using the FADN data individually or matching them with other data sources.

The manuscript firstly presents the main elements of 2014-20 Rural Development (RD) assessment as far as questions, indicators, data and sources; Then it focuses on FADN data uses in the Italian RDP evaluations, synthesized in the 2019 AIRs, highlighting the different approaches. After a discussion on the main results observed, in the view of critical issues and possible solutions, some conclusions with a perspective on the next programming period end the paper.

1. The CAP 2014-20 evaluation at a glance: questions and indicators

During the different programing periods of Rural Development, the Commission has boosted the importance of the so-called strategic approach, that provides a closer and more addressed relationship among the need's assessment, the identification of objectives and the choice of measures. Following this approach, the Commission introduced, and enhanced, a common vision of a monitoring and evaluation framework, providing a common ground Europe-wide. In this context, emphasis was given to the use of indicators and a particular attention was paid to the data sources to support and evaluate policies in the agricultural sector (Scardera, 2008; Mantino, 2008).

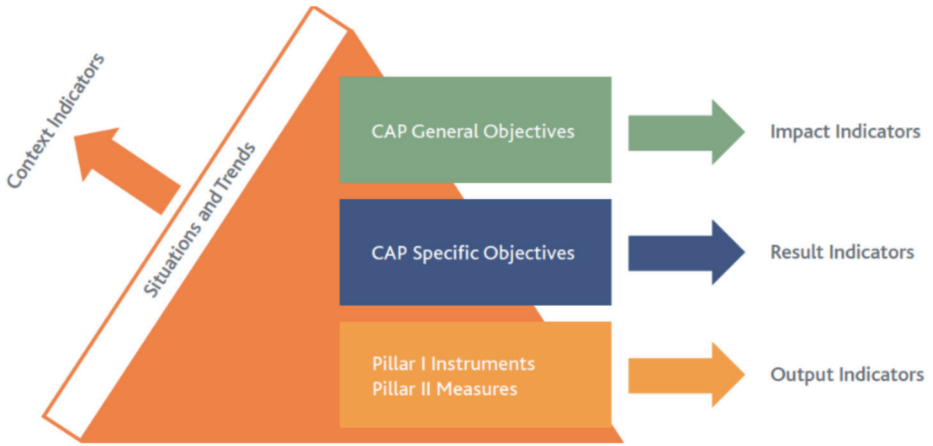
The Regulations during the 2014-20 period confirm the importance of evaluation: it provides evidence, transparency, learning and accountability for decision-making and improves the effectiveness, utility, and efficiency of RD interventions.

The European Commission (EC) has strengthened the vision of a "one-fit-all" system within the Common Monitoring and Evaluation System (CMES)[1] presented in the Technical Handbook (European Commission, 2017). The CMES includes the so-called indicator plan (common context/impact, output, result, target indicators), the Common Evaluation Questions, the Evaluation Plan and a list of guidance documents. In accordance with the past, the

1. In the programming period 2014-2020 there is often confusion between what is the Common Monitoring and Evaluation Framework (CMEF) and the Common Monitoring and Evaluation System (CMES). The CMEF 2014-20 is the compilation of rules and procedures necessary for evaluating the whole CAP; whilst the CMES contents the rules and procedures within the CMEF, which relate only to rural development policy or Pillar II of the CAP (European Commission, 2017).

general objectives shall be assessed using common impact indicators, while the specific objectives shall be assessed by using common result indicators. The information shall be gathered from established sources of data, such as Eurostat and the Farm Accountancy Data Network.

Figure 1 - Relations among indicators in 2014-2020 CMES



Source: European Evaluation Helpdesk (2019).

European Commission provided detailed fiches for each of the common indicators and among those 13 impact indicators shall be used to assess RDPs impacts. For example, three of these are directly related to the CAP Objective – "Fostering the competitiveness of agriculture". They are I.01 Agricultural entrepreneurial income; I.02 Agricultural factor income; I.03 Total factor productivity in agriculture. As context indicators, these indicators are already available and calculated at macro-level for each Member States (Economic Accounts for Agriculture), but they cannot be directly related with RDPs interventions. Indeed, changes in these indicators at aggregate level (sector) could only represent a gross effect caused by several factors and prove to be of little use in analyzing the actual RDPs effects. For this reason, indicators I.01, I.02, and I.03 should be calculated primarily at micro-level both for a group of beneficiaries and a control group (non-beneficiaries). In this goal, the Technical Handbook indicates the FADN as a relevant source and suggest this database to be used for the quantification of those indicators, as impact indicators[2] (Table 1).

2. The availability of standardized datasets (e.g. input/output tables for EU Member States, FADN data) is a great advantage for quantitative methods. There are significant economies of scale for methods using such data (European Commission, 2014).

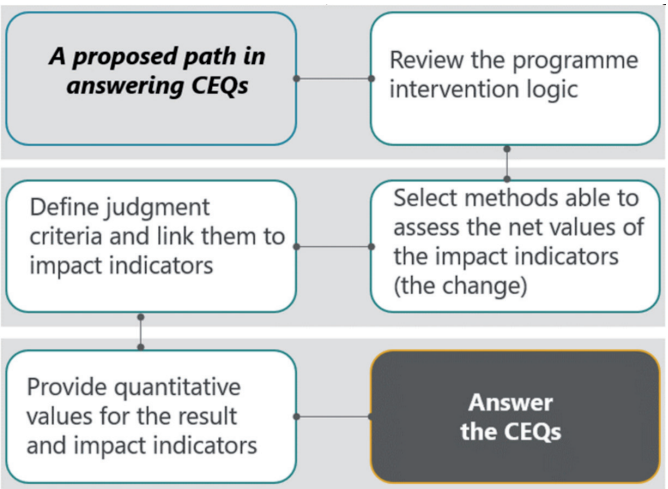
Table 1 - List of proposed sectorial impact indicators using the FADN for RDPs assessment

Sectorial Indicators	Proposed utilisatioin	Calculation form FADN Codes
I.01 - Agricultural entrepreneurial income (Per Annual work units (AWU) in agriculture)	Agricultural entrepreneurial income measures the income derived from agricultural activities that can be used for the remuneration of own production factors, i.e. non-salaried (= family) labour, land belonging to the agricultural holding and own capital. It is obtained by deducting wages, rent and interest payments from agricultural factor income	(SE135 + SE206 – SE275 –SE360 + SE600 – SE365)/SE010 *SE135 = Total Output crops and crop production* *SE206 = Total Output livestock and livestock products* *SE275 = Total intermediate consumption* *SE360 = Depreciation* *SE600 = Balance current subsidies and taxes* *SE365 = Total external factors (wages, rents and interest paid)* *SE010 = Total labour input in full time equivalents*
I.02 - Agricultural factor income (per annual work unit (AWU))	Agricultural factor income measures the remuneration of all factors of production (land, capital, labour) regardless of whether they are owned or borrowed/rented and represents all the value generated by a unit engaged in an agricultural production activity. It corresponds to the net value added at factor cost	(SE135 + SE206 – SE275 –SE360 + SE600)/SE010 *SE135 = Total Output crops and crop production* *SE206 = Total Output livestock and livestock products* *SE275 = Total intermediate consumption* *SE360 = Depreciation* *SE600 = Balance current subsidies and taxes* *SE010 = Total labour input in full time equivalents*
I.03 - Total factor productivity in agriculture	Total factor productivity (TFP) compares total outputs relative to the total inputs used in production of the output. TFP reflects output per unit of some combined set of inputs: an increase in TFP reflects a gain in output quantity which is not originating from an increase of input use	Output (n=3): Crop Production (FADN SE135), Livestock Production (FADN SE206) and Other Output (SE256) in nominal (basic) values Inputs/Factors (m=4): Labour in AWU (FADN SE010), UAA (FADN SE025) in hectares, Working Capital (FADN SE275 [intermediate consumption]) in nominal value, Fixed Capital (FADN SE360 [depreciation]) in nominal value

Source: European Commission (2018a).

In the enhanced Annual Implementation Report, Member States (MS) shall report findings on their evaluation by answering the Evaluation Questions. To provide support to MS and evaluators, the European Evaluation Helpdesk introduced two dedicated documents: "Guidelines. Assessment of RDP results: How to prepare for reporting on evaluation in 2017" and 'Approaches to assess RDP achievements and impacts in 2019", recommending several approaches for answering CEQs[3]. The document related to 2019 AIR, particularly, provides a range of possible techniques to be applied in optimal data-situations as well as in data gap ones; qualitative methods are also included. The document is organized in different sections by each evaluation question, but it proposes however a general path to identify the most suitable method based on data availability (Figure 2) (European Commission, 2018b).

Figure 2 - Common Evaluation Questions: general recommended steps



Source: European Commission (2018b).

The Evaluation Helpdesk also provided an interactive decision tool, 'Data for the assessment of RDP achievements and impacts', which intends to orient the choice of evaluation approaches and data in quantification of impact indicators (European Evaluation Helpdesk, 2019). The tool transfers

3. It is to be underlined that all the Helpdesk guidelines and working documents are non-binding document, which aims to facilitate the exchange and learning from practices to improve the quality of evaluations of RDPs 2014-2020.

the logic frameworks developed in the Guidelines mentioned above into an interactive format, providing further detailed and practical information and recommendations on what to do in case of data gaps both in the short and long term, when solutions are needed. The interactive tool consists of a set of seven logic models covering the 13 common impact indicators and the micro approach using FADN for the quantification of indicators I.01, I.02 and I.03 is strongly confirmed.

2. Evaluating Rural Development Programs using FADN data

As mentioned, the range of methodologies that can be applied to evaluation is very wide and no single method can claim a monopoly for provision of right evidence, but a suitable choice of combination of techniques can lead to robust answers to evaluation questions. Variants of evaluation methods range from more "naïve" approaches, i.e. beneficiaries' opinion on programme effects or comparisons of the outcomes of participants with their pre-programme situations, to more rigorous experimental and quasi-experimental approaches. This process of choice is always very complex and requires robust skills and is based on several elements, among which attributes, availability and detail of potentially usable information are highly determining factors.

As the Farm Accountancy Data Network collects farms' structures, income and performance data, it always has been – and still is – considered a very useful source that meet the information demands in programming and assessing RDPs (European Commission, 2010; European Commission, 2021b; Abitabile & Scardera, 2008).

The FADN is the only harmonized data archive on farms that covers the entire European Union by region and contains, in Italy, about 2,000 elementary pieces of structural, accounting, and non-accounting information for each farm in the network, along different years. Over the years several changes have been introduced in the FADN which, at the beginning, was specifically built to collect farm accounting data and to analyze farm revenues. As a result, currently FADN allows the use of different assessment models and the possible application of many techniques, as exemplified in Table 2.

The Evaluation Handbook confirms the main points of strength in the use of FADN: i) it is the only common European source of microeconomic data; ii) the bookkeeping principles are the same in all countries; iii) farms are selected on the basis of sampling plans at the level of each region in the Union. However, the Handbook recalls some well-known critical issues: i) the survey does not cover all the agricultural holdings; ii) the methodology

Table 2 - Summary of proposed FADN uses in RD evaluation

	Context and needs assessment	**Implementation and performance assessement**	**Economic justification via comparation**	**Effect (Impact) assessment**
Type of indicators	Context Baseline	Result Specific	Specific	Baseline Result
Type of approach	Benchmarking Scenarios Parameterization	Pre - post Profiling Selection criteria	Partial budgets Farm balance sheets Tec. Coeficient	Shift-share Comparison group design Statistical matching
Example of indicator	Labour productivity	Gross Value Added	Costs and income	Farm Net Value Added
Examples of techiques	Analysis by groups Chain of indices Farm profitability	Scenario Sensitivity Profiling	Fair compensation CEA Loss of income	Regression PSM and DiD Naïve Comparison
Examples of references	Borsotto, 2019 Cagliero *et al.*, 2011	Cagliero *et al.*, 2021 NUVAL, 2016	Seroglia and Trione, 2002 INEA, 2014	Cisilino *et al.*, 2013 EC, 2018a Michalek, 2012
Notes/ caveat	Missing information	Rotation of farms	Representative-ness	Satellite samples

Source: authors' elaboration from Cagliero *et al.* (2011).

applied provides representative data only along three dimensions (territory, economic size, and type of farms). The evaluator must take into consideration also the delays in the provision of FADN data (2 years) and be aware on how the sample relates to the whole population; the evaluator needs to clearly recognize which *segment* of the supported farms list is included in FADN survey.

At the end of April 2021, the Evaluation Helpdesk made available a further report on best uses of FADN for the assessment of RDP in the view of agriculture competitiveness (European Commission, 2021b). This document proposes practical solutions and examples from various Member States experiences and describes what should be considered when using FADN data in assessing Rural Development effects on competitiveness and answering the

related CEQs. These issues are discussed following some guiding requests as well as:

1. What are the basic sources of farm-level data, which can enable evaluators to answer CEQs?
2. Why is farm-level data essential to answering CEQs on competitiveness?
3. Are the variables available in the FADN sufficient to estimate the RDP's effects?
4. What requirements are needed from a sample of data at farm-level to be used for answering the CEQs?
5. Given that the FADN is the first choice as a data source for the calculation competitiveness parameters, how can the FADN be utilized to answer CEQ 27?

3. Using FADN answering the common question on agricultural competitiveness

In contrast with the previous period (2007-2013), for 2014-20 there is no Mid-Term Evaluation and evaluation outcomes are reported during the programme in the so called in chapter 7 of enhanced Annual Implementation Reports. The AIRs in 2017 include the quantification of RDP's achievements; judgment criteria are provided by Evaluation Helpdesk to interpret result indicators and to answer the Focus Area Common Evaluation Questions 1-21 (European Commission, 2016). The AIRs submitted in 2019 require an update of these evaluation findings and, in addition, they are expected to include (European Commission, 2018a): i) the assessment of the RDP's impacts (net values of impact indicators); ii) RDP's contributions towards the European Union strategies; iii) the answers to all the CEQs, including those related to the European level objectives EQ (22-30).

The analysis of the outcomes related to the Italian RDPs evaluations has been carried out from 2019 AIRs in relation to the quantification of impact indicators I.01, I.02 and I.03 in answering the Common Evaluation Question 27: 'Fostering the competitiveness of agriculture'. In the EC guidelines the use of existing data is highly recommended for this evaluation exercise. It is suggested to cross-reference FADN micro level data with the information related to beneficiaries stored in the Information Systems (administrative data) and then put the coming results in comparison with macro level tendencies, following a two stages approach.

Table 3 summarizes the results of the documentary survey by classifying the Italian Regions into four levels of quantification of the indicators analyzed in the 2019 AIRs (AIR, 2019).

Generally, a relevant effort to answering the Evaluation Question by the quantification of these common impact indicators using FADN data is found. But some evaluators argue that it is not possible to quantify any effect at the current stage of projects' uptake; they do not use FADN data to calculate indicators and they will not use them in the coming years (- indicators not quantified)[4].

In six Regions (^ - quantification is only planned), it is possible to observe a sort of willingness to use FADN data for the quantification of impact indicators, although this has not yet been done because the timing of data. According to the evaluators, these estimations should be made over a sufficient period in which the effects of the RDP can be assessed. This implies, as example, being able to detect the first effects on projects concluded in 2017 only through FADN data available in 2020, referring to 2017 to set the pre-intervention situation and referring at least to 2019 to estimate the post-intervention change.

Table 3 - Uses of FADN for estimating impact indicators and answering CEQ 27

RDP	I.01	I.02	I.03	Indicator specific/ proxy	Use/Notes	Evaluation Services
Valle d'Aosta	^	^	^	–	Qualitative approach	Lattanzio Advisory
Piemonte	*	*	*	–	Necessity data panel	Ires Piemonte
Lombardia	X	X	X	Output/cost; FNVA/ AWU; FNI/FWU	Counterfactual Approach; Economic context	Agriconsulting
PA Trento	X	*	*	–	–	IZI
PA Bolzano	X	*	*	FNI	–	RTI IZI-Apollis OHG
Veneto	X	X	X	Output/costs; FNI/ FWU	Counterfactual Approach; Economic context	Agriconsulting
Friuli V.G.	–	–	–	–	–	Ismeri Europa
Liguria	–	–	–	GVA/AWU	Benchmarking	Lattanzio Advisory

4. In the case of Liguria, however, the FADN is used to estimate result indicator R2, "Change in Agricultural output on supported farms/AWU (focus area 2A)".

Table 3 - Continued

RDP	I.01	I.02	I.03	Indicator specific/ proxy	Use/Notes	Evaluation Services
E. Romagna	X	X	X	Output/costs; FNI/ FWU	Counterfactual Approach; Economic context	Agriconsulting
Toscana	^	^	–	–	–	Lattanzio Advisory
Umbria	^	^	–	–	–	Lattanzio Advisory
Marche	^	^	–	–		Lattanzio Advisory
Lazio	*	*	–	FNI/FWU	EU FADN database	Cogea
Abruzzo	X	X	X	–	Statistical matching	ISRI
Molise	–	–	–	–	–	NVVIP
Campania	^	^	–	–	–	Lattanzio Advisory
Puglia	^	^	–	–	–	Lattanzio Advisory
Basilicata	–	–	–	–	–	NVVIP
Calabria	X	X	X	–	Econometric Model; Statistical matching	RTI ISRI-Sinapsys
Sicilia	*	*	–	–	PSAWEB	RTI ISRI-AGROTEC
Sardegna	X	X	X	–	Statistical matching	RTI ISRI-PWC-Interforum-Primaidea
PSRN	*	*	*	–	–	Lattanzio Advisory

X → full quantified; * → context update; ^ → planned to be done; – → not quantified.
FNVA: Farm Neta Value Added; FNI: Farm Net Income; AWU Agricultural Work Unit; FWU: Family Work Unit; GVA: Gross Value Added

Source: authors elaboration from 2019 AIR – Italian Regions

In four Regions (* - context update) the evaluators estimate only the gross change in the economic context, without assessing the direct contribution of the RDPs, but they argue any way that FADN is the main source to be used

for this purpose. In Piemonte, the evaluators aim to use three-year average values to assess those issues, considering the rotational nature of the FADN panel and the variability of agricultural results caused by weather conditions occurred in the last years; this has prevented the possibilities of assessing the contribution of the RDP in the 2019 AIR. In the case of Lazio Region, the estimation has been carried out, unlike the other cases, using the European FADN and not the Italian database[5].

In the remaining eight Regions (X - full quantification), the use of FADN data for the quantification of impact indicators I.01, I.02 and I.03, in answering to Common Evaluation Question 27, has been different among the evaluators.

The evaluators of Sardegna, Calabria and Abruzzo's RDP use FADN for estimation of both beneficiary and non-beneficiary groups and the exercise is focused entirely on transitional operations related to the previous programming period. Evaluators highlight the FADN sample is unbalanced in terms of economic size compared with the beneficiary group; this problem has required a downsizing of the sample with a loss of significance and robustness. Furthermore, the rotational nature of the panel leads to a critical issue: the number of constant observations over a minimum time is very small and did not allow counterfactual analyses. However, the evaluators intend to use FADN for future analysis. Towards the ex-post evaluation, it's planned to gather a direct survey on subsidized farms to be compared with a sample of non-treated ones, using FADN and applying a statistical matching procedure.

The evaluator teams of Trento and Bolzano's Programmes point out some caveat; they argue that the contribution of the RDP to farm income is underestimated because the value is too variable according to the type of farming. To estimate the effects of the investment supported, analyses are carried out on monitoring data integrated by a direct survey conducted at project check, while FADN data are used to analyze the economic dynamics in different sectors. Furthermore, evaluators state that the RDP provides effects on labour productivity rather than on business profitability[6].

For the estimation of the impact indicators for Lombardia and Emilia-Romagna, the data estimated in 2007-13 Ex-Post Evaluation and the FADN data available until 2016 are used. In evaluators point of view, the difference between the situation with RDP (FADN data) and without RDP (estimated values) allows to appreciate the potential impact of the interventions. In the case of Veneto, the analysis is carried out using the results of a direct survey

5. There are some differences between the two sources, first of all the different informative detail which is considerably higher from the Italian one.

6. It could mean a criticism in terms of relevance of indicators.

on beneficiaries (factual group), while the FADN is used to build up the control group.

Finally, a relationship between FADN data use to answer the CEQ 27 and the evaluation team has to be highlighted. From the comparison between the analysis conducted on the 2019 AIRs and the evaluation service assignments (Table 3), some evaluators show a deeper interest in the use of FADN data. It is because of a more structured and continuous relationship with both the Managing Authority and the CREA-PB offices, which manage the FADN surveys. In particular, the CREA-PB, as well as the former INEA, has provided during the years several documents explaining the use of the database, such as "L'archivio RICA per valutazione" (INEA, 2003).

4. Discussion: uses, criticism and possible improvements in FADN uses

In this section, a discussion of the results obtained in the previous chapter is presented, following, where possible, the guiding questions proposed by the European Commission (European Commission, 2021b) on best uses of FADN for the assessment of RDP and reported at the end of Chapter 2.

In relation to the first question proposed regarding which data sources can be used for evaluation, most Italian evaluators point out the FADN could be considered the most appropriate and usable source; other information taken into consideration are those deriving from official statistics sources, for example by ISTAT, or administrative indications, while in rare cases recourse was made to direct surveys.

The analysis underlines how relevant could be conducting assessment under a counterfactual approach, comparing groups of beneficiaries and non-beneficiaries. In this light, detailed information available at the farm level in the most complete way sound necessary (guiding question 2 – Why is farm-level data essential to answering CEQs on competitiveness?).

Regarding the ability of the variables collected by the FADN to be sufficient to conduct evaluations as requested in question 3, two distinct reflections should be made. The analysis here presented concerns the theme of competitiveness (CEQ 27) only and in this case the FADN economic variables are judged adequate and also capable of determining some additional indicators (e.g., Output/cost) proposed by evaluators. On the other hand, the variables collected by the survey may not always be sufficient for assessments on other topics, such as climate change or quality of life in rural areas.

We may consider the next guiding question the most relevant, as it addresses the critical issues of appropriate samples to answer the evaluation questions. Considering Italian 2019 AIRs, it is possible to aggregate the main evidence about FADN data use and farm samples to answer CEQ 27, as

well as some critical points and possible improvement; a synthesis matrix is hereby proposed (Table 4).

As pointed out, several evaluators used FADN data for the setting up of beneficiaries and control groups having similar characteristics in a counterfactual approach. This process has been set with different techniques, especially regarding the composition of the samples, whether in the treated group or in the untreated one. The evaluators highlight a critical issue related to the number of observations belonging to the database, especially when there is a need for in-depth analysis in terms of type of farming or economic size, e.g. small farms. In these cases, the solutions suggested are basically an extension of the FADN sample, through various methodologies, such as, for example, the use of databases from neighbouring regions or the activation of so-called satellite samples (Cagliero *et al.*, 2011; European Commission, 2020).

An important aspect to be considered using FADN is the possibility given by time series analysis assured for more than 10 years, thanks to the continuity through time of the survey. However, even in this case several critical points must be highlighted, as the rotational nature of the panel provides a significant number of entries and exits of farms over time. Here again, the solution is most likely to set up a satellite sample, which would continuously survey farms that otherwise would be dropped out from the FADN sample (Abitabile & Scardera, 2008). This could ensure a constant sample of farms for an appropriate period of time, useful for the assessment (pre and post intervention). However, it should be noted that the satellite sample cannot improve the statistical representativeness of the basic sample, as it does not respect the same stratification criteria. It should therefore be considered as an "oriented (or guided) sample" addressed to collect information about RDP beneficiaries which can then be compared with the universe of farms represented by the FADN survey.

A simpler alternative to the satellite sample, even if less complete in terms of consistency, is to collect the technical-economic data on the beneficiaries through a specific application computing the farm's balance sheet. The application called "Bilancio semplificato" (simplified business budget), adopts a methodology comparable with the results of the FADN survey and provides several indicators to answer to the Evaluation Questions[7].

Finally, in relation to the last guiding question proposed by the Commission, regarding the best possible uses of FADN, it can be said that studies of a counterfactual nature, starting from the farm level, are indicated as the most appropriate to answer the common question in terms of

7. https://bilanciosemplificatorica.crea.gov.it.

Table 4 - Summary matrix on FADN uses, critical points and possible solutions

Actual use	Criticism	Possible improvement
Construction of groups of beneficiary farms and similar control groups	Low number of beneficiary farms	Sample extension methods Activation of satellite samples
Details by farm type and economic size	FADN sample not aligned to the population of beneficiaries	Activation of satellite samples
Use of deep time series (>10 years)	Rotational nature of the panel	Activation of satellite samples
Analysis of evolution in the regional context	Gross effects and not the atual RDP contribution	Benchmarking
Estimation of economic performance coefficients	Need for data from administrative source	Macthing with administrative archives

Source: authors elaboration from 2019 AIRs.

competitiveness. The attributes of the FADN survey and the possibility of constructing comparison groups between farms represents a sort of potential "golden standard", once the observed critical points on the samples have been resolved. In addition, the evidence estimated at farm level could also be traced to a macro level (European Commission, 2018a).

In other cases, to estimate the economic performance of subsidized farms, the evaluators have set the so-called technical coefficients from FADN data (Cagliero *et al*., 2011); those estimated parameters are then applied on administrative data, containing generally structural but non economic information. Although this approach is somehow naïve, it represents a first effort towards the possibility to cross-refer administrative records to the FADN. This cross-reference is the most far-reaching and interesting proposal in the literature for improving the possibilities of using FADN in evaluation pathways (European Commission, 2014, 2020, 2018a, 2021a and 2021b).

Finally, another relatively widespread use of FADN has been the estimation of the economic evolution in the regional context, i.e. updating the context/impact indicators, to highlight changes at territorial or sectorial level. But we know that this estimation exercise is not able to capture the contribution of RDPs to these observed changes. The result is a gross and insufficient quantification of the intervention. However, this information can be used as a benchmark within a more refined analysis process.

We have to underline a limitation in the analysis of the current use of the FADN for evaluation in Italy, that is a criticality due firstly to the application of different methodologies in the assessment exercises. This variability, as summarized in Table 3 above, does not let possible comparability among the different evaluations carried out from Italian RDPs. Because of this limitation, it is complex to express a general judgement of these evaluations or propose a meta-evaluation exercise. This limitation can be found also in the European context, since cases of use of the FADN result in the Evaluation Helpdesk overviews as patchy and they do not allow any comparability (European Commission 2021a and 2021b). However, proposing an analysis at Member States level, however parcelled out and complex, and a comparison Europe wide could represent an interesting insight and the next step for this study.

5. Main conclusions and perspectives for the future

In order to assess RDPs' effects, a very specific knowledge is necessary.

The Programmes are very complex and the situations among the Italian Regions are heterogeneous. In addition, the estimation of an indicator, determining the net effects of an intervention, is particularly challenging in situations where data are scarce, RDP uptake is low, or where insufficient time and resources have been devoted to the evaluation exercise (European Commission, 2018b).

The availability of standardized datasets (e.g. ISTAT, FADN, IACS) represents a relevant advantage for the application of quantitative methods and FADN data are confirmed to be very useful. However, their usefulness is conditioned by some critical points (i.e. What if the sample size is too small?), that have to be overcome as presented above: using sample extension methods; activating satellite samples; matching with administrative archives. For RDPs evaluation purposes, these improvements should become a practice in all Regions, as a path to better identify causal effects, in the light of potential generalization and lacks the evidence gathered (European Commission, 2021a).

In the view of enlarging the FADN regional sample, considering other regions where a similar measure is applied could represent an interesting opportunity; therefore, the suggested solution to increase the sample size is to include "neighbouring" RDPs. In this process some caveat must been considered: i) using only very similar measures with similar eligibility criteria; ii) including the location of the farm as a control variable; iii) considering a shift of the programme's effect (European Commission, 2021a and 2021b).

Building up a satellite design, as integrative system of samples to the FADN, could improve robustness of analyses in evaluation. This would be helpful especially when there is a lack of information about some specific topics or interventions. Accordingly, satellite samples are made by those farms belonging to a specific measure's regional list of beneficiaries on which FADN methodology is then applied.

As known, it would be desirable to process data both from official and administrative sources, such as FADN or information from Payment Agency or Managing Authority. Considering different databases is always a challenge the evaluator has to be ready to deal with. This topic has led to a growing literature about appropriate methods (Sinabell & Streicher, 2004; Michalek, 2012; European Commission, 2010, 2021a and 2021b). In matching different sources, comparable data are required to perform evaluations and such an approach would improve the validity of the evaluation studies considerably. To get integration of data belonging to different sources, it would be desirable to get the same definition of variables and indicators: this represents one of the main challenges. As regard FADN and monitoring or other administrative sources, we often have to face with a problem of data recording (because some of them are not mandatory and fields are not filled in) or with different definition/range/classification for the same information (Cisilino *et al.*, 2013; European Commission, 2020). Accordingly, this narrows the number of variables that can be used for statistical analysis (Counterfactual analysis, Statistical Matching) and the poor matching in the definition of variables leads to a large use of proxy variables. In this view, greater attention to the integration and the harmonization of information from the early stages of programming has to be the goal. This could be achieved through collaboration of all the subjects involved (Managing Authorities - Administrative information systems, Evaluators, Research sector).

Finally, data quality issue shall be strongly stressed (European Commission, 2021a). As known, data should be available, relevant, and consistent, as well as complete and precise. There should be no problem with the quality of FADN data in terms of completeness and time consistency[8] since a sophisticated quality check is done regularly.

The proposal for the new CAP 2023-27 includes some improvements through a New Delivery Model and organizational approach in relation of a new specific objectives' framework, which may reinforce future evaluations and nudge investigations forward new themes e new approaches, in the light of an innovating governance with the National Strategic Plan. We can then

8. In order to reduce the effects deriving from the rotation of the farms in the sample, a recent statistical weighting methodology has been developed, for stabilizing the results over time.

expect new fields of evaluation and new challenges in the definition of data and their use (Cagliero *et al*., 2021; Cagliero *et al*., 2020).

A data repository such as FADN, based on microeconomic data, therefore has obvious and relevant potential for estimating incomes and any changes triggered in agricultural enterprises, but it is also possible to identify new fields of analysis such as innovation, training and, above all, environmental and social sustainability, or thematic issue, such as agriculture in specific territories. These fields can be the topics to be addressed for future applications of FADN in an evaluation perspective (Cagliero *et al*., 2019; Poppe & Vrolijk, 2016 and 2018) and several evaluation exercises in this sense are already available in Italy (Arzeni *et al*., 2021; Cristiano & Proietti, 2019; Cagliero *et al*., 2018; Cisilino *et al*., 2019). In the view of the future National Strategic Plan, there are significant opportunities to improve the use of data for these issues, compared to the partial underuse that has occurred in the past, and in this sense the FADN improvement indications by the Commission are moving. Furthermore, the FADN can provide basic knowledge on local production systems at the microeconomic level and the strengths and weaknesses of agricultural holdings. This allows not only to highlight or verify any intervention needs but also to provide a baseline as a reference for subsequent evaluations.

Turning back to the Italian experiences, the lack of a systematic link between the databases relating to the agricultural sector and those relating, for example, to environmental parameters on a territorial scale, and the partial absence of functional georeferencing, represent critical points also for the future (Cagliero *et al*., 2019). Probably these limits can be overcome with the transformation of the FADN towards the FSDN (Farm Sustainability Data Network) with the integration of environmental data also through the collection of data on the physical context in which the farm operates (Vrolijk & Poppe, 2021). Anyhow, it can be said that access to data, here understood as dialogue between different databases (e.g. with Agea data or data from six regional Information Systems), is confirmed as a critical point to be addressed and therefore this is the most important challenge in the coming years.

In this light, the governance system that will be adopted for the future National Strategic Plan will also have consequences on evaluation activities. Today, it seems difficult to imagine, especially for interventions deriving from rural development, a single evaluation of the future Strategic Plan, while a framework composed of punctual thematic and territorial evaluations and an overall meta-evaluation at the level of the National Plan is perhaps more likely. The example of the significant variability observed in the exercise here proposed on the competitiveness evaluation in the light of FADN uses brings out a possible critical point that leads to a reflection on applying common metrics in future evaluations.

Indicators are concepts, not only figures and their mere quantification cannot be the final goal of an evaluation process. It is very challenging to quantify impact indicators that are very narrowly defined, and these indicators are often not enough. From this background, the objective should be to achieve a broader view to monitor and analyse changes in the behaviours of farmers in a more consistent and trustworthy manner, using different and integrated sources of information, among which FADN plays an evident and relevant role.

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