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A composite indicator on farm sustainability. The potential of the Italian Census of agriculture

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ABSTRACT

From the Brundtland report, that introduced the "classic" definition of sustainable development, to the Rio Summit, that laid the foundations for its global institutionalization, the concept of sustainability has been at the center of a very vast international debate (1997 Earth Summit, 2002 WSSD, 2012 Rio+20, MDGs 2000, MDGs Report 2015). In the UN2030 Agenda for Sustainable Development, Goal 2 aims to "End hunger, achieve food security and improved nutrition and promote sustainable agriculture" and it will come into effect on January 2016, guiding policy making for the next fifteen years.

Over the past two decades, the scientific literature has tried to describe and measure sustainable development in its various declination (Simon, 1989; Becker, 1997; Parris and Kates, 2003; Moldan et al. 2006; Rao and Rogers, 2006; Hansen, 1996; Raman, 2006), often addressing the complex interconnections that exist between the three dimensions of development: environment, economy, and society. More specifically, a number of different indicator-based methods assessing sustainability of agricultural systems have been proposed (Rosnoblet et al., 2006; Rao and Rogers, 2006 ; Bockstaller C. et al. 2009; Gómez-Limón and Sanchez-Fernandez, 2010; Reig-Martinez E. et al., 2011; Binder et al. 2012 ; Hřebíček et al. 2012).

In this paper, we describe the information collected by the agricultural census and we assess its ability to measure some of the environmental, economic and social factors useful to provide a definition of agricultural sustainability.
The census of agriculture is the principal mean of collecting agricultural statistics, providing a comprehensive source of statistical information for farms and agriculture. It contributes to agricultural planning and policy-making process in a number of areas, including food security, work, gender and environmental issues. The Census timeliness does not allow to considered it a primary source for monitoring Sustainable Development, but it has the potential to provide very valuable information, especially if integrated with other sources.
We propose, therefore, a framework for assessing farm sustainability and build composite indicators for social, economic and environmental aspects of farm sustainability, as well as a general index as combination of the three.
In the construction of the composite indexes, the first step is the translation of a possible generalized concept into a measurable information. The economic dimension considers indicators such as the presence of other gainful activities beside the agricultural one and their weight as a diversification of income sources, the presence of ICT devices, the use of e-commerce, land and labour productivity and the presence of quality certifications; the social dimension takes into account age, education and training of agricultural holders and the stability of jobs within the farm; finally the environmental dimension includes indicators on sources and efficiency of irrigation, organic farming, livestock density, soil protection practices, the use of renewable energy and the presence of energy crops..

Keywords Sustainability; Farms; Composite Indicators; Economy; Agricultural Census

Introduction: the policy context

On 25 September 2015, the United Nations Assembly adopted the post-2015 development agenda (UN 2015 b) in its resolution 70/1: “Transforming our world: the 2030 Agenda for Sustainable Development” -. In the 2030 Agenda for Sustainable Development, Goal 2 aims to “End hunger, achieve food security and improved nutrition and promote sustainable agriculture”.

SDG2 include 5 multidimensional targets, and in particular goal 2.4: “By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality”.

Sustainable development is a fundamental and overarching objective of the European Union, enshrined in the Treaty. Measuring progress towards sustainable development is an integral part of the EU Sustainable Development Strategy (EU SDS) (Eurostat 2013). The EU set of sustainable development indicators (SDIs) has been developed by Eurostat in 2001 and endorsed by the European Commission on 2005. The SDI framework refers to the economic, the social, the environmental, the global and the institutional dimensions and covers ten thematic areas.

Moreover, in the Communication on the Reform of the Common Agricultural Policy (CAP), the European Commission underlines the connection between the Europe 2020 strategy and agricultural development, considering the green growth in the agricultural sector and the rural economy as a way to enhance wellbeing by pursuing economic growth while preventing environmental degradation (European Commission 2010).

2. The Methodology

2.1 Conceptual framework to identify and develop agriculture sustainability indicators

The situation of agriculture needs to be considered in the broader context of sustainable development. Starting from the definition presented in the Brundtland report (1987), which defined sustainable development as development that "meets the needs of the present without compromising the ability of future generations to meet their needs" (UN 1987), sustainable development deals with the inter- and intra-generational aspects of (the distribution of) human well-being. The well-being of future generations is dependent on the resources that the current generation leaves behind. Although the concept of sustainability is open to diverse interpretation, there is broad agreement that the assets that should be preserved for future generations fall under four main types of capital: economic, natural, human and social capital (OECD, 1995, CES 2009).

Over the past two decades, the scientific literature has tried to describe and measure sustainable development in its various declination (Simon, 1989; Becker, 1997; Parris and Kates, 2003; Moldan et al. 2006; Rao and Rogers, 2006; Hansen, 1996; Raman, 2006), often addressing the complex interconnections that exist between the three dimensions of development: environment, economy, and society. More specifically, a number of different indicator-based methods assessing sustainability of agricultural systems have been proposed (Rosnoblet et al., 2006; Rao and Rogers, 2006 ; Bockstaller C. et al. 2009; Gómez-Limón and Sanchez-Fernandez, 2010; Reig-Martinez E. et al., 2011; Binder et al. 2012 ; Hřebíček et al. 2012).

The farm level is where sustainable agriculture practices can contribute to or mitigate negative environmental outcomes and impacts (Russillo, 2009).

Following the Amartya Sen capability approach (Sen 1993, 2000), a farm level approach seems more comprehensive: having certain commodities at the macro level is not enough to ensure sustainability, while the perspective should be the 'functioning and capabilities' determined by a broader range of factors other than the measurement of economic and natural capital.

The farm level approach permits to distinguish among a large number of relevant practices (e.g organic and conventional production, irrigation, soil treatment (vd. Rigby 2001), and the results can then be interpreted to identify key characteristics related to the sustainability performance of the farm.

2.2 Data availability: the Italian Agricultural Census

In order to study agricultural sustainability at farm level, a data constraint seems to arise: farmers have little incentive to collect data on results and impact indicators that have no specific value for them.

The data gathered during the Agricultural General Census provide a complete information base on the structure of the agricultural and livestock system on a national, regional and local level. The data therefore have a strong impact on the development of national agricultural policy and, since the survey is conducted according to rules drawn up on a European level, also represent a fundamental tool for EU agricultural policymakers. The agricultural census collected a wide range of information. The farm questionnaire contains more than 100 variables about the structure (farm size, agricultural production methods, non-farm activities and commercial orientation, age and education of the holder, and so on), and multi-functionality of farming (e.g. the other gainful activities of the holding and non-productive functions, as conservation of rural heritage or agri-ecological systems). The information obtained describes the agricultural world in detail: from the number of firms to the ownership of land, from the use of farming land to the size of livestock holdings, from the manual labour involved to associated economic activities. The data refer to various territorial levels, right down to municipal detail.

The legal basis is Regulation 1166/2008of 19 November 2008 for the farm structure survey (FSS). EU Member States collect information from individual agricultural holdings and, observing strict rules of confidentiality, data are forwarded to Eurostat. The information collected in the farm structure survey covers land use, livestock numbers, rural development, management and farm labour input (including the age, gender and relationship to the holder of the agricultural holding). The survey data can be aggregated by different geographic levels (for Member States, regions, and also districts). The data can also be arranged by size class, use of farming land, legal status of the holding, objective zone, farm type, size of livestock holdings and the manual labour involved to associated economic activities The basic unit underlying the farm structure survey is the agricultural holding: a technical-economic unit, under single management, engaged in agricultural production.

2.3 Analytical framework for the selection of indicators

The analytical framework has been developed in phases. First, we identified a list of the most significant variables of the questionnaire for the description of agricultural sustainability.

The following characteristics have been used to define the farm sustainability: farm land area, utilised agricultural and arable land, permanent grassland, permanent crops, wooded area, organic farming production methods (crop and livestock), products with "quality" labels (Protected Designation of Origin – PDO and Protected Geographical Indication - PGI), irrigated area, irrigation methods, sources of irrigation, crop rotation on arable land, soil cover and tillage practices, livestock, animal housing, manure application techniques, farm work of sole holder's family, farm work of non-family labour (regularly employed and employed on a non-regular basis), age of labour force, working days, training of manager (agricultural training of manager and vocational training undertaken by manager during the last 12 months), landscape features (hedges, tree lines and stone walls). other gainful activities (non-farm work on the holding and work outside the holding), other gainful activities of the holding (directly related to the holding, electronic commerce, Standard Output (SO) of agricultural products (crop or livestock).

Starting from this list, we identified 13 subdomain assigned to the three dimensions of agricultural sustainability: environment (water, organic farming, livestock density, soil and energy), economy (diversification, digitalisation, productivity and quality), and society (risk of abandon, employment, education, landscape).

Environment is the result of complex interactions between nature and anthropic action. The agricultural activities impact on conservation of water resources, soil fertility, soil erosion, animal welfare, human health, and air and water pollution. The farm's choices can have positive or negative effects on the environment. Farms can contribute to the reduction of water losses, choosing appropriate irrigation methods (such as drop irrigation), and the source of irrigation water used on the holding (on and off-farm ground and surface water vs. off-farm water from common water supply networks). Production methods that reduce the use of pesticides, chemical fertilizers, ensuring even animal welfare, as organic farming, promote sustainable agricultural systems than conventional farms. Soil conservation in terms of chemical and physical fertility improve with minimum tillage, crop rotation, soil winter cover, set-aside of agricultural land, manure application and reducing livestock density.

With regards to the social domain, we point out that the agricultural holding has always had a social role in rural communities and on development of territories. Furthermore, it is can generate positive externalities and improve economic competitiveness in the peri-urban areas. Generational renewal in agriculture reduces the risk of farmland abandonment, the young farms (age of holders and other labour force) ensure the continuity farming and can be an opportunity to work for young people. A good education level of the holder and its training in agriculture can promote a more sustainable management of the farm. Agricultural activities describe the landscape (e.g. cultivation area and presence of linear elements such as hedges, tree lines, stonewalls), and the scenic value make rural areas attractive for places to live and for tourism.

Figure 1: *Indicators on farm sustainability in the analytical framework*

Domain/ Subdomain	Indicator	Description
Environment		
Water	Source of irrigation	% of UAA irrigated with water from local sources
	Efficient irrigation	% of irrigation with most efficient technique
Organic farming	Organic agriculture	% of UAA with organic production
	Organic breeding	% of heads of animals bred with organic methods
Livestock density	Livestock density	Livestock units (LSU) per ha of farm's land area plus other pasture areas used
Soil	Wooded area	% of wooded area on Farm land area
	Crop rotation	% of arable land with planned crop rotation
	Tillage	% of arable land with zero tillage
	Soil winter cover	% of arable land with some winter cover
	Manure application	% UAA on which solid/farmyard manure or slurry is applied
	Controlled grassing	% of controlled grassing of fruit trees area
Energy	Renewables	Production of renewable energy
	Energy crops	Plantation of energy crops
Society		
Risk of abandon	Younger family worker	Age of younger family worker
Employment	Employment density	Days of work per ha
	Stability of work	% of days of work carried out by non-regular non-family labour force
Education	Level of education of the manager	Index of level of education (1-9)
	Vocational training	Vocational training undertaken by manager during the last 12 months
Landscape	Landscape features	Linear elements (hedges, tree lines, stonewalls) established or maintained during the last 3 years
Economy		
Diversification	Other gainful activities	Number of other activities
	Most gainful activity	Weight of the most gainful among other activities
Digitalisation	Devices	Use of pc or other electronic devices for holding's activities
	e-Commerce	Use of e-Commerce
Productivity	Land productivity	Standard output per ha
	Labour productivity	Standard output per day worked
Quality	PDO & PGI	% of UAA with PDO or PGI products

Like other economic enterprises, also agricultural holdings have adapted to market changes. Beside the strategies to improve farms' productivity, diversifying production (other gainful activities of the holding: tourism, processing of farm products, production of renewable energy and so on), farms have also been able to respond to new consumer needs by producing quality products (PDO and PGI labels). The modernization of agriculture has also gone through digitalisation of farms (use of PC to plan activities and e-commerce).

In the second phase we built the indicators from the list of variables selected. The selection criteria can be synthetized in: policy relevance, analytical soundness, measurability. All this criteria can be considered met by the Census data, that are agreed among Member States. In particular, variables surveyed by the Agricultural Census are identified as being of importance to policy makers.

The analytical soundness is more complex to asses because it concerns the extent to which the indicator can establish links between agriculture activities and environmental conditions, and thus refers more specifically to the attributes which provide the basis to measure the indicator. It should also be possible for the indicator to explain a link between agriculture and an environmental issue which is easy to interpret and applicable to a wide set of farming systems (OECD 1999).

The criterion of measurability, relates to the appropriate data available to measure the indicator, and it is met by the census data.

As stated before, the chosen indicators (with related data collected during the 2010 Agricultural Census) present the advantage to be significant at farm level, and therefore, they are meaningfully even applied at this micro level. Moreover, the chosen indicators, have often been used in the literature to asses agricultural sustainability.

3. Aggregation methodology

The initial dataset was affected by few missing values, none of the variables counting more than 0.3% of missing. Missing values have being imputed for the risk of abandon of public and private companies, which we considered as minimum (imputing a proxy age of 18). All other missing have been treated by deleting those units which presented at least one missing for one of the 13 subdomains.

All variables have been standardized fixing average equals 100 and standard deviation equals 60, then we have changed the sign of variables with negative polarity. Starting from this new dataset, we calculated subdomains as simple average of variables, domains as simple average of subdomains and sustainability as simple average of the three sub-domains. This aggregation strategy, based on step-by-step averages, has the value of assigning the same weight to sub-domains and domains regardless the number of their components.

We compared the results with other methodologies provided by the Istat-developed software COMIC: these are the min-max method, a z-score (0;1), the Jevons index, the Mazziotta Pareto Index, and a geometric mean. The correlation among methods is extremely high with the exception of the MPI. The min-max seems to be affected by the presence of outliers. These results support the choice we made as a robust one. For a further sensitivity analysis of the method we compared the results by alternatively dropping one on the subdomain variables. Correlations between different overall sustainability indexes remain always above 90%, and seem to be most of all affected when dropping the “risk of abandon” variable.

4. Results

There were 1.6 million farms in Italy in 2010, working 12.856 million hectares of land (the utilised agricultural area) or 42,7 % of the total land area in Italy. The average size of each agricultural holding (farm) was 7,9 hectares. However, there were stark contrasts in the structure of agriculture: on the one hand, there were a large number (50,9%; EU-28 49,1%) of very small farms (less than 2 hectares in size) that farmed a small proportion (5,7 %; EU-28 2,5%) of the total land area that was used for farming in 2010 and, on the other, a small number (1% of all holdings; EU-28 2,7%) of very large farms (over 100 hectares) that farmed 26,2% of the farmland (EU-28 50,2%). Italy holds 13,2% of European farms (second after Romania 31,5%), but only 7,4% of utilized agricultural area and with an average area of holding of 8 hectares vs. 14 hectares of UE-28 (Italy is among the last ten countries in the EU-28.). Indeed, the average size of an agricultural holding in the United Kingdom (90.4 hectares) was six times as high as the EU-28 average in 2010 and more than eleven times the average size in Italy. The number of small and medium size holdings (less than 30 hectares) in Italy decreased in the past decade. However, Italy is the second country in terms of output standard (49.460,3 Eur million, after France with 50.733,2 Eur million).

In the analysis of sustainability and its three dimensions (Environment, Society, Economy), agricultural holdings show quite different results. In general, larger holdings present better results in sustainability, and in every sub-domain (Table 1).

Table 1: *Sustainability Indicators by size (UAA) of agricultural holdings, 2010.*

Size (UAA)	Number of holdings	Percentage	Sustainability	Environment	Society	Economy
Total	1.615.590	100,0	100,0	100,0	100,0	100,0
0-1.000	1.356.861	84,0	99,7	99,7	99,7	99,6
1.000-5.000	208.336	12,9	101,3	101,3	101,3	101,4
5.000-20.000	43.675	2,7	102,8	102,3	103,0	103,2
20.000-50.000	5.186	0,3	103,8	103,1	103,3	105,1

Source: Authors' elaboration on Italian agricultural census subset

According to the agricultural census 2010, on average, "sole holder" holdings are smaller than firms with more structured organization, and holdings that are legal entities have on average a UAA ten times larger than sole holders firms (according to Eurostat data). Individual firms are the smallest (on average), and they represent 96.1 per cent of firms with 76.1 % of total UAA.

The analysis of sustainability in relation to the legal status, best results emerge from public and non profit actors, with the composite indicator on environment slightly higher than the average and very good results in terms of social and economic outcomes, particularly due to the level of education, digitalisation, and diversification; capital societies are characterized by the worst environmental impact but the best economic outcomes, while individual firms present values very close to the overall average.

Table 2: *Sustainability Indicators by legal status and form of management of agricultural holdings, 2010.*

	Number of holdings	Percentage	Sustainability	Environment	Society	Economy
		Legal status				
Sole holder	1.553.298	96.1	99.9	100.0	99.8	99.8
Partnership	41.473	2.6	102.8	101.6	103.2	103.7
Other kinds of personal	5.953	0.4	103.3	100.9	103.4	105.7
Limited company	7.563	0.5	105.0	101.1	107.0	106.9
Mutual company	2.856	0.2	104.8	101.0	105.9	107.5
Public Administration	937	0.1	104.9	101.8	107.3	105.6
Body managing collective propreties	2.231	0.1	104.4	102.0	106.0	105.4
Non-profit	1.054	0.1	104.2	101.2	107.3	104.1
Other legal status	225	0.0	103.5	100.5	105.5	104.4
		Management				
Direct management	1.541.792	95.4	100.0	100.0	100.0	99.9
Management w employees	66.067	4.1	100.6	99.8	100.0	102.0
Other forms	7.731	0.5	102.1	100.8	102.8	102.7

Source: Authors' elaboration on Italian agricultural census subset

Comparing different forms of management (direct management of the farmer, management with employees, other forms), firms with direct management present a lower sustainability level, due in particular to the lower educational attainment of the farmers, with respect to other, more structured forms of management.

Geographical distribution of phenomena is particularly relevant in Italy, where Northern areas presents the highest level of development. The same happens for agriculture sustainability, and Northern Regions perform much better with respect both to our global indicator, and the indicators related to the three subdomains. On the other hand Southern Regions, Sicily, and Sardinia present lower values in every domain.

Table 3: *Characteristics of agricultural holdings by region, 2010 (weighted by UAA).*

	Number of holdings	Average UAA	Sustainability	Environment	Society	Economy
Piemonte	66,747	1657.8	102.1	101.1	102.0	103.0
Valle d'Aosta	3,499	2079.7	103.7	103.9	102.4	104.9
Lombardia	53,680	1968.2	103.9	102.4	104.6	104.7
Veneto	118,850	717.3	102.1	101.0	102.5	102.8
Friuli Venezia Giulia	22,262	1044.8	103.5	102.1	104.2	104.4
Liguria	20,149	245.8	103.1	102.5	102.5	104.3
Emilia-Romagna	72,958	1467.2	102.9	102.7	102.2	103.8
Toscana	72,480	1066.3	103.2	101.2	102.6	105.8
Umbria	36,185	1024.7	102.9	102.5	102.5	103.6
Marche	44,767	1088.0	101.7	101.4	101.2	102.4
Lazio	98,001	831.7	102.2	101.5	102.3	102.8
Abruzzo	66,750	768.4	102.0	101.3	101.5	103.3
Molise	26,236	786.9	100.7	100.5	100.6	101.2
Campania	136,585	444.2	101.4	100.7	101.7	101.7
Puglia	271,545	489.9	100.3	100.3	99.6	101.0
Basilicata	51,710	1079.1	101.5	102.1	100.7	101.7
Calabria	137,378	423.0	101.3	102.1	100.7	101.2
Sicilia	219,049	665.4	100.9	101.4	100.5	100.6
Sardegna	60,329	2111.6	102.3	101.3	104.0	101.7
Bolzano	20,055	4529.1	104.9	106.8	103.0	104.8
Trento	16,375	1093.9	106.6	103.5	104.9	111.4
ITALY	1,615,590	897.6	102.2	101.8	102.1	102.8

Source: Authors' elaboration on Italian agricultural census subset

It is worth noticing that the social sub-domain present broader differences, and that education of the management seems to be a good tool to increase sustainability: digitalisations, for instance, seems to increase overall sustainability in the economic sub domain.

For what concerns continuous variables, we looked at the correlations between the domains and some relevant variables such as UAA, Labour and land productivity, quantity of days of work, as a proxy of the holding's dimension. We see here how the domains of sustainability are positively correlated among them, even the economic with the environmental one. Yet the environmental domain is negatively correlated with both productivity measures, especially with land productivity, highlighting the negative impact of intensive agriculture, in particular on soil quality.

These results show the potential, not yet fully exploited, of building a composite indicator at farm level.

REFERENCES

Bockstaller C. et al. (2009). Comparison of methods to assess the sustainability of agricultural systems. A review. Agron. Sustain. Dev. 29, 223-225.

European Commission (2010). The CAP towards 2020: Meeting the food, natural resources and territorial challenges of the future Brussels, 18 November 2010 COM(2010) 672 final

Eurostat Sustainable development in the European Union— 2015 monitoring report of the EU sustainable development strategy European Commission Luxembourg:

Gómez-Limón Josè A. and Sanchez-Fernandez G. (2010). Empirical evaluation of agricultural sustainability using composite indicators . Ecological Economics.

Hansen, J.W. (1996). Is agricultural sustainability a useful concept? Agr. Sys. 50(1), 117–143.
Moldan B. et al. (2012). How to understand and measure environmental sustainability: Indicators and targets. Ecological Indicators, 17, 4-13.
OECD (2003). OECD Environmental Indicators. Development, Measurement and Use. Reference Paper. OECD, Paris.
OECD/JRC (2008). Handbook on constructing composite indicators. Methodology and user guide. OECD Publisher. Paris http://www.composite-indicators.jrc.ec.europa.eu.
Parris, T. M., Kates, R. W. (2003). Characterizing and measuring sustainable development. Reviews in Advances, 28(13): 1-13.
Raman, S. (2006). Agricultural sustainability. Principles, processes and prospects. Haworth Press, Binghamton, NY (USA)
Rao, N.H., Rogers, P.P., 2006. Assessment of agricultural sustainability. Current Sci. 91(4), 439-448.
Reig-Martinez E. et al. (2011). Ranking farms with a composite indicators of sustainability. Agricultural Economics, 42 (4).
Rigby Dan, Woodhouseb Phil, Younga Trevor, Burtonc Michael (2001) Constructing a farm level indicator of sustainable agricultural practice. Ecological Economics Volume 39, Issue 3, December
Rio Declaration on Environment and Development (1992). Report of the united nations conference on environment and development.
http://www.un.org/documents/ga/conf151/aconf15126-1annex1.htm. Accessed 02.10 2015
Rosnoblet J., Girardin P., Weinzapflen E., Bockstaller C. (2006). Analysis of 15 years of agriculture sustainability evaluation methods. Proceedings of 9th ESA Congress, Warszawa, Poland, 4-7 September, 707-708
Russillo Aimee László Pintér (2009) Linking Farm-Level Measurement Systems to Environmental Sustainability Outcomes: Challenges and Ways Forward, IISP (Canada)
Simon D. (1989). Sustainable Development: Theoretical Construct or Attainable Goal? Environmental Conservation, 16, 41-48.
United Nations World Commission on Environment and Development 1987: 423
United Nations Conference on Sustainable Development (2012). “The future we want”. Rio de Janeiro, Brazil, from 20 to 22 June 2012
United Nations Economic and Social Council, 2002. Implementing Agenda 21: Report of the Secretary-General. Commission on Sustainable Development acting as the preparatory committee for the World Summit on Sustainable Development, Second preparatory session, 28 January – 8 February 2002.
United Nations, 2010. The Millennium Development Goals Report 2010. New York: United Nations.
United Nations, 2015. The Millennium Development Goals Report 2015. New York: United Nations.
UN 2015 b General Assembly Resolution adopted by the General Assembly on 25 September 2015 n. 70/1. Transforming our world: the 2030 Agenda for Sustainable Development
World Commission on Environment and Development, 1987. “Our Common Future”. Oxford: Oxford University Press.