RESEARCH ARTICLE

Assessment of the CAP Payments Impact Using the Index of Berry in some Rural Italian Regions

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Abstract

In Italy there has been after the mid-term review of the Common Agricultural Policy (CAP) a significant reduction of financial subsidies allocated towards farmers and a new reallocation of payments disbursed by the European Union. In fact, lots of indirect payments have been allocated in order to stimulate investments in farms aimed at reducing the socio-economic marginalization in rural areas. The aim of this research was to assess by a quantitative approach such as the Berry Index the impact of financial subsidies allocated to less favored areas and to the rural development on the total amount of financial subsidies disbursed by the CAP since 2004 to 2015 in all Italian regions. Findings have pointed out as the northern Italian regions have had the highest level of Berry Index in terms of financial subsidies disbursed by the Common Agricultural Policy. Positive has been the role and impact of this methodology in order to compare different Italian regions pointing out the pivotal role of indirect payments in reducing the marginalization in rural areas even if the dichotomy between some Italian regions is increasing over the time.

Keywords: Rural development, multifunctionality, second pillar, less favoured areas, FADN.

1. Introduction

Since the early 1970s complying with their obligations established by the Common Agricultural Policy (CAP) the European Union in order to stimulate on the one hand farmers income and on the other the its own food self-sufficiency has allocated towards farms lots of direct payments correlated to the quantity of the yield in commodity production [8], [10], [13], [24], [25]. Lots of reasons such as the enlargement of the European Economic Community, the agreements during the General Agreement Tariffs and Trade (GATT) and in World Trade Organization (WTO) and the requirement of a shrinking in financial resources towards the primary sector have implied a radical change in the CAP [8], [26]. In fact, there has been in the late 1990s and in the early 2000s an increase of decoupled payments and the development of financial subsidies allocated by the European Union [26]. As a consequence of this change in the Common Agricultural Policy strategies the European Commission has chosen to foster two different approaches correlated to the structure of the CAP which are each other completely independent and they have also different target of activity and function. In fact, the Common Agricultural Policy has been structured in two pillars: the first able to support decoupled payment to farmers and the second pillar able to give financial supports and aids aimed at increasing the multifunctionality in the countryside as a consequence of the transition from a productivist model to a post productivist one [5], [13]. [14], [22], [23], [26].

In particular, the second pillar by the Rural Development Programme in each European countries has stimulated the pluriactivity and multifunctionality and within of the second pillar some stayed behind rural areas have benefited from specific financial subsidies allocated in the framework of the Less Favoured Areas (LFA) payments [8], [13], [19], [20], [21], [26].

Many researchers have argued the positive and direct impact of financial subsidies allocated by the second pillar of the CAP in reducing the out emigration from

the countryside and in halting moderately the socio-economic marginalization in rural areas located in many European countries and in particular in some new comer member states after the enlargement in 2004 and in 2007 [5], [8], [10], [11], [12], [13], [15]. In Italy the positive and direct effect of payments and other financial aids allocated by the Common Agricultural Policy via the second pillar have been pivotal in reducing partially the marginalization in disadvantaged rural areas and in other European countries as well [8], [12].

In general, lots of scholars have investigated in depth by a quantitative approach the role and effect of financial subsidies allocated by the CAP in lessening or in halting the socio-economic marginalization in rural areas in many European countries and in protecting the landscape afterwards the reform of the CAP established in 2003 by the European Commission [3], [6]. Quantitative approaches have assessed by Gini Index unbalances in some European states focusing their studies on the role of financial subsidies allocated by the Common Agricultural Policy and in particular investigating the income distribution and its own imbalances in different European countries [10], [11], [13], [18], [19], [20]. Not so common have been the researches throughout a quantitative methodology such as the Berry Index in assessing the payment impacts in some European regions. By contrast, in literature lots of studies of Berry Index have been addressed in estimating the impact of food consumption on the total amount of income and food diversity using either the Berry Index and or the modified Berry Index [1], [2], [4], [7], [17].

The European Commission since the middle 1960s has established and arranged an annual survey on a set of farms aimed at assessing the impact of economic decisions of the European

Union in favour of farmers and towards the rural development called Farm Accountancy Data Network or FADN [9], [11], [12]. The FADN, according to the definition of the European Commission, is a dataset aimed at evaluating both income of farmers, output and input in farms and also different economic impacts of the Common Agricultural Policy on a sample of more than 4 million of farms which have a level of farmer's net income and an endowment of agricultural areas above specific thresholds [9], [10], [11], [12], [13].

The purpose of this paper was to asses by a quantitative approach throughout the Berry Index, in particular by the Transformed Berry Index, via a logarithmic transformation [1], [2], [4], [17] the impact of financial subsidies allocated towards less favoured areas and by the rural development plan to farmers using the Farm Accountancy Data Network since 2004 to 2015 in all Italian regions.

2. Material and Methods

In literature there are lots of researches aimed at estimating by a quantitive approaches some index of diversity [16]. In this paper it has used the transformed Berry Index by a logarithmic transformation of the index proposed by Berry in 1971 aimed at investigating corporate growth and diversification in some firms [4] even if as mentioned before it is uncommon to find the application of Berry Index as a tool able to evaluate the diversity in the Italian countryside and the assessment of the Common Agricultural Policy using the findings published by the European Union in the FADN public database. In general, the Berry index is calculated as:

$$BI = 1 - \Sigma \ w_i^2 \qquad (1)$$

where w_i^2 is the share of LFA payments on the total of financial subsidies and payments allocated by the Common Agricultural Policy in all Italian regions or the share of financial subsidies allocated by the second pillar of the CAP on the total amount of financial supports disbursed by the Common Agricultural Policy in all Italian region over the time of investigation 2004-2015.

If the value of Berry index is close to 0 this implies as an Italian region is able to get the bulk of financial subsidies instead, a value close to 1 implies than every Italian region is able to use the same quantity of financial subsidies investigated. In case of Transformed Berry Index (TBI) the higher is the value of TBI the higher is the capability of each Italian regions in using the same quantity of financial subsidies.

In order to increase the comparability among all Italian regions it has transformed by logarithm the Berry Index (TBI) estimated as mentioned above hence, in mathematical terms the formula is [2], [4]:

$$TBI = \ln[(BI)*(1-BI)^{-1}] \qquad (2)$$

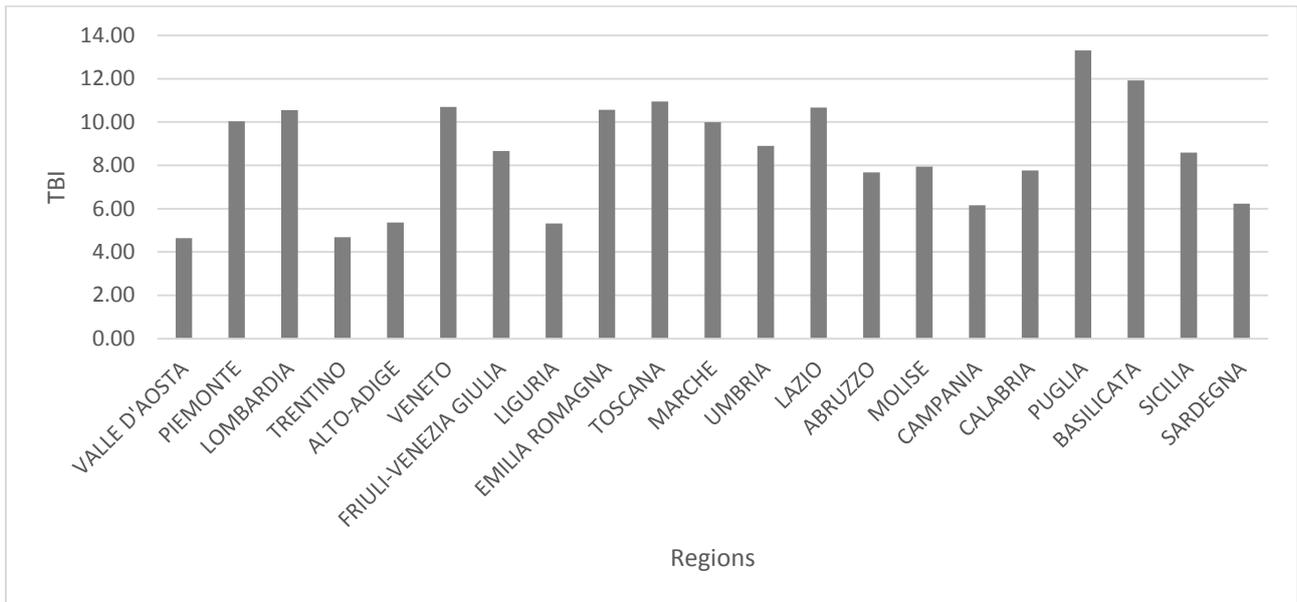where BI is the Berry Index calculated as mentioned in (1).

Figure 1. Transformed Berry Index between Less Favoured Areas supports on the CAP financial subsidies allocated by the European Union in the National Rural Development Plan *(Source: Author's elaboration on data http://ec.europa.eu/agriculture/rica/database/database_en.cfm).*
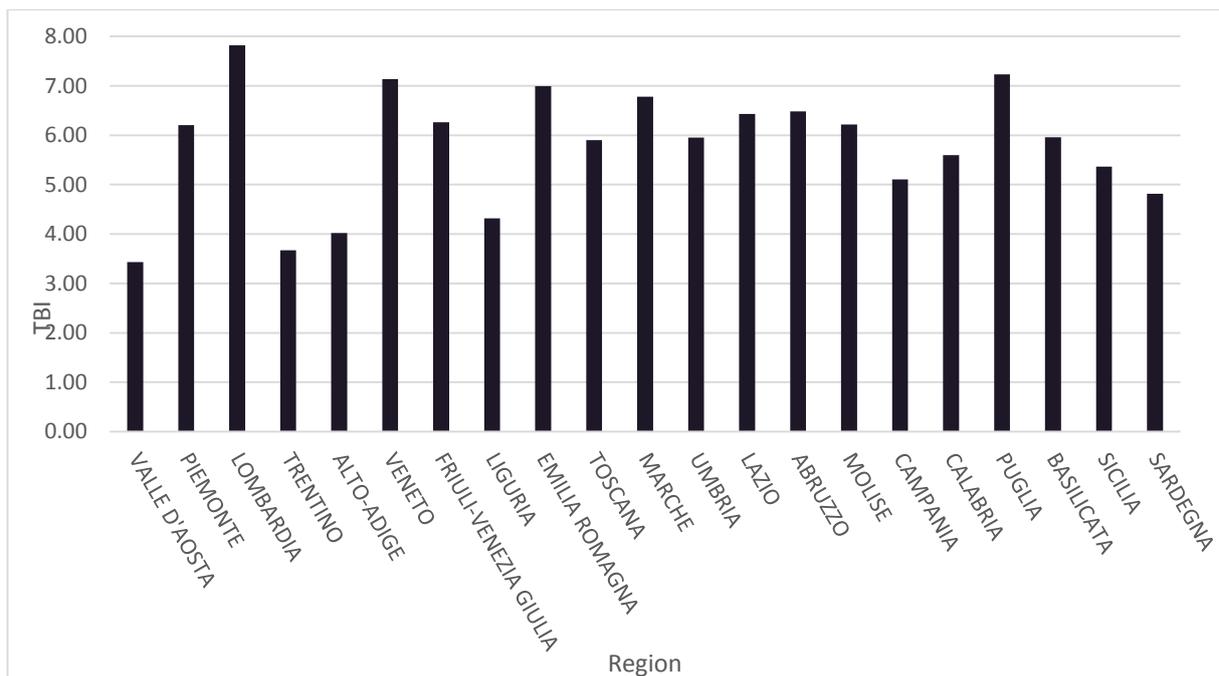

Figure 2. Transformed Berry Index between Rural Development Plan (RDP) financial supports and payments on the Common Agricultural Policy financial subsidies *(Source: Author's elaboration on data http://ec.europa.eu/agriculture/rica/database/database_en.cfm).*

3. Results and Discussion

Focusing the attention on the variable Less Favoured Areas payments on the total amount of subsidies allocated by the Common Agricultural Policy, research findings have pointed out in Italy a value equal to 8.72 and significant fluctuations have been highlighted among regions (Fig. 1). In fact, the Italian regions located in the centre and south of Italy have had higher values than the northern Italian regions

even if the peak in the amount of Transformed Berry Index between the variable LFA financial supports on the CAP total amount has been found in Lombardia which is characterised by small farms scattered in mountainous areas which need of a significative level of financial support towards disadvantaged rural areas.

Table 1. Main descriptive statistics of Transformed Berry Index (TBI) in all Italian regions since 2004 to 2015 *(Source: Author's elaboration on data http://ec.europa.eu/agriculture/rica/database/database_en.cfm).*

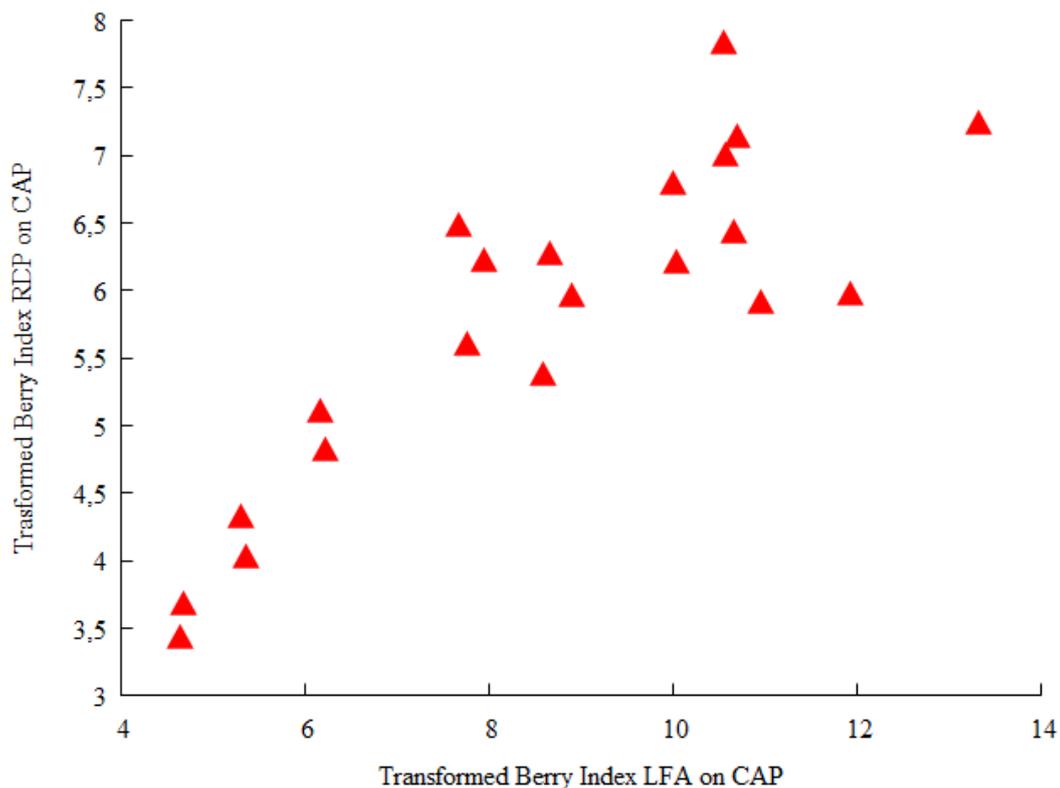| Variable	Average	Median	Min	Max
Less favored areas on Common Agricultural Policy funds	8.601	8.663	4.643	13.314
Rural Development Plan subsidies on Common Agricultural Policy funds	5.795	5.961	3.430	7.820
Variable	**Std. dev**	**Variance coeff.**	**Asymmetry**	**Kurtosi**
Less favored areas on Common Agricultural Policy funds	2.501	0.290	-0.092	-0.990
Rural Development Plan subsidies on Common Agricultural Policy funds	1.203	0.207	-0.463	-0.615

Figure 3. Main correlations between the Transformed Berry Index (TBI) made by Less Favored Areas on Common Agricultural Policy funds and the Transformed Berry Index (TBI) Rural Development Plan subsidies on Common Agricultural Policy funds *(Source: Author's elaboration on data http://ec.europa.eu/agriculture/rica/database/database_en.cfm).*

The outcomes in this research of Transformed Berry Index value of financial subsidies allocated by the European Commission in order to promote the Rural Development Plan (RDP) on the total amount of financial supports and aids disbursed by the Common Agricultural Policy have pointed out in Italy a value close to 6.23 which implies the highest ability in using the financial subsidies allocated by the RDP. In Lombardia has been assessed the highest level of Transformed Berry Index Rural Development Plan subsidies on total subsidies allocated by the Common Agricultural Policy (Fig. 2). In the southern Italian regions, the highest level has been found in Puglia instead the lowest has been pointed out in Sardegna region. Comparing all Italian regions, the modest value has been estimated in Valle d'Aosta region and in Trentino as well.

Addressing the analysis on the Transformed Berry Index in Less Favored Areas on Common Agricultural Policy funds and in the variable Rural Development Plan subsidies on the total amount of subsidies allocated by the Common Agricultural Policy findings have had an average value close to 8.6 and 5.79 with a variance in terms of standard deviation equal to 2.5 and 1.2 (Tab. 1).

Table 2. Main correlations in the linear regression model. Dependent variable is Transformed Berry Index (TBI) Less Favored Areas on Common Agricultural Policy funds in all Italian regions since 2004 to 2015 *(Source: Author's elaboration on data http://ec.europa.eu/agriculture/rica/database/database_en.cfm).*

Variable	Coeff	St. error	t-value	p-value	significance
Constant	2.24	0.48	4.65	0.0002	***
TBI Rural Development Plan subsidies on CAP funds	0.41	0.06	6.94	1.28e-06	***

*** P<0.001

The highest values of fluctuation between min and max value has been assessed in the variable Less Favored Areas on the Common Agricultural Policy funds; by contrast the variable Rural Development Plan subsidies on the Common Agricultural Policy funds has pointed out the poorest range between max and min values.

Figure 3 shows the main correlation between the Transformed Berry Index variables assessed in Less Favored Areas and in Rural Development Plan subsidies on the Common Agricultural Policy funds. Findings have pointed out as the poorer is the amount of TBI in LFA payments the more modest is the TBI in Rural Development Plan variable.

In general, the dependent Transformed Berry Index RDP on CAP correlates directly to the regressor TBI LFA on CAP with a p value lower 0.001 (Tab. 2). The R^2 and adjusted R^2 have pointed out as a value equal to 0.73 and 0.72 hence, more than 70% of the variance is explained by the model of linear regression. The statistical test has highlighted as there is not heteroscedasticity and errors are distributed normally even if findings in some tests have pointed out a structural break in the time series of data investigated in all Italian regions.

4. Conclusions

In all Italian regions financial subsidies allocated by the Common Agricultural Policy have had a fundamental impact in the development of rural areas halting the rural emigration from rural territories. Outcomes in the Transformed Berry Index have had the highest value in the Less Favoured Areas payments than in financial subsidies for implementing the rural development.

Summing up, Lombardia and in Veneto have intercepted the highest level of financial subsidies for the development of less favoured areas compared to the indirect payments allocated in order to getting better the rural development by measures and initiatives with

a tightly nexus to the multifunctionality such as rural tourism.

For the future it is important to recalibrate the different items allocated in the financial subsidies disbursed by local authorities in a perspective of holistic growth in rural territories specifically in stayed behind rural areas which have suffered of an increasing emigration and socio-economic marginalization.

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