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Analysing the impact of subsidies on the Albanian agriculture sector

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Abstract

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This paper analyses the impact of government subsidy schemes on the Medicinal and Aromatic Plants (MAPs) sector in Albania, applying the Propensity Score Matching Method combined with the “veteran” approach. The paper is based on a structured survey applied in 2015 in the region of Shkodra (northern Albania), the region where MAPs cultivation is concentrated. Results suggest that subsidies have affected the planted area in the year when they are obtained, and partially the yields, but have no impact on price (proxy for quality). The paper contributes to the literature not only in terms of the relevant empirical findings but also regarding the benefit of applying combined methods in policy impact assessment.

Keywords: agricultural subsidies; impact assessment; propensity; score matching; veteran approach; medicinal plant; aromatic plant; Albania

List of abbreviations: CAP – Common Agriculture Policy; CDF – Coupled Payments; CSAs – Case Study Areas; EC – European Commission; EU – European Union; FADN – Farm Accountancy Data Network; GARCH – Generalized Autoregressive Conditional Heteroscedasticity; GMM – Generalized Method of Moments; GTAP – Global Trade Analysis Project; MAPs – Medicinal and Aromatic Plants; OECD – Organization for Economic Co-operation and Development; PSM – Propensity Score Matching; RDP – Rural Development Programme; SPS – Single Payment Scheme

Introduction

Agrifood sector is among the most important economic sectors in Albania, contributing to about fifth of the GDP and accounting for about half of the employment (FAO, 2019). Within the agrifood sector, Medicinal and Aromatic Plants (MAPs) collection and cultivation is one of the most important subsectors. It is an important source of income for many rural households in Albania. The income from the collection of MAPs account for 30-40% of household income in selected northern Albania regions. Thus MAPs represent the most important forestry sub-sector in terms of involvement of members of mountainous areas communities and a major income source for their households. MAPs can be found throughout the country, though some regions have a special concentration like Malësi e Madhe (Shkodra) – our survey area (Skreli & Imami, 2018).

MAPs have a strong export orientation. Albania has been a world player in the supply of MAPs, especially in the case of sage which is one of the main wild MAPs collected and by far the main cultivated MAP in Albania. Supply of wild MAPs is decreasing, due to damaged MAPs resources and a reduced labour force in mountainous areas (caused by migration). This declining trend in wild MAP collection is compensated by the growing importance of cultivation, which has been stimulated by Albanian government subsidy schemes (Imami et al., 2015).

The number of farmers cultivating MAPs at the country level is above 4 000 – more than 90% of them are located in Shkodra. The total area cultivated with MAPs in Albania reached 5 000 ha in 2014, out of which 4 106 ha (or 80%) were cultivated in the Shkodra district (most of which in the administrative unit of Malësi e Madhe). Most farmers in this region started cultivation in early 2010s. Main reasons for farmers' engagement in MAPs cultivation include the presence of processors/exporters, high profitability, and support by a government subsidy scheme (Imami et al., 2015).

Agricultural support schemes have combined two elements of support, namely direct payments and investments. The purpose of the implementation of these schemes has been to increase production in the most important agricultural sectors, including MAPs. Since 2012 MAPs have been a priority sector of support, aiming at increasing cultivated area, by covering 50% of investment project cost, typically investment in new cultivated areas. During 2012 – 2014, each year, approximately 200-300 farmers benefited from such governmental support. After 2014, the support for the MAPs sector was phased out (reduced significantly) (FAO, 2019).

There have been concerns about the evolution of the MAPs sector, related to the subsidy scheme. Overproduction (triggered also by the subsidy scheme) has resulted in dramatic price decrease of sage, the main cultivated MAP (which is also the focus of this paper) (FAO, 2019). Despite the importance of this sector and the significant support from the government, there has been no study on the impact of the governmental support schemes.

This paper aims at analysing the possible impact of governmental support/subsides on the MAPs sector. We investigate 3 key outcome variables: cultivated area (with MAPs), yield which can be considered as a proxy for technology transfer, and price which can be considered as a proxy for quality, by comparing beneficiaries (of governmental subsidy schemes) with non-beneficiaries (control group).

The paper uses a quasi-experimental design by applying Propensity Score Matching Method (PSM) as well as the "veteran" approach attributing the difference between two groups to the subsidy (treatment). Namely, in the case of PSM we compare beneficiaries (of governmental subsidy schemes) with non-beneficiaries (control group), while in the case of the "veteran" approach, we compare veteran and new participant groups to assess the «impact» of the subsidy. Analysis is based on a structured survey applied in 2015 in Malësi e Madhe (in the region of Shkodra), where MAPs cultivation is concentrated. The empirical research was developed and its findings are analysed in the context of the existing literature on policy impact assessment which are explained below.

Literature review

There has been a growing body of literature on the analysis of the effectiveness of agricultural support programmes all over the world. Research varies by country, sector, indicator, method and time. This review aims at demonstrating this diversity in Europe, since Albania is situated in Europe and aims to become an EU member state in the future.

A significant part of the studies analysing the effectiveness of European agricultural support programmes focuses on agricultural production and productivity impact. Salou et al. (2017), for instance, analysed the impact of quota removal on French dairy production with a partial equilibrium ex-ante model and confirmed that quota removal would cause an increase in milk production in the European Union. The authors also found that quota removal alone had limited impact on the redistribution of production across dairy systems. In terms of productivity, Minviel and Latruffe (2017) in their meta-analysis of the literature argue that 25% of the models find a significant positive effect; around 50% find a significant negative effect, while the rest report non-significant effects of agricultural support policies on farms' technical efficiency in Europe. Their results also reveal that when subsidies are modelled as an additional output in the efficiency calculation, their effect on technical efficiency is commonly found to be positive.

Besides agricultural production and productivity, a certain amount of literature is dedicated to the analysis of agricultural and food prices related to agricultural support. In this regard, Rezitis and Stavropoulos (2010), for instance, analysed the price volatility effect of the CAP on Greek beef supplier farms by using a Generalized Autoregressive Conditional Heteroscedasticity (GARCH) process on Greek farm level data for 1993-2005. Results showed that the change of the EU price support regime, after 2006, had negative effects on beef production level in Greece. International evidence from OECD (2007) calculations using the general equilibrium GTAP (Global Trade Analysis Project) model for 2005-2013 confirms that the CAP has in the past distorted both the level and the volatility of world market prices to the detriment of farmers in developing countries. We have also included prices in the empirical analysis of this paper.

Land markets are also a popular area of policy analysis in Europe whereby various studies are dedicated to the analysis of land prices, rental prices and land use in relation with the CAP. Under this topic, most of the studies have focused on the impact of direct payments on land prices and concluded that these payments are highly capitalised. For example, Feichtinger and Salhofer (2013), by applying a meta-analysis of the literature, indicated that a 10% decrease of agricultural support would decrease land prices by 3.3% to 5%, implying that large part of the farm subsidies is absorbed by the land owners instead of operating farmers. Klaiber et al. (2017) also investigated the capitalisation of the SPS into agricultural land rental prices by applying fixed effect regression model on Bavarian farm-level panel data for 2005-2011 and found strong capitalisation effects, especially after 2009. On average, the marginal effect on rental rates of an additional SPS euro was found to be equal to 37 cents, growing over time to 53 cents as harmonisation developed. We have not included the impact on the land market in our empirical analysis, because, on one hand, land market is weakly developed in Albania (FAO, 2019), while on the other hand, the impact on land market takes longer time that the time span which is included in our analysis.

A major stream of the literature is dedicated to the investigation of the impact of CAP measures on structural changes of agricultural holdings. Generally, studies conclude that the CAP has high impact on farm structures in Europe, though results are mixed on concrete directions. Bartolini and Viaggi (2013) analysed the determinants of changes in EU farm size based on data obtained from a 2009 survey of over 2363 farm households in 11 Case Study Areas (CSAs) in 9 different European Countries. By applying simulation modelling, the authors find that single payments scheme models affect the changes in demand and CAP abolishment strongly reduces the intention to increase the amount of farmed area. Geographic variables, farm characteristics as well as the number of on-farm employees are found to be relevant to explain the planned farmed area expansion. As another side of the coin, Tocco et al. (2013) examined the determinants of exit from agriculture of CAP payments in France, Hungary, Italy and Poland in 2005-2008 by bivariate profit models and found that total subsidies were negatively associated with the out-farm migration of agricultural workers in Hungary and Poland, implying that the CAP hindered labour exit from agriculture. Conversely, results were exactly the opposite for France and Italy, representing ‘Old Member States’. Also our paper deals with the impact of the support schemes on farm size and structure, namely the cultivated area (under MAPs).

Another strand of the literature deals with the analysis of agricultural support on rural employment and jobs. There seems to be accordance in most of the studies that the CAP generally had a negative impact on agricultural and rural job creation in Europe. The latest and most comprehensive work on the impact of CAP on rural jobs was commissioned by the European Parliament and was written by Schuh et al. (2016). Their study found that CAP Pillar I payments have had a negative impact on agricultural and rural job creation. Evidence suggests that Pillar I payments have prevented outmigration of small and family farms and at best maintain jobs in the sector but do not create new jobs. However, Pillar II payments have been found to be more effective in creating rural jobs, mainly in cases where resources are highly focused and integrated. The diversification of agricultural activities helped to create new job opportunities.

Another area of studies focuses on analysing the impact of CAP on rural income levels. In this respect, the European Commission suggests that direct payments have made a significant share of farm income in Europe, with large variations between member states and type of farming (EC, 2015). Severini et al. (2016) investigate the role of direct payments in the variability of farm income in Italy based on a constant FADN sample of 2 402 Italian farms during the decade 2003-2012 using a Taylor’s series expansion model. Results show that the income stabilising role of direct payments increases as the share of direct payments in total farm receipts increases. Ciaian et al. (2015) analysed the income distributional effects of the single payment scheme (SPS), coupled payments (CDP) and rural development programme (RDP) of the EU by using a micro level FADN dataset for EU-15 countries covering the period 1999-2007 and employing the GMM estimator. According to their results, farmers gain 66-72%, 77-82% and 93-109% from the CDP, SPS and RDP respectively. Thus in terms of farm income, the most transfer-efficient policy instrument seems to be the RDP, followed by the SPS, whereas the least effective is CDP.

In the case of Albania, there has been limited research on policy impact assessment. Skreli et al. (2014) analysed the impact of the public extension services in Albania, applying Propensity Score Matching Method, based on a structured survey – the results show that government extension service has had no net impact on increasing farm size or cultivated area. Skreli et al. (2015) focused on the analysis of government subsidy schemes on farm production capacity, technical efficiency and use of idle production factors on olive and vineyard sectors of Albania, using again Propensity Score Matching Method. Results show that government subsidy scheme had a net positive impact on cultivated area, and on part-time on-farm employment. On the other hand, no significant net impact was observed regarding farm size and crop yields.

Overall, it seems that impact of agricultural support programmes is diverse. There is nothing like a clear and simple statement whether support makes positive or negative changes in the sector. However, results vary to a great extent by country, method, sector and time, creating more lessons and cases than ‘black or white’ effects.

Material and Methods

Quasi-experimental design using Propensity Score Matching (PSM) method has been used to create two similar groups from a randomly selected sample, a group composed of subsidised farmers (treated group) and another composed of non-subsidised farmers (control group). Conceptually, PSM is based on the counterfactual approach. From a pool of treated and control group subjects, PSM enables finding observations from non-treated subjects that are (on average) similar to the control group subjects on as many criteria as possible with the exception of the treatment itself. Following the work by Rosenbaum and Rubin (1983; 1985), Rubin and Thomas (1996), Sekhon (2011) and Stuart et al. (2011) PSM has become an increasingly popular approach to estimate causal effects in impact evaluation.

The goal of matching is to adjust the data prior to the parametric analysis assuring that (1) the relationship between *Ti* and *Xi* is eliminated or reduced and (2) bias and inefficiency is reduced. As a result, one obtains a subsample with more similar observations with lower variation, in equation (1):

$$\check{p}(X|T=1) \sim \check{p}(X|T=0), \quad (1)$$

where, *Xi* stands for the variable used for the matching process (such as farm size in our case), *Ti* represents the treatment whereas $\check{p}$ refers to empiric density of the data (sample or subsample) and not the density of population (Ho et al., 2007).

For matching (creation of similar groups for treated and control groups), MatchIt procedure of R was used. MatchIt is designed for causal inference with a dichotomous treatment variable and a set of pre-treatment control variables. MatchIt works for experimental data but is usually used for observational studies where the treatment variable is not randomly assigned by the investigator, or the random assignment goes awry (Stuart et al., 2011).

To obtain similar (treated and control) groups we used several independent variables in the logistic regression to achieve matching, and concluded that farm size in 2012 was dominant, and adding other variables worsened the indicators because they were correlated to the farm size in 2012. We used several matching techniques, such as simple matching, full matching, nearest matching with calliper 0.15, 0.2, 0.25 and 0.3, before opting for calliper 0.25.

We applied matching calliper = 0.25 and obtained only 44 observations in each group as shown in Table 1 below.

Table 1. PSM table sample size

Sample size	Control (non-beneficiaries)	Treated (2012 beneficiaries)
All	111	57
Matched	44	44
Unmatched	67	13
Discarded	0	0

The absolute standardized bias is an indicator of PSM quality; it is calculated as $\frac{|\bar{\bar{X}}_t - \bar{X}_t|}{\sigma_c}$ (Stuart and Rubin, 2008). Absolute standardized biases greater than 0.25 are considered particularly problematic (Ho et al., 2007). In our case, the absolute standardized bias is low, namely = 0.12 (Table 2), which is lower than 0.25. For the newly obtained group, we observe no significant farm size differences for 2012 (sig = 0.588).

Table 2. PSM obtained groups farm size statistics

Summary of balance for matched	Farm size 2012
Means Treated	17.0455
Means Control	16.0682
SD Control	8.2445
Std. Mean Diff.	0.0605
Absolute Standardized Bias	0.12
Sig	0.588

After obtaining the new groups/subsamples through PSM, we run simple regression models, as shown in formula (2):

$$Y = a_0 + a_1X + a_2T + \varepsilon, \quad (2)$$

where, *Y* stands for outcome (yields and prices) in 2014, *X* for outcome variable in 2012, *T* is a dummy variable for the treatment (1 for treated group (beneficiaries in 2012), 0 for the control group).

Including the treatment as well as the planted area in 2012 and 2014 in the above model, resulted in biased coefficients, because the planted area in 2012 is an endogenous variable. Therefore, the relation between these variables has been analysed through correlation, applied to the obtained subsamples.

Esposti (2017) shows that implemented eligibility rules may determine very heterogeneous groups and differences between beneficiaries and not beneficiaries, which is one of the limitations of the PSM method. To tackle this limitation, we use an alternative and complementary approach of analysing the impact of treatment/support in this paper. The veteran approach aims at analysing comparisons between group of beneficiaries that have benefited in the past (named veteran) versus new entrants. The rationale behind is that new entrants should be similar to the veteran, since they follow a similar screening process, capturing also the entrepreneurial initiative, however, the veteran, having benefited in advance, might perform differently compared to new entrants, and the difference might be attributed to the treatment. Veteran approach has been applied to assess the impact of microfinance in developing economies (Karlan, 2001).

In the first phase we run two tests, one t-test for independent samples and t-test for pared samples. T-test for pared samples compares the mean difference between our samples and 0. T-test for independent samples compares the difference of mean between two groups.

As to our sample and data collection, the MAPs farm survey was based on structured questionnaires, obtaining information on several variables that were used for the matching and comparative analysis (see the following section). The questionnaire was based on extensive literature review. It was initially tested in the field and was further improved after the testing.

The survey was carried out during 2015 in Malësi e Madhe (administrative unit within the region of Shkodra) – the choice of the region was done based on its role and weight in the MAP sector (explained in the introduction). The sample includes 168 sage farmers including both beneficiaries and non-beneficiaries of subsidies.

Data were entered into excel based database and were analysed using R.

Results and Discussion

In the following subsections we analyse the net effect of government subsidy on the MAPs sector for three types of outcome, namely planted area, yield and price.

Net effect of government subsidies on planted area

According to the veteran approach, we compare planted area between 2012 beneficiaries (representing the veterans) and 2014 beneficiaries (representing new entrants). It seems that there is no statistically significant difference between the two groups (t-test = -1.220 and sig = 0.225 > 0.05). Mean of planted surface in 2014 of the veteran group (2012 beneficiaries) was 30.00 dynym, whereas the mean of planted surface in 2014 of the new entry group was 25.39 dynym – the difference is not statistically significant. Furthermore, the variance of the data is similar across both groups (F = 1.151, sig = 0.285 > 0.05) (Table 5).

Both groups experienced a growth in planted area size, but the growth was significantly higher for the new entrants as confirmed by t-pared tests. When comparing planted area differences over the years (2012 to 2014), it can be observed that the veteran group has smaller increase (average differences is 12.281 dynym), whereas for the new entry group this value is 19.5451 dynym because the mean of differences was also statistically significant (t = 2.547, sig = .012) (Table 3).

After using the PSM method**,** we run Pearson correlation to analyse the relationship between planted areas in the two years analysed and the treatment. The support schemes are found to have a positive immediate impact on cultivated area in the year when they are allocated. In addition there is a positive correlation between the planted areas for both years, but there was not significant correlation between the treatment and the planted area in 2014 (Table 4).

Table 3. Paired sample tests

Paired samples test	Paired differences			t	df	Sig. (2-tailed)	Comparison of the mean of differences between groups
	Mean	Std. Dev	Std. error mean				
Planted area 2014 – planted area 2012 (Beneficiary 2012 – Treated)	12.281	12.905	1.709	7.184	56	0.000	t = 2.547 (sig = 0.012)
Planted area 2014 – planted area 2012 (Beneficiary 2014 – Control)	19.5451	18.845	2.237	8.697	70	0.000	
Price 2014 – Price 2012 (Beneficiary 2012)	-24.825	31.052	4.113	-6.036	56	0.000	t = 0.12 (sig = 0.905)
Price 2014 – Price 2012 (Beneficiary 2014)	-24.085	37.324	4.43	-5.437	70	0.000	
Yield 2014 – Yield 2012 (Beneficiary 2012)	0.50351	0.86354	0.11438	4.402	56	0.000	t = -2.314 (sig = 0.022)
Yield 2014 – Yield 2012 (Beneficiary 2014)	-0.2507	2.33476	0.27709	-0.905	70	0.369	

Table 4. Correlation of planted area and treatment

		Treatment	Planted area 2012	Planted area 2014
Treatment	Pearson Correlation	1	.255*	.030
	Sig. (2-tailed)		.016	.784
	N	88	88	88
Planted area 2012	Pearson Correlation	.255*	1	.802**
	Sig. (2-tailed)	.016		.000
	N	88	88	88
Planted area 2014	Pearson Correlation	.030	.802**	1
	Sig. (2-tailed)	.784	.000	
	N	88	88	88

* Correlation is significant at the 0.05 level (2-tailed)

** Correlation is significant at the 0.01 level (2-tailed)

Table 5. Independent sample tests

Independent samples test	Treatment	N	Mean	Std. Dev	Std. error mean	Levene's test for equality of variances (F)	T-test for equality of means
Planted area 2014	Beneficiary 2014	71	25.39	20.015	2.375	1.151 (sig = 0.285)	-1.220 (sig = 0.225)
	Beneficiary 2012	57	30	22.663	3.002		
Planted area 2012	Beneficiary 2014	71	5.94	4.212	0.5	31.289 (sig = 0.000)	-6.425 (sig = 0.00)
	Beneficiary 2012	57	17.72	14.725	1.95		
Price 2014	Beneficiary 2014	71	132.54	5.269	0.625	0.525 (sig = 0.470)	0.084(sig = .933)
	Beneficiary 2012	57	132.46	5.355	0.709		
Price 2012	Beneficiary 2014	71	156.62	33.464	3.971	0.102 (sig = 0.75)	0.115 (sig = .909)
	Beneficiary 2012	57	157.28	30.736	4.071		
Yield 2014	Beneficiary 2014	71	2.0408	0.21816	0.02589	12.972 (sig = 0.000)	2.451(sig = .016)
	Beneficiary 2012	57	2.1439	0.25001	0.03311		
Yield 2012	Beneficiary 2014	71	2.2915	2.37413	0.28176	0.142 (sig = 0.707)	2.005(sig = .047)
	Beneficiary 2012	57	1.6404	0.6782	0.08983		

Net effect of government subsidy on price

According to the veteran approach, we compare prices between 2012 beneficiaries (veterans) and 2014 beneficiaries (new entrants). A decrease in average prices for both groups from 2012 to 2014 is observable (sig = 0.00, Table 5), but there are no statistically significant differences in the level of prices (sig = .933, sig = .909, Table 3) as well as in the level of price decrease between both groups (t = .120, sig = .905). Thus, the treatment is not found to have had an impact on price (e.g. the difference in price levels between both groups), which can be considered as a proxy for quality.

Following PSM method, we also run a regression to assess the potential net impact of government subsidy on price (differences between both groups), controlling for price in 2012. As Table 6 below shows, there are no statistically significant differences between the groups – thus, the treatment is not found to have had an impact (Table 6).

Table 6. Impact of treatment on price using PSM

Model	Coefficients	Sig.
	B	
(Constant)	129.982	0.000
Treatment	1.692	0.235
Price 2012	0.014	0.458

Net effect of government subsidy on yields

Following the veteran approach, we also analyse yield which can be considered as proxy for technology transfer/progress. The comparison of mean of differences confirms that there is a significant difference between both groups – the 2012 beneficiary (treated) group seems to perform better (Table 3 and Table 5).

As to the PSM method, we also run a regression to analyse relationship between price in 2014 and treatment controlling for yields in 2012. As Table 7 below shows, there are no statistically significant differences between both groups – thus, the treatment is not found to have had an impact.

Table 7. Impact of treatment on yield using PSM

Model	Coefficients	Sig.
	B	
(Constant)	2.476	0.000
Treatment	-0.092	0.454
Yield 2012	-0.147	0.128

Conclusions

Results show that support schemes have an immediate impact on cultivated area in the year when they are allocated. Following the veteran approach, the control group which represents new beneficiaries (who benefited subsidy in 2014) marked a higher growth than the treated group, which had benefited the subsidy in 2012. Thus, the farmers, tend to expand the cultivated area benefiting from the subsidy, and the growth of cultivated area is much lower in other years (when farmers do not benefit subsidies), demonstrating that subsidy is a key driver of cultivation decision among farmers in the immediate year when they benefit the subsidy. As such, the policy of subsidizing new cultivated area is a key determinant of farm behaviour and decision-making regarding new investments (in cultivated area with MAPs), thus the policy acts as a guide/orientation in this context. The strong drop in MAPs prices that have taken place recently (after the survey was conducted), which is partially caused by a strong increase in production from cultivated sage (the main MAP cultivated in Albania) can be attributed to the underlying support policy.

Results also suggest that subsidy schemes are not found to have an impact on price (which is a proxy for quality). This is in line with our expectations, since the support scheme subsidized only increased cultivation area, thereby could not have contributed to improved quality (and consequently higher price). We therefore recommend that new support schemes in the future should integrate components that aim at improving quality (e.g. encouraging technological progress), which may include technical assistance or investments that result in improved technology and thereby also quality.

As to yields, results should be taken with caution since sage enters into full production in the third year, thus the differences in yield might be attributed (partially) to this effect. This is one of the limitations of the study – comparison can be best done (in the case of yields) when the new cultivation of the control group has entered into full production. Thus, such aspect should be considered when carrying out impact assessment in the agriculture sector following quasi-experimental approach.

Another limitation of this paper is that it neglects potential impact on employment and income – future research work may consider these aspects too. Last but not least, this study has not assessed the impact on land market prices (which is one of the main topics of research interest related to agriculture support schemes impact assessment). This is particularly important because the direct impact on increased land utilization is expected to result in increased land prices (sold or rented) in the future, just like in the case of EU countries.

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