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Abstract
This paper evaluates the impact of two programs that provide public and private goods, in the form of irrigation canals and materials (such as hail nets). Using a twelve-year panel of wine producers from Mendoza and San Juan, Argentina, we find that the programs have had positive and significant impacts on production and yield. We also find that the programs present important complementarities, in the sense that being exposed to the two interventions increases the outputs more than the mere sum of the separate interventions.

Key words: Program evaluation, Agricultural extension services, Wine production
JEL codes: H41, Q18

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1. Introduction

Developing countries assign a large amount of their annual budget to finance programs to assist agriculture producers. From a public policy perspective, this presents the important challenge of having reliable quantitative measures to evaluate the impact of these programs.

Interventions to improve farmers' welfare and production involve different types of assistance such as providing infrastructure (mainly irrigation channels and electricity networks), technology equipment, inputs provision, market access, and specific knowledge by training and fostering the adoption of technologies and practices.

There is an ongoing debate on whether using public expenditure to provide public goods (such as irrigation canals) and/or whether using public expenditure to provide private goods (such as hail-resistant nets). The rationale of using public funds to provide private goods is mainly related to restrictions in financial markets. Given restrictions in financial markets, the access to credit in order to finance potentially profitable investments is not really an option for most small and medium producers in developing countries. Other literature relates the provision of private goods in agriculture to the absence of insurance markets to protect producers from natural disasters. Furthermore, even if insurance markets where available for producers, a more complex system is necessary to cover damages for the complete wine value chain. Given the market structure, when the value chain is not vertical integrated and there are many producers in the bottom of the value chain, producers cannot translate their investment into prices. In these cases, there is no incentive to invest in certain types of private goods.

Previous literature shows that public expenditure on agriculture allocated towards the provision of public goods has greater returns than public expenditure allocated towards the provision of private goods (see Godtland et al., 2004; Fan et al., 2008; Fang and

Norman (2014)).

In this paper we evaluate some components of two programs financed by the Inter-American Development Bank (IDB) in two Argentine provinces: Mendoza and San Juan. These programs are PROVIAR (*Programa de Apoyo a Pequeños Productores de la Corporación Vitivinícola Argentina*) and PROSAP (*Programa de Servicios Agrícolas Provinciales*). While PROVIAR is a program that provides private goods (such as hail-resistant nets), the component of PROSAP evaluated in this paper provides public goods (such as irrigation channels).

During the 1990s, 11,200 vineyards abandoned wine production in Argentina, approximately one quarter of the total number of vineyards (8,000 were small grape producers). The remaining producers tried to survive by joining cooperatives that had their own wineries and access to marketing channels, for local and international commercialization. More than a decade later (in 2008), according to National Wine Institute (INV – *Instituto Nacional de Vitivinicultura*) there were approximately 6,000 small grape producers not adequately integrated into the wine value chain. The main features of these small non-integrated wine producers are: i) low levels of yield and low quality of crops, ii) lack of access to support services, iii) low bargaining power, and iv) poor access to information on relevant markets. This group of small wine producers has low capitalization because, among other reasons, they lack access to modern technologies.

According to 2013 figures from the INV, Argentina has 27,470 vineyards with 206,532 planted hectares, producing about 3.0 million tons of grapes annually. Approximately 94% of grape production is used for wine production, 4.6% for table grapes, 1.0% raisins, and the remaining 0.2% for other uses. 57% of grapes produced for wine were considered of high enological quality. In 2013, 76.3% of wine produced in Argentina was for domestic market commercialization and 23.4% for export, for a value of US $877 million. The main grape producing provinces are the ones studied in this paper, Mendoza (70% of the total production in Argentina) and San Juan (25%). The main objective of PROVIAR is to improve profitability and economic stability to small producers involved on grape production, and, specifically, to achieve their integration to the wine industry. Program's activities are grouped into three components: promotion of association schemes, support on the implementation of integrated business plans, and strengthening institutionalization. The component of PROVIAR evaluated in this paper consists on provision of resources as Non-Refundable Contributions (NRC) and technical assistance necessary to increase efficiency and yield. Specialists are expected to advise producers on the implementation of good agricultural and manufacturing practices and on commercial development for domestic and foreign markets. Assistance also includes informing producers on the availability of insurance against adversities such as frosts, contributing to the mitigation of climate risks. This paper focuses on the evaluation of the program component that assigns Non-Refundable Contributions, granted as hail-resistant nets, wood, wire, improvement on irrigation inside the vineyard, plant nursery, workers and/or farm machinery. These contributions were assigned after a technical survey in which a specialist decided which was the producer's main constraint to develop their grape-production activities.

The component of the PROSAP program studied here provided improvements on irrigation infrastructure in the provinces of Mendoza and San Juan, Argentina. It was part of a larger national program that started in 1995, designed to support agricultural services to increase the value of agricultural exports by improving quality and production volumes. This broad objective was to be achieved through a combination of interventions, including better administration of water resources, basic agricultural infrastructure, and monitoring of both animal and plant health. The objective is to stimulate regional economy development by increasing coverage and quality of rural infrastructure and of agricultural sector services. PROSAP also finances initiatives that impulse competitiveness of small and medium producers and agricultural firms.

In this case of study, we evaluate those PROSAP projects that consisted on protection of rivers or watersheds; increasing the adaptive capacity for water management in communities or producers, construction or rehabilitation of water infrastructure such as dams or canals and establishment or management of water reserves. The main objective of these irrigation projects was to achieve sustainable water irrigation thought construction and rehabilitation of infrastructure, capacitation and technical assistance in order to increase efficiency. These projects were implemented between 2003 and 2013 on several localities from Mendoza and San Juan (see Table 1). In a way, PROSAP is providing a public good and/or service, even though the best definition that fits what the program provides is "club goods" (also called artificially scarce goods) classified as a subtype of public goods that are excludable but non-rivalrous, at least until reaching a point where congestion occurs. This is the case since only the producers that are located on the side of the irrigation canal can use it.

Using a twelve-year panel, we study the impact of some of the components of PROVIAR and PROSAP on production and yields (production per hectare). The main result is that the programs have had positive and significant impacts on the two outputs. The evaluation of the two programs together allows us to answer some policy questions that are usually overlooked. For instance, whether there are or whether there are not complementarities of one type of infrastructure (in this case irrigation canals) with another type of assistance (e.g., hail nets). In this dimension we find that the programs present important complementarities, in the sense that being exposed to the two interventions increases the outputs more than the mere sum of the separate interventions.

The paper is organized as follows. The next section presents related literature. Section 3 presents data and identification strategy. Section 4 presents results. Section 5 concludes.

2. Related literature

Extension services programs focus on looking different strategies to improve productivity in agriculture providing all kind of sources to producers. These sources are not only material ones, some involve transferring knowledge to producers, "training and visit" extension, decentralized systems, "fee-for-service" and privatized extension, farmer-field-schools analized in detail by Anderson and Feder (2007).

As these assistance programs grew in number, impact evaluation studies came along to assess their efficiency. Most of the studies do not count with randomized assignment of extension services, and try to control for selection bias by using control groups of farmers and non-experimental techniques as we do on this study.

Most part of the literature on impact evaluation of extension services programs on agriculture find certainty about increasing revenues (Akobundu et al., 2004) and improvement on technology or knowledge adoption (Lopez and Maffioli, 2008; Praneetvatakul and Waibel, 2006), but we find mixed results related to extension services programs effects on yield, specially on the short-run. Maffioli et al. (2013) evaluate whether public interventions are successful in promoting agricultural technology uptake by small and medium farmers. They find evidence that the program increased density of plantation and adoption of improved varieties, but they find no evidence of impact on yields for the period under study. Godtland et al. (2004) argue that empirical evidence on farmer field schools effectiveness has been mixed. Some studies show that farmer field schools participants use less pesticide and have higher yields compared to nonparticipants, while others (Feder et al., 2003) find little evidence of impact on these outcomes. At the same time, there is little evidence of diffusion of knowledge from farmer field schools graduates to other farmers. Owens et al. (2003) and Romani (2003) estimate the impact of traditional extension services and find a positive impact of extension services on productivity and yields using panels of farmers for Zimbabwe and Ivory Coast, respectively. However, they note that this impact is neither present for all the years nor for all the crops studied.

The results of the introduction of new technologies and knowledge may not materialize immediately. Maffioli et al. (2011) study the impact of publicly subsidized agricultural extension services on yields and product quality using panel data from grape producers in Mendoza, Argentina. The program provided farmers with technical advices on production processes, especially on the use of variable inputs (including the use of fertilizers, irrigation, pruning, the use of machineries, and phytosanitary plans). They find a negative overall impact on yields and evidence of a positive average impact on the adoption of higher-quality grape varieties. They find evidence of a temporary decrease in yields suggesting the existence of an adjustment process following the introduction of higher-quality grapes. Their findings reinforce the importance of temporal dimension of extension services.

Impact of irrigation improvement on rural areas has been widely investigated. Hasnip et al. (2001) identify four inter-related mechanisms through which irrigated agriculture can enhance and sustain rural livelihoods. These are: i) improvements in the levels and security of productivity, employment and incomes for irrigating farm households and farm labor; ii) the linkage and multiplier effects of irrigation development (as part of wider agricultural growth) for the wider economy; iii) increased opportunities for rural livelihood diversification; iv) multiple uses of water supplied by irrigation infrastructure. Empirical studies on India confirm that if value crops and yield increases, and more intensive cultivation techniques expand, less risky and more continuous levels of rural employment and income there will be, for both farm families and landless labor. Landowners may also benefit from increased land values, often enhancing their access to credit, social standing and empowerment within the community. The indirect impacts of investment on water irrigation improvements are vast and help widely on rural development.

On Ethiopia, Van Den Berg and Ruben (2006) find that past development of irrigation stimulated growth without deepening inequality, and that irrigation decreased dependence on food-for-work programs playing a positive role in the development of Ethiopia.

This study sheds some light on the effectiveness of a particular extension service on production and yield. Further analysis calculates the marginal effects of the mechanisms used in PROVIAR program, namely, the materials granted by the intervention: machinery, wood and wire and/or hail-resistant nets. Regarding to this type of intervention, Salk et al. (2007) argue that in agriculture, there is need for a deeper analysis of management of climate risks, because the farmers appear to have a paradoxical position: they perceived that they are strongly exposed to climate risks but, they do not want to pay for adapted tools, arguing that this is too expensive or complex. The program analyzed on this paper aims to solving this issue: we find that the interventions are effective, both by irrigation infrastructure improvements and materials, especially by providing hail-resistant nets. We show that the provision of these inputs helps small grape producers to increase their production and yield.

Overall, previous literature has evaluated similar extension services programs with mixed results. We contribute to this literature by reporting new evidence that providing grape producers with irrigation infrastructure and production inputs has a positive impact on production and productivity.

The discussion does not end there. Even though private goods provision has its reported returns, previous literature argues that a high proportion of public expenditure destined to private goods compromise the productive efficiency of public rural expenditures. Returns on investment in rural infrastructure, agricultural innovation and rural education tend to be higher than returns on public expenditure destined to private goods, both in LAC as well as in other parts of the world. The main concern is market distortions and inefficiency of the allocation of resources. Fan et al., (2008) find that agricultural input and output subsidies have proved to be unproductive, financially unsustainable, environmentally unfriendly in recent years, and contributed to increased inequality among rural Indian states. Furthermore, López (2004) focuses on structure of public expenditures as an important factor of economic development. Expanding total public expenditures in rural areas while maintaining the existing public expenditure composition prevailing in the countries does little to promote agricultural income and reduce rural poverty. Other literature argues that these programs tend to be regressive, with most of the supports going to larger producers. PROVIAR program is not the case; only 4.7% of producers in the first percentile in terms of farm surface (i.e., those with the largest farm size) were beneficiaries of the program, compared to 17% in the last percentile.

In this paper we evaluate both types of programs, provision of private goods and provision of rural public goods, and the impact of its complement finding that it boosts individual impacts of the programs if they would have been launched individually.

3. Data and empirical methods

Since the evaluation was carried out after the program was planned, implemented and completed, we use historical data available in administrative records. The data was provided by the INV, which is responsible for collecting and processing data on the production of all wine producers in Argentina. Our data has annual information for a period of twelve years from 2002 to 2013 for all wine producers in the provinces of Mendoza and San Juan. This data also provides information on the materials assigned to each of the producers who requested non-refundable contributions and the date that the materials were provided.

We have information on production for 27,625 vineyards in the full sample. From this universe, 2,323 vineyards were part of PROVIAR program, which assigned the first NRCs on 2010 to 282 vineyards, followed by 941 vineyards on 2011, 791 vineyards on 2012 and 256 vineyards on 2013. These PROSAP projects analyzed are allocated at locality level, since the main intervention is on infrastructure improvements on secondary and tertiary irrigation canals. 42 localities were beneficed with this project, involving 8,064 vineyards. 884 vineyards received both PROVIAR and PROSAP projects. 18,122 vineyards received neither PROSAP or PROVIAR. The variables of interest are total production (the sum of the production of all varieties of grapes in a given year) and a proxy for yield (measured as kilograms per hectare).[1] Table 2 summarizes the information above. Table 3 reports the descriptive statistics of the output variables.

The selection of beneficiaries was not random. In a nutshell, the authorities selected some localities from the provinces of San Juan and Mendoza, and only producers in those localities were eligible to receive the intervention. The difference in differences approach is widely used for those cases in which there is no random assignment and there is pre-and post- treatment data for both treated and control units, as it is in our case. Thus, in order to calculate the impact of the interventions on production and yield we use a difference-in-differences approach. This methodology compares the change in the variable of interest in the treatment group before and after intervention with the change of that

[1] The proxy yield variable is constructed as the ratio of production to the size of the vineyard.

variable in the control group. The control group is composed by all producers who were not beneficiaries of neither PROSAP or PROVIAR program, 18,122 vineyards.

The main advantage of the difference-in-difference methodology is that it controls for any time-invariant unobserved heterogeneity, and also by shocks common to all producers in a given moment of time (such as macroeconomic shocks). The change in the outcome of the control group is an estimate of what would have occurred to treated producers in the counterfactual case without intervention.

Formally, the difference in difference approach estimates the following regression model:

$$\ln(Y_{it}) = \beta T_{it} + \alpha_i + \mu_t + \varepsilon_{it} \quad (1)$$

where Y_{it} is any of the impact variables (production and yield) analyzed for producer i at time t, T_{it} is a dummy variable that is equal to one if producer i is treated at time t and zero otherwise, β is the parameter of interest that reflects the impact of the program. The last three terms in equation (1) represent the unobservable determinants of Y_{it}: α_i is the fixed effect for each producer, μ_t is the time effect common to all producers at time t, and ε_{it} is the usual error term.

The identification assumption of the differences in differences methodology is that the post-treatment trend of the control group is a good estimation of what would have been the trend of the treated group if the program would not have been executed. This assumption cannot be tested, but it is possible to test statistically the similarity of the trends prior to treatment in both groups. Table 4 shows the results of estimating a modified version of equation (1) that includes a linear trend and, instead of the treatment variable, an interaction between the linear trend and a dummy variable that takes the value of 1 if the producer will be eventually treated and 0 if the producer will never be treated, using only observations for the pre-intervention period. If the pre-intervention trend of producers who were not treated (control group) and the pre-intervention trend from those who will be eventually treated is not significantly different, then we can be confident that the trends in the two groups would have remained similar in the absence of intervention (thus providing validity to the assumption that the trend in the control group is a good counterfactual for the trend in the treated group in the post-intervention period).

As reported in Table 4, for both outputs we cannot reject the hypothesis that pre-intervention linear trends are the same for the eventually treated and control producers. This provides confidence on the difference-in-difference assumption. These results hold for both PROVIAR and PROSAP separately, and for the two outputs.

The usual assumption in econometrics is that the observations are independent. In this context, however, there might be a potential correlation between observations for the same vineyard. Thus, in all regressions we cluster standard errors at the vineyard level. As mentioned below, all results are robust to clustering at locality level or department level.

4. Results

The main results on the impact of PROVIAR are presented in Table 5. As shown in Column (1), producers who participated in the program produced 9.4% more than those that were no part of the program. The beneficiaries also increased their yield (see Column (2)): the yield for treated producers is 7.7% higher than producers that belong to the control group. All these results are robust to different specifications of the standard errors, clustering at locality level, clustering at department level, and also to controlling for hail.[2] [3]

Table 6 shows the impact of the program using, instead of a binary variable for the treatment, a continuous variable equal to the amount of dollars granted by the program (and zero for producers in the control group). An increase of a thousand dollars in the

[2] Results with standard errors clustered at locality and department level are available upon request.
[3] Most results remain unchanged if analyzed by grape varietal.

amount received from the program (the average amount received is US$ 11.991) leads to an increase of 0.7% in production and an increase of 0.6% on yield.

We also explore the marginal impact of the combination of materials provided. The materials were grouped in three categories: wood and/or wire, hail-resistant net, machinery and other tools (note that these categories produce seven combinations). In this specification, T_{it} is a vector of binary variables that is equal to one if the producer received certain combination of materials and zero otherwise. As reported in Table 7, producers who receive only hail-resistant nets show 47.6% increase on yield and 51.8% increase on production compared to producers that were non-beneficiaries. Those who received hail-resistant nets in combination with other inputs, also show positive and significant impacts on production and yield. The combination of hail-resistant nets plus wood and/or wire increased 30.4% production and 21.5% yield. The combination of hail-resistant net plus machinery increased production and yield less than the former combination, 16.5% and 16.9% for each outcome respectively. Nonetheless the combination of the three groups of materials (hail-resistant nets, wood and/or wire and machinery) has less impact on the outputs than the one-and-one combinations with increases of 12.5% and 14.4% for each outcome respectively. Machinery and wood and/or wire provided separately had smaller impacts and their combination did not have a significant impact on production and yield at all.[4]

Even though the evaluation of PROVIAR is only capturing short-term impacts of the program, the results provide evidence of benefits from policies directed to assist rural wine producers.

As robustness check, we run a placebo exercise in which we restricted the sample

[4] There is no information available on whether producers received additional materials in subsequent periods. Our specification implicitly assumes that they did not.

to the pre-treatment period (2002-2009), and we assign a fake treatment after 2005 to those producers that were eventually treated. We reproduce Tables 5, 6, and 7 using these fake program dummies (not reported, available upon request) and, as expected, most of the coefficients associated to the fake program dummies are equal to zero (only three coefficients out of 18 were significant at the 10 percent level).

The results on the impact of PROSAP are reported in Table 8. As shown in Column (1), producers who were beneficiaries of the program produced 4.2% more than non-beneficiaries producers. The beneficiaries also increased their yield (see Column (2)): the yield for treated producers is 4.6% higher than producers that belong to the control group. These results indicate that are important benefits, in term of increasing production and yields, of providing infrastructure in the form of irrigation canals.

The two programs, PROVIAR and PROSAP, have shown strong impacts on the outcomes of interest. We now move to study the potential complementarities between the two programs. As shown in Table 9, there is a positive interaction effect for those producers that are beneficiaries of the two programs (884 vineyards). In addition to the increases in production and yield associated to be beneficiaries of PROVIAR or PROSAP, those producers that were beneficiaries of both programs showed an increase of 14.7% on yield and 16.6% on production, on average. This means that the impact from PROSAP interventions on yield and on production was more than duplicated with the interaction with PROVIAR program.

To conclude, it is important to point out some caveat to the interpretation of our findings. Given non-random assignment, it is always possible to have treatment selection. If that were the case, the difference-in-differences regressions may be just capturing changes over times for the groups that got different combinations of treatments.

5. Conclusion

This paper evaluates the impact of two programs that provide infrastructure in the form of irrigation canals (mainly secondary and tertiary canals) and materials (such as hail nets) to wine producers in the provinces of Mendoza and San Juan. The main result is that both programs have had positive and significant impacts on production and yield. We also find important complementarities between the two programs, in the sense that being exposed to the two interventions increases the outputs more than the mere sum of the separate interventions. This is important from a policy perspective in many dimensions. First, the design of the interventions should take into account the existence of complementarities. Second, these complementarities should be taken into account when calculating the cost-benefit analysis of the interventions in order to correctly estimate the potential benefits of public spending.

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Table 1. PROSAP projects

Name of the project	Department beneficed	Locality beneficed	Year in which the project concluded
Construcción 5to y 6to Tramo Canal San Martín	Lavalle- San Martín	Costa de Araujo; Gustavo André; Tres Porteñas; Nueva California	2003
Proyecto Integral Reducción Los Andes Sector 2	Rivadavia	Libertad; Los Campamentos; El Mirador; La Central	2009
Modernización Sistema de Riego Las Tunas	Tupungato	El Peral; Santa Clara; Gualtallary	2009
Modernización Sistema de Riego Constitución Medrano	Junín-San Martín-Rivadavia	Junín; Medrano; Los Arboles	2009
Proyecto Integral Reducción Los Andes Sector 1	Rivadavia	Reducción	2010
Modernización Sistema de Riego Arroyo Grande	Tunuyán	Villa Seca, Los Sauces; Vista Flores, Los Chacayes	2010
Riego Canales Socavón y Frugoni	San Rafael	Las Paredes y Capitán Montoya	2012
Riego Canal San Martín	Junín y San Martín	Villa Cabecera de San Martín, Alto Verde, Montecaseros, Chivilcoy, Buen Orden, Villa Italia, El Ramblón, Ingeniero Giagnoni, y parte de Rodríguez Peña; y, en Junín, parte de Los Barriales y La Colonia	2012
Riego Naciente Chachingo - Pescara	Maipú y Guaymallén	Tres Esquinas, Cruz de Piedra, Rodeo del Medio, Coquimbito, Chachingo, Fray Luis Beltrán de Maipú y Corralitos, La Primavera y Colonia Segovia de Guaymallén.	2012
Riego Canal Nuevo Alvear	Gral. Alvear	Bowen y General Alvear	2012
Riego Céspedes - Sarmiento	Sarmiento	Valle de Tulum	2013

Table 2. Distribution of vineyards according to the intervention

	Number of vineyards
PROSAP	7,180
PROVIAR	1,439
PROSAP & PROVIAR	884
CONTROL GROUP	18,122
TOTAL	**27,625**

Table 3. Descriptive statistics

	Mean	Standard Deviation	Observation s	Number of vineyards
Yield	17,208	17,461	211,956	23,942
Production	158,693	353,632	213,141	24,221

Notes: Yield is defined as total production/ total size of the vineyard (kilograms per hectare). Production is measured in kilograms per vineyard per year.

Table 4. Test on pre-treatment trends

	Ln (Yield)	Ln (Production)
	(1)	(2)
Time * Eventually Treated	0.00666	0.00847
	(0.00599)	(0.00602)
Intervention		
Observations	117,174	117,752
Number of vineyards	20,587	20,780

Notes: All regressions include vineyard fixed effects and a linear time trend. Standard errors clustered at the vineyard level are in parentheses.

Table 5. The impact of PROVIAR

	Ln (Yield)	Ln (Production)
	(1)	(2)
Intervention	0.0774***	0.0938***
	(0.0123)	(0.0125)
Observations	211,956	213,137
Number of vineyards	23,942	24,221

Notes: All regressions include vineyard fixed effects and year fixed effects. Standard errors clustered at vineyard level in parentheses. ***Significant at 1%.

Table 6. The impact of PROVIAR by amount provided (thousands of USD)

	Ln (Yield)	Ln (Production)
	(3)	(4)
Intervention	0.0059***	0.0072***
	(0.0014)	(0.0014)
Observations	211,956	213,137
Number of vineyards	23,942	24,221

Notes: All regressions include vineyard fixed effects and year fixed effects. Standard errors clustered at vineyard level in parentheses. ***Significant at 1%.

Table 7. The impact of PROVIAR by type of assistance provided

	Ln (Yield)	Ln (Production)
	(1)	(2)
Machinery and other inputs	0.1103**	0.1408***
	(0.0496)	(0.0497)
Hail-resistant net	0.4763***	0.5180***
	(0.0618)	(0.0671)
Hail-resistant net and machinery	0.1651**	0.1692**
	(0.0698)	(0.0666)
Wood and/or wire	0.0937***	0.0888**
	(0.0361)	(0.0345)
Wood and/or wire and machinery	-0.0036	0.0059
	(0.0335)	(0.0349)
Wood and/or wire and hail-resistant net	0.2149***	0.3041***
	(0.0639)	(0.0658)
Wood and/or wire, hail-resistant net and machinery	0.1251*	0.1444*
	(0.0746)	(0.0840)
Observations	211,956	213,137
Number of vineyards	23,942	24,221

Notes: All regressions include vineyard fixed effects and year fixed effects. Standard errors clustered at vineyard level in parentheses. ***Significant at 1%. **Significant at 5%. *Significant at 10%.

Table 8. The impact of PROSAP

	Ln (Yield)	Ln (Production)
	(1)	(2)
Intervention	0.0458***	0.0422***
	(0.0092)	(0.009)
Observations	211,956	213,137
Number of vineyards	23,942	24,221

Notes: All regressions include vineyard fixed effects and year fixed effects. Standard errors clustered at vineyard level in parentheses. ***Significant at 1%.

Table 9. Complementarities between PROVIAR and PROSAP

	Ln (Yield)	Ln (Production)
	(1)	(2)
PROVIAR	0.0610***	0.0739***
	(0.0145)	(0.0147)
PROSAP	0.0417***	0.0371***
	(0.00934)	(0.00962)
PROVIAR*PROSAP	0.0444*	0.0547**
	(0.0227)	(0.0233)
Observations	211,956	213,137
Number of vineyards	23,942	24,221

Notes: All regressions include vineyard fixed effects and year fixed effects. Standard errors clustered at vineyard level in parentheses. ***Significant at 1%. **Significant at 5%. *Significant at 10%.