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Landscape quality payments in Switzerland: The congruence between policy and preferences

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Abstract

Swiss landscape quality payments (LQPs) are a form of agricultural subsidy that provides funding for farmers engaged in maintaining or creating different elements that contribute to landscape quality. This study is the first step to analyse the effect of different measures to increase landscape quality using four indicators of perceived landscape quality (beauty, authenticity, uniqueness and complexity) from two nationally representative public surveys conducted in 2011 and 2020. While most LQP categories do not have a significant effect, both payments for productive grassland and those connected to stone structures have an effect on more than one of the four indicators of perceived landscape quality. These payments seem to cause a visible change in the landscape or preserve elements that are important for landscape quality. Such payments help to provide ecosystem services, while those not causing any visible change can be conceptualised as a form of rent-seeking. In the future, more efforts are needed to evaluate the payments to enable evidence-based policy-making and steer payments towards measures that result in improvements to landscape quality that are visible and notable to the public.
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1. Introduction

The Millennium Ecosystem Assessment (Millennium Ecosystem Assessment, 2005) revealed that agriculture provides, or should provide, much more than food and fibre (provisioning services). While traditionally mainly the provisioning part of agriculture, producing food, was recompensated, in the early 1990 s, a change in recompensating farmers was introduced in Switzerland, following a worldwide trend (Potter and Wolf, 2014). Product-related subsidies were replaced by direct payments for ecological services, mainly biodiversity, water protection and prevention against air pollution, but also animal welfare. Later, in 2013, cultural services also began to be compensated. Farmers now receive direct payment for contributing to "landscape quality". In particular, regionally characteristic landscapes should be fostered and qualities, such as traditional buildings, hedgerows, dry stone walls or a more complex crop rotation, should be preserved or encouraged by direct payments. As a more complex landscape or a landscape comprising more perceived naturalness is perceived as more attractive (Ode and Miller, 2011; Ode et al., 2009), fostering agricultural practices that enhance landscape complexity and perceived naturalness are important.

Obviously, it is also important to evaluate the effects of such direct payments. While most fields of agri-environmental policies tackle issues that are subject to objective measurement, such as emissions (Doole et al., 2013) and biodiversity (Boetzl et al., 2021), the evaluation of policies that target the perceived quality of agricultural landscapes is more challenging. Apart from individual components, the perception of landscapes also has socially shared and biological aspects (Bourassa, 1991; Hunziker et al., 2007). Article 1a of the European Landscape Convention emphasises that perception by humans is key to its characterisation (Council of Europe, 2009). Therefore, the performance of landscape policies is necessarily dependent on public preferences and judgements that need to be empirically assessed (Joo, 2008). It is increasingly argued that the success of landscape policies depends on the macro-environment (Carmona-Torres et al., 2011; Zasada et al., 2017) and public participation in the planning process (Conrad et al., 2011; Jones, 2007; Santé et al., 2020). However, attempts to measure the success of landscape policies are rare (Maes et al., 2014; Paracchini et al., 2012, 2011). Yet measuring the effects of policies on public perception is crucial, particularly in response to claims that direct payments to farmers, even if labelled as targeted at creating ecological or landscape benefits, are merely the result of rent-seeking by strong interest groups (Czyżewski and Matuszczak, 2018; Potter and Wolf, 2014; Thompson, 2016).

Therefore, this paper compared measures implemented to improve the perceived quality of agricultural landscapes with how residents evaluate the changes they perceive in their home municipality. This study builds on literature on non-monetary evaluation methods of landscape perception rooted in environmental psychology literature (Bourassa, 1991; Kaplan and Kaplan, 1989), using social science indicators that measure public perception of landscape aesthetics developed for the Swiss landscape monitoring programme (Kienast et al., 2015). The novelty of our approach lies in linking such landscape evaluation frameworks to a set of landscape-specific policy instruments.

The paper is structured as follows. In Section 2, we describe the data sets used, the theoretical framework to analyse the data and the statistical methods. In Section 3, we present our results on linking the two datasets on agricultural payments and attractiveness. This section is followed by a discussion and conclusions.

2. Material and methods

2.1. Datasets and theory

2.1.1. Landscape quality and LABES

To measure perceived landscape quality, we used data from the Swiss Landscape Monitoring Program (Landschaftsbeobachtung Schweiz or LABES) (Kienast et al., 2013; Wartmann et al., 2021b, 2021a). The LABES data were collected through nationally representative surveys in 2011 (three years before the first direct payments for landscape quality) and 2020. In 2011 and 2020, a representative sample of residents of Switzerland responded to a survey about the perceived quality of landscapes in their home municipality (2011: $n = 2814$; 2020: $n = 2090$). The LABES comprises six different indicators describing the landscape quality of a municipality as the smallest administrative unit in Switzerland (Kienast et al., 2015). From the six indicators, we selected the following four indicators because they reflect either quality directly (beauty) or other aspects to which landscape quality payments would be expected to contribute.

- Landscape beauty (BEAUTY): According to Bourassa (1991), landscape beauty is an umbrella concept, integrating the cultural (e.g. connotations as authenticity and uniqueness) as well as the biological (e.g. perception of complexity) dimension. In the LABES, the indicator value is the aggregation of two statements: "the landscape in my municipality is very beautiful" and "I like the landscape in my municipality very much".
- Landscape uniqueness (UNIQUE): The indicator "uniqueness" was described by Twigger-Ross and Uzzell (1996) as comprising both the peculiarity and uniqueness of a landscape and the temporal aspect of the temporal continuity of the landscape. In LABES, the indicator value is calculated as the mean of the two statements for the aspect of distinctiveness ("the landscape in my municipality is unique" and "the landscape in my municipality makes the region special") and the two statements for temporal continuity ("I can discern the past in the landscape" and "the landscape in my municipality evokes my past experiences and adventures").
- Landscape authenticity (AUTH): Authenticity is culturally defined and often referred to as a sense of place (Kianicka et al., 2006). In LABES, the indicator is the mean of the following three statements measured on a 5-point Likert scale: "the landscape in my municipality appears to be authentic", "the landscape in my municipality appears to be real" and "the different items and elements of the landscape belong here".
- Landscape complexity (COMPLEX): The indicator "complexity" is based on the theory of landscape preference (Kaplan and Kaplan, 1989), which states that humans prefer landscapes that offer some complexity in the composition of their elements. For the LABES indicator, the average of the two statements "the landscape in my municipality is diverse" and "in the landscape in my municipality there are a lot of different elements".

All statements were measured on a 5-point Likert scale between 1 (*not agree at all*) and 5 (*fully agree*).

2.1.2. Swiss landscape quality payments

With producer support estimated at 62.7%, Switzerland has one of the highest rates of agricultural subsidies in the world (Kovačićek et al., 2019). Similar to the European Union, it shifted from a system of market support to a system that aims to remunerate ecosystem services

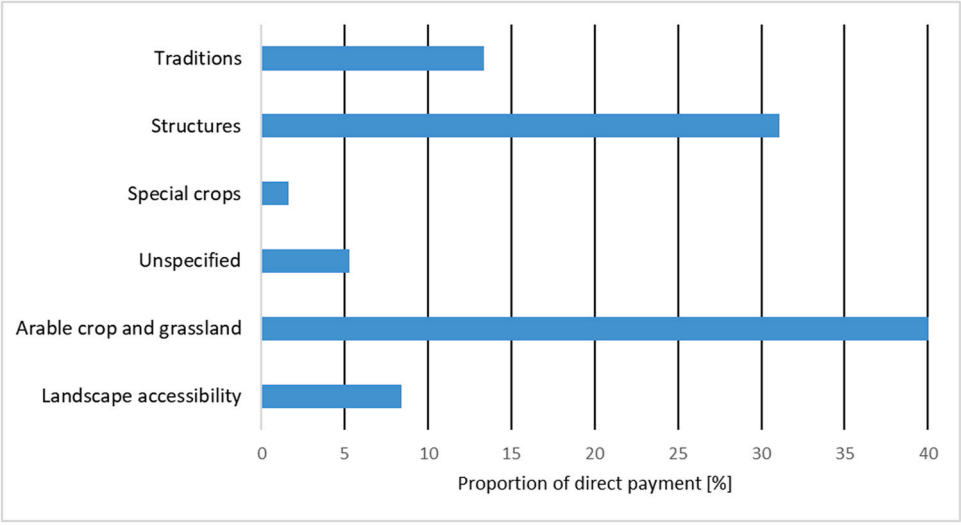

Figure 1. Division of funding for LQPs in 2020
(Source: own calculations).

provided by farmers (Mann and Lanz, 2013). Currently, in addition to biodiversity payments, production system payments and others (e.g. animal welfare), 150 million Swiss francs, or 5% of the national agriculture budget of 3 billion francs, are earmarked for LQPs, which are also aimed at fostering the characteristic landscape in a region (BLW, 2020; Steiger et al., 2016).

Agricultural policy is one of the few policy areas in Switzerland that is mainly governed at the national level. Over recent decades, however, an increasing number of policies have been developed in conjunction with cantons (Mann and Reissig, 2011), including the LQPs, to allow for more regional differentiation in the direct payments that reflect differences in agricultural practices and conditions across different areas in Switzerland. Cantons contribute at least 10% of payments (increasing the national budget of 150 million francs to at least 165 million francs) (BLW, 2020). With relatively general guidelines provided at the federal level, each canton defines the criteria for which specific measures farmers can receive payments. On this basis, farmers, regional planners and private landscape planning offices have formed projects, which then had to be approved by both the cantonal and federal levels (Steiger et al., 2016).

On the federal level, the following categories of measures are eligible for funding (Steiger et al., 2016) and expenditures are split as indicated in Fig. 1:

- Accessibility: keeping landscapes open
- Arable crop and grassland: low input or production
- Unspecified
- Special crops: vineyards, fruits and vegetables
- Structures: wood structures, stone structures and water bodies
- Traditions: traditional landscape elements, on-farm traditions and traditional agriculture

The federal administration has specified these measures. Measures dedicated to productive arable crops or productive grassland, for example, should enhance the diversity of crops or

grasslands by enriching crop rotation or increasing the number of grassland types. Measures designed for low-input arable crops or grasslands are aimed at introducing arable wild flowers in the crop fields or to enlarge the types of meadows in grassland-dominated farms. In particular, the introduction of low-input pastures and meadows rich in low-input species is fostered. Measures related to wood structures comprise a large number of measures related to different types of trees (single trees, fruit trees, fruit trees in traditional orchards, etc.). A small part of the measures is related to traditions (e.g. pollard willows or traditional fences with trees). Measures in the "structures" category either maintain small structures in the relief or relate to traditional farm practices, such as the maintenance of a mosaic of grassland and bushes or pastures with trees. The category of stone structures comprises the maintenance of geological phenomena, such as erratic blocks or sinkholes. Tradition-related measures comprise, for example, the maintenance of traditional walls as boundaries of pastures. A small number of measures are related to the accessibility of landscapes. Finally, the category "farm traditions" comprises measures related to traditional elements on the farm site, such as fountains, traditional houses, traditional farm gardens or the availability or visibility of different animals on the farm. In supplementary material S1 pictures of selected measures can be found.

A comprehensive collection of measures does not exist, as every project has its own measures adapted to the local landscape. The description above is based on a review of projects and catalogues of measures of different cantons (Amt für Landwirtschaft und Natur des Kantons Bern, 2017; Andres and Abderhalden, 2016; Gassmann et al., 2014).

It can be argued that this institutional framework has enabled the creation of the diversity of funding instruments it was supposed to create for the diversity of local needs. In the small canton of Appenzell Innerrhoden, for example, the cantonal administration has initiated a single project for the whole canton, which is built around four objectives: to maintain (i) linear and point-based natural and cultural landscape elements, ii) area-related landscape elements such as flower meadows, iii) on-farm landscape elements and iv) alpine farming huts. The much larger canton of Berne, on the other hand, offers a large catalogue in six different categories (arable measures, grassland measures, wooden elements, water-related measures, walls, wells or ways and diversity) from which initiators of projects can choose.

Among the 26 cantons, Steiger et al. (2016) reported that the funding ranged between 74 and 224 francs per total hectare of farmland and between 91 and 303 francs per hectare of farmland of participating farms. There are two reasons for this relatively broad range: i) the share of participating farms and (ii) variability in the amount of funding provided by the cantonal administration. While the federal administration pays a fixed sum of 120 francs per hectare of area under any of the schemes (Federal Office of Agriculture, 2020), each cantonal administration issues its own catalogue of payments, which may vary considerably. This is illustrated in Fig. 2, which depicts the distribution of payments for the sub-category of farm traditions, indicating a much higher spending in Switzerland's northeast and the Valais Canton than, for example, in the Italian-speaking region in the south of the country.

2.1.3. Two contrasting theoretical approaches to measuring the effects of landscape quality payments

To evaluate Swiss LQPs, two complementary conceptualisations of LQPs can be applied. On the one hand, direct payments for landscape quality could be considered reimbursements for public goods within the framework of multifunctionality or ecosystem services (Daniel and Perraud, 2009; Renting et al., 2009). On the other hand, payments for landscape quality could

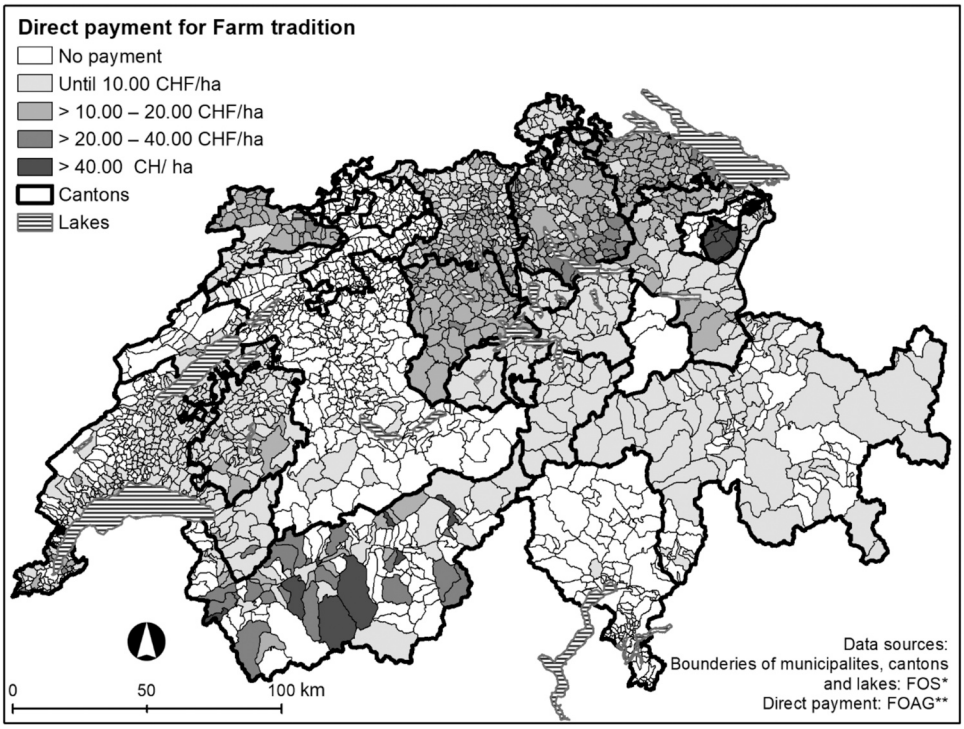

Figure 2. Variation of direct payments for "farm traditions" among municipalities and cantons. * FOS: Federal Office for Statistics * * Federal Office for Agriculture.

be a product of the rent-seeking processes of the different actors involved in the LQPs. In the following section, we briefly outline these two concepts.

The concepts of multifunctionality (Frei et al., 2020; Minang et al., 2015) and ecosystem services (Tengberg et al., 2012; Wratten et al., 2013) have been designed and elaborated on to emphasise the many non-market amenities that are by-products of agricultural production. In both frameworks, landscapes are among the core amenities connected to the production of food. Schaller et al., (2018, p. 735) stated in a paper about European agricultural landscapes that "the importance of non-marketable, socio-cultural and environmental public-good-type ecosystem services outweighs the importance of agricultural production". This is representative of this perspective in that the potential non-market amenities of the farming sector are at least as important as marketable production. The state has the responsibility of delivering attractive landscapes by providing incentives or regulations. The most likely target group would be farmers in charge of the agricultural land and its aesthetic design.

Covering 36% of the Swiss surface, agricultural land is the most dominant form of land use in Switzerland, exceeding both forests (31%) and unproductive land (25%). Swiss regions where farmland dominates have a higher population density than forested and unproductive regions and surround the cities where a major part of the Swiss population is situated. If one also takes into account the high aesthetic heterogeneity of agricultural land (Dronova, 2017), it can be assumed that the type of management of farmland should have a significant effect on the perceived quality of landscapes in general, as the visibility of farmland exceeds the visibility of

unproductive land. Based on the concept of multifunctionality and ecosystem services, farmers are incentivised to provide attractive landscapes. Therefore, it can be hypothesised that the more funding that is invested into incentivising farmers to make landscapes more attractive, the better the outcome will be, i.e. the better the landscape quality will be assessed by the public.

The contrasting approach implies that today's agricultural subsidies are mainly a result of rent-seeking. This view is reflected in the body of public choice literature (Josling and Moyer, 1991; Tullock and Hillmann, 1991). This view emerged in parallel with concepts such as multifunctionality and ecosystem services.

While this approach has mainly been applied to unconditional transfers to farmers (Mulgan, 2008; Vanzetti, 1996), the overlap with the main participating interest groups also suggests the applicability of this approach to LQPs:

- Farmers may be aware that payments labelled as environmental payments may be more stable and better accepted than unconditional transfers from the taxpayer. At the same time, LQPs usually interfere less with the farmer's intention for high yields than other agri-environmental schemes. In many cases, the focus is on the maintenance of pre-existing infrastructures on the farm.
- For LQPs, farmers collaborate with landscape planning and projection bureaus. The need to plan and coordinate landscapes at the regional level to design meaningful projects has created a class of businesses (Carlsson et al., 2017) that will also stabilise the scheme.
- In similar instances, it has been shown before (Mann and Reissig, 2011) that regional decision makers in parliaments and the administration benefit from maintaining the notion of transfers that appear to be environmentally motivated but that set the criteria for payments as low as possible.

Based on the approach of "rent-seeking", one can hypothesise that measures applied in LQPs would be a potential greenwashing of transfers paid to farmers. The standards would be set at a low level to minimise additional costs for farmers In this case, the outcome of the measures would be unlikely to have an effect. An alternative conceptualisation of LQPs would highlight that some of the measures incentivise farmers to maintain or increase visual landscape quality, which would then have an effect on the perception of the public. We used these two conceptualisations to frame our study and explore whether the levels of LQPs and landscape attractiveness are related. Although the absence of a relation between LQPs and public perception of landscape quality would not be definitive proof that LQPs have no effect on the visual landscape or that a relation between the two is a direct causal relation, exploring such connections is needed to provide evidence for future policy-making of agricultural direct payments that are directed at improving cultural ecosystem services for the public.

2.2. Data preparation and statistical analysis

The aim of the statistical models was to test the relationship between changes in the perceived quality of landscapes in a municipality and funding for LQPs in the same municipality. Therefore, the LQPs as well as the LABES data had to be prepared on the level of municipalities.

For the LABES data, we first calculated the mean value of the four indicators described above (BEAUTY, UNIQUE, AUTH and COMPLEX) for each municipality in 2011 and 2020, respectively. We then calculated the difference between the mean in 2020 and 2011, resulting in

Table 1
Descriptive statistics of dependent variables.

Dependent variable	Mean difference 2020–2011	Standard deviation
Landscape BEAUTY perceived by the public	-0.143	0.834
Landscape UNIQUEness perceived by the public	-0.237	0.984
Landscape AUTHenticity perceived by the public	-0.143	0.775
Landscape COMPLEXity perceived by the public	-0.179	0.963

positive values if the landscape perception indicators increased and negative values if the indicator values decreased.

We selected municipalities that were sampled in both surveys, with each survey consisting of a nationally representative sample, but where in each survey other municipalities could have been sampled due to the random selection of respondents. This reduced the sample size to 486 out of a total of 2172 municipalities. Our sample consisted of 1888 respondents in 2011 and 1438 in 2020. Fig. 2 illustrates which municipalities were included in this study, given the limitations in data availability for both surveys.

For the LQPs, we calculated the total surface area included in a project for each municipality. Furthermore, we calculated the total payment for each LQP category for each municipality. We then calculated the mean payment (Swss francs/ha) for each category and municipality and joined this data with the LABES survey data.

We used the method of ordinary least squares with the LABES indicators as dependent variables and the LQP measures as explanatory variables. Table 1 shows the mean value for each indicator (dependent variable) and its standard deviation for Switzerland. Table 2 shows the same results for each category of measures (explanatory variables).

In order to include the payment categories that best explain the changes in participants' judgements, we applied stepwise regression. Stepwise regression is widely used for variable selection and is based on the Akaike information criterion (Akaike, 1969; Judge et al., 1980). Stepwise regression is implemented in the oslrr package in R (Hebbali, 2020), which we applied. Within the oslrr package, we used the command "ols_step_best_subset", which provides a sequence of models and their respective quality information, such as Akaike Information Criteria (AIC), Sawa's Bayesian Information Criteria (BIC) and Schwarz Bayesian Criterion (SBC) (see Hebbali, 2020). The procedure starts with a model including one variable and thereafter stepwise including another variable until all variables have been included in the model. We selected the model providing an optimum of all criteria (AIC, etc.). The selected model contained the measures that best explained the judgements.

3. Results

Our four models (BEAUTY, UNIQUE, AUTH and COMPLEX) revealed that many measures did not have any explanatory power in our model at all. Out of the large catalogue of LQP categories, neither the payments for productive arable crops nor for fruits and vegetables had any effect on perceived landscape quality. Broadening crop rotations, which is, for example, a typical measure for productive arable land, did not have a measurable influence on the overall attractiveness judged by the general public. Subsidies for accessibility of landscapes, for traditional landscape elements or for keeping landscapes open also did not result in any significant differences between the perceived landscape quality in 2011 and 2020. In general, the variation

Table 2
Descriptive statistics of independent variables.

Measure group	Measure category	Mean direct payment [CHF/ha*year]	Standard deviation [CHF/ha*year]
Accessibility:	Keep the landscape open	6.5	21.0
Accessibility:	Maintain path, monuments and benches	5.1	7.5
Arable crops and grassland	Productive arable crops	41.6	43.2
Arable crops and grassland	Arable crop low-input	6.8	29.5
Arable crops and grassland	Grassland productive	13.6	27.8
Unspecified	Grassland low-input	23.0	32.7
Unspecified	Basic payment	9.2	12.9
Special Crops	Special crops	4.2	19.6
Special Crops	Vineyards	12.0	50.1
Special Crops	Landscape with vineyards and fruits	0.05	0.7
Structures	Wooded structures	29.4	41.3
Structures	Stone structures	3.7	8.4
Structures	Natural structures	13.3	25.3
Structures	Water structures	16.5	139.6
Traditions	Farm traditions	12.0	20.4
Traditions	Traditional landscape elements	9.3	24.4
Traditions	Traditional agricultural infrastructure	15.6	59.4

in the perceived landscape quality that can be explained by the LQP is very low. Table 3 displays the results of the four regression models. None of the payment categories that were significantly correlated with all four dimensions. Nevertheless, the payments for measures within productive grasslands have a significant influence on perceived authenticity (AUTH) and perceived complexity (COMPLEX, Table 3). These measures aim to diversify grassland production, incentivising farmers to introduce different grassland types. In practice, for a farm with

Table 3
Results of the regression analyses.

Measure category	BEAUTY	UNIQUE	AUTH	COMPLEX
Productive grassland	0.00247° (1.77)	0.00237(1.48)	0.00253 * (1.99)	0.00469 * *(2.92)
Stone	0.00846° (1.81)			0.0106 * (2.02)
Farm traditions		0.00475 * (2.16)	0.00299(1.72)	0.00336(1.58)
Structures	-0.00218(−1.39)			-0.00306° (−1.71)
Extensive Grassland		-0.00206(−1.49)		
Vineyards	0.00111(1.45)			
Low-input arable	0.00208(1.61)			
Water			-0.000532(−1.39)	
Wood			0.00191(1.48)	
Intercept	-0.204 * ** (−4.20)	-0.279 * ** (−4.38)	-0.433 * ** (−7.81)	-0.279 * ** (4.63)
R^2	0.02	0.02	0.02	0.03

Estimates and *t*-value in parentheses; * ** $p < 0.001$; * * $p < 0.01$; * $p < 0.05$;° $p < 0.1$

much intensely mown grassland, this implies the introduction of pastures and low-input meadows. This visibly increases grassland diversity. Furthermore, low-input meadows (and pastures) add to naturalness in the landscape and pastures to animals in the landscape, apparently having some impact on the perceived complexity, authenticity and beauty of the landscape. Both diversity and naturalness are known aspects of visual landscape quality (Dramstad et al., 2006a; Frank et al., 2013; Tveit et al., 2006).

The resources spent on stone structures, which significantly explain perceived complexity (COMPLEX), are most often preservation structures for stone walls but may also include stone heaps or sinkholes that host valuable flora and fauna or erratic blocks.

Furthermore, the measures to preserve traditions around the farm building itself have a significant impact on the perceived uniqueness (UNIQUE) of the landscape of the participants' residential municipality.

In the two models, the variable "structures" had a negative coefficient. In the case of the model explaining the LABES indicator "complexity", the variable "structures" was significant at the 10% level.

Overall, some categories of LQPs significantly explained changes in landscape perception from 2011 to 2020. However, there are only a few that form a large wealth of measurements. The reasons for success or failure are discussed in the next section.

4. Discussion

With substantial financial governmental investment in agriculture and the need to support agricultural landscapes to deliver multiple ecosystem services to the public, there is a need to better understand the links between direct payments for agricultural measures and public perception of landscape quality. In this study, we tested several direct payment measures and their influence on the indicators of public landscape perception assessed through the national landscape monitoring programme.

Our results highlight that measures to diversify grassland had a significant effect in explaining the improved public perception of landscape quality across municipalities. However, most other variables did not show any significant relationship with public perception indicators. In the following, we discuss our results with respect to the literature and highlight avenues for further research.

The literature about the rationale of contemporary agricultural policies (Frei et al., 2020) enabled us to consider two contrasting hypotheses to frame these effects, or rather, the lack of observed effects of LQPs on perceived landscape quality. The starting point for this study was the question of whether payments for landscape quality enable agriculture to better provide ecosystem services, such as landscape quality, or whether they have to be judged as rent-seeking. If LQPs are framed as supporting ecosystem services and the multifunctionality of agriculture, and these effects would be noted by the public, we would expect a significant effect of the payments on perceived landscape quality (Daniel and Perraud, 2009; Renting et al., 2009). Following this notion, LQPs would be a monetary investment for which the local population gets increased landscape quality in return. However, if the LQPs are classified as rent-seeking, we would not expect any or little effect on the public perception of landscape quality.

Repeated surveys about the perceived quality of the landscape in people's local environments (Kienast et al., 2015; Wartmann et al., 2021a) provided an opportunity to test the empirical evidence for these two views. Our results provide some support for both notions because we see very little variance in perceived landscape quality explained by the level of LQPs. This

would indicate that LQPs represent more rent-seeking behaviour, with no effect on landscape quality perceived by the public. However, we also found some limited support for the notion of LQPs as measures supporting ecosystem services, with a significant effect of direct payments for measures related to "productive grassland", "stone structures" and "traditions". With our methodology based on the difference between two surveys with different respondents, we would not expect to obtain a very high determination coefficient as the variance in landscape perceptions between individuals can be considerable (Wartmann et al., 2021a). Furthermore, there is considerable spatial variability regarding LQP payments. However, despite this caveat, the level of explained variance remains low. Thus, the objective was to prove that there are some small but significant effects despite the influence of other much more powerful factors.

Although most of the LQP categories did not or at a very low level, contribute to the explanation of variance of the indicators of perceived landscape quality, we found some significant effects, which are in line with theories of landscape perception, for instance, more different grassland types or more animals in the landscape. Both measures have some influence on both indicators, complexity (COMPLEX) and beauty (BEAUTY), as these measures increase both perceived "naturalness" and landscape diversity. Both aspects are important for landscape preference (Coeterier, 1996; Ode et al., 2009; Tveit et al., 2006). The presence of animals in the landscape, an aspect of measures related to productive grassland and to farm traditions, is furthermore known to boost landscape preference (Howley, 2011; Howley et al., 2012).

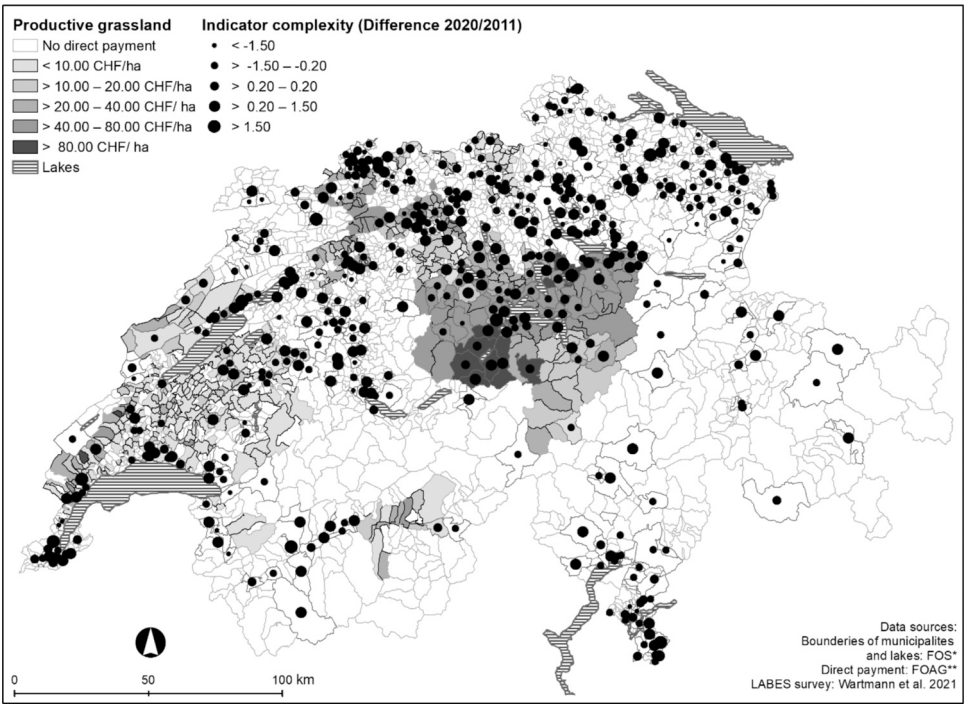

Figure 3. The relationship between direct payments for "productive grassland" and the LABES indicator "complexity" (dots) on the municipality level. The coefficient of "productive grassland" in the related model is 0.004688, and the *p*-value of the model is 0.0027. *FOS: Federal Office for Statistics. * *FOAG: Federal Office for Agriculture.

However, measures aimed at broadening crop rotation by adding different grains may lead to a barely visible increase in diversity and were therefore not significant.

More difficult to interpret is the negative coefficient for the measures related to structures in the models explaining BEAUTY and COMPLEX. Payments in this category are often awarded for the preservation of an existing richness of structures, such as edges of forests, hedges or bushes. At this stage, it remains unknown why the perceived landscape quality decreased more in municipalities where more direct payments were awarded to maintain or increase such diversity.

Finally, the low measures of explained variance ranging from 2% to 3% deserve discussion. A reason may be the low effectiveness of many of the measures. However, many changes in regional landscapes that affect perceived landscape quality, such as new building projects or restructured forests, are beyond the scope of LQPs. Second, our method relies on two different samples of respondents (a sample in 2011 and a sample in 2020). This potentially introduces more variability in the results for each municipality.

Figures 2 and 3 further suggest a spatially uneven distribution of payments for the different categories across Switzerland. However, whether this uneven distribution is linked to variations in landscapes and the degree to which their quality is deteriorating or at risk of deterioration was not the focus of this study and would need to be assessed in further research that links payments to physical landscape assessments.

5. Conclusions

Our first analysis of LQPs shows that some form of direct payment for landscape quality has a significant effect on the measured public perception of landscape quality. This would suggest that these forms of payments are indeed visibly changing (improving) landscape quality, but any causal effects would need to be determined through direct experiments with respondents. There are further measures preserving valuable landscape structures, such as erratic blocks and sinkholes, where they still exist, which were also shown to have a small but significant effect on indicators of landscape perception. Based on our results, we would therefore argue that such measures focusing on the provision of ecosystem services should be fostered and further developed with a monitoring system put in place to measure effects more directly. Measures, however, which do not lead to a perceivable landscape change, should be re-evaluated, as they can be considered as “rent-seeking”.

In order to have a sound evidence base for decision-making, funding spent on agricultural payments should be evaluated more rigorously to assess which measures have a measurable effect on public perceptions, for instance, using direct photo elicitation of before and after measures or guided walks with residents that are accompanied by semi-structured interviews, among other methods. Applying such social science methods to evaluate the effect of public spending on public perception will help address the lack of information about the relationship between public support and ecosystem services delivered to the general population.

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