RESEARCH ARTICLE

Governing the Commons: Why Self-Administered Farm Outlets Flourish in Switzerland

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Investigations of the question why some commons flourish and why others fail is one of the most exciting and interesting topics in the social sciences. In this paper we take a look at the performance of self-administered outlets. In Switzerland, many farmers offer their products via self-administered outlets. Offering such an outlet is a trust game for the farmer and a commons dilemma for the customers. By law customers are required to pay for the products. However, in practice detecting and prosecuting shoplifting at outlets is almost impossible. Hence, for the customers paying the demanded price for a product is more or less voluntary and constitutes a social dilemma. If all pay, the outlet flourishes and provides convenient access to agricultural products. But shortsighted payoff-maximizing behavior suggests shoplifting which leads sooner or later to the disappearance of the self-administered outlet. Our study consists of 240 telephone interviews with farmers who either have an outlet, had one in the past but closed it, and of farmers who never had a self-administered outlet. We find that self-administered outlets increased in popularity in recent years and flourish very well in Switzerland. Farmers that offer a self-administered outlet place higher trust in others than farmers not having an outlet. Furthermore, outlets work well with respect to shoplifting and percent of demanded price paid under two conditions: if the outlet is monitored and if it contains inexpensive products as compared to more expensive ones. Hence, outlets work when the decision to pay is a low-cost decision for customers.

Keywords: self-administered outlets; commons; social dilemmas; cooperation; public good

1. Introduction

Since Mancur Olson's (1965) seminal work "The logic of collective action" research on when commons raise and when they fail is one of the most fascinating and most important topics in the social sciences. In theory, the decision to contribute to a public good or to refrain from overusing a common resource is structured as the decision situation in the Prisoner's Dilemma: Rational actors face the incentive not to cooperate which leads to a Pareto-inefficient Nash-equilibrium. Much research has shown that the cooperation problem of the Prisoner's Dilemma can be solved. In principle there are five different avenues to cooperation: First, cooperation is possible when a third party intervenes and eliminates the incentive to defect. The third party can be the state, or alternatively, a private stakeholder who receives the property rights. As is known, solving the cooperation problem through the intervention of the state is already discussed in Thomas Hobbes' (1651) famous book "Leviathan". Along similar lines Garrett Hardin (1968) discusses the possibility that cooperation can also be reached when the property rights are well-defined, e.g. are given to a private stakeholder.

Second, cooperation is feasible if actors stop utility maximizing and behave altruistically. However, this possibility breaks with the assumption that most humans are utility maximizers. To be sure, humans sometimes behave altruistically, particularly towards members of their own family or group (Darwin, 1871; Dawkins, 1976; Wilson, 2005; Rand & Nowak, 2013). However, most social scientists probably agree that altruism is rare outside family bonds or when the stakes are high. Third, cooperation is feasible when the game is iterated and when actors value future payoffs sufficiently high. This solution is discussed in

Axelrod's (1984) famous book "The evolution of cooperation". If the decision in the Prisoner's Dilemma is iterated, actors can use conditional strategies such that cooperation lies in the self-interest of players (see also Dal Bo & Frechette, 2011, 2018). Fourth, an incentive to cooperate can be established if actors have the opportunity to invest into their reputation by cooperating (Nowak & Sigmund, 1998; Rand & Nowak, 2013). Fifth and finally, cooperation can be reached if actors have the opportunity to sanction other co-players for non-cooperation (Fehr & Gintis, 2007; Dreber, Rand, Fudenberg, & Nowak, 2008), or alternatively, can reward other cooperators for cooperation (Rand, Dreber, Ellingsen, Fudenberg, & Nowak, 2009). Sanctioning other non-cooperators or rewarding other cooperators is typically costly and by itself subject to a free rider problem if group size is larger than two. This is why Fehr and Gintis (2007) call it altruistic punishment. They suggest that it is driven by emotions. Humans become angry when they feel treated unfairly which motivates punishment even if it is costly (Winter & Franzen, 2017).

All five solutions are very compelling but they depend on rather restrictive conditions. Solution number one depends on the existence of adequate institutions (e.g. the state or a private owner) who are able to detect defections and to sanction them. Such conditions are of course not always given as demonstrated by global environmental problems such as overusing fossil fuels and emitting CO_2 into the atmosphere. Solution number two requires changing human nature. Applying conditional strategies in iterated games depends typically on relatively stable dyadic or small group relations. Experimental research has shown that voluntary contribution in groups of four players erodes already rapidly after a few rounds (Fehr & Gächter, 2002). Also, solution number four depends crucially on group size so that individuals can observe and track their behavior. These conditions must also be met in solutions through altruistic punishment. In addition, altruistic sanctioning depends on the cost of sanctioning. In reality, these conditions, adequate institutions, small groups, and the possibility to monitor individual behavior are not or only imperfectly met. This holds definitely true for Hardin's example of overpopulation or global environmental problems like CO_2 emissions. This is the reason why these global common goods problems have not been solved so far.

However, as Elinor Ostrom (1990) pointed out some common goods are successfully managed. Ostrom's analysis is based on 14 case examples such as the sea fishery in Antalya in Turkey or the common pastureland in Törbel, a small community in the Canton Valais in Switzerland. From her case analyses Ostrom summarized eight conditions that must be met for commons to survive: First, access to the commons must be restricted. For example, in Törbel only members of the community have access to the common pastureland and usage by farmers from outside the village is prohibited. Second, there have to be rules that limit not only the number of users but also the intensity of usage. In Törbel, farmers are only allowed to send as many cattle to the common pastureland as they are able to maintain during wintertime. This very crucial rule avoids the incentive that farmers increase their herds during summertime when using the common pastureland. Third, members of the community are able to participate in designing the rules that regulate the access to the commons. Fourth, the behavior of users must be observable and hence can be monitored. In Törbel, this condition was fulfilled since the farmers were able to observe how many cattle each member puts on the common pastureland. Fifth, members who violate the rules can get sanctioned. Sixth, there are institutions that regulate conflicts if they emerge among the group members. Seventh, such forms of successful management of commons can only exist if the community has a certain degree of autonomy. Finally, the last principle states that "governance activities are organized in multiple layers of nested enterprises" (Ostrom, 1990, p. 90).

Ostrom's eight design principles have inspired much empirical research during the last couple of decades. Cox, Arnold, & Villamayor Tomas (2010) conducted an extensive meta-analysis of the accumulated evidence. The authors incorporate 91 mainly qualitative case studies in their analysis and conclude that all principles receive substantial empirical support (see also Baggio et al., 2016). A book by Poteete, Janssen, & Ostrom (2010) discusses a wide range of empirical evidence from experimental to field studies. However, studies using large numbers of common pool units are still rare (Poteete et al., 2010, p. 68).

In this paper we fill in the gap of large scale data analysis of real life commons. Our example are self-administered outlets through which farmers sell some of their food products. These direct outlets have increased in popularity in Switzerland during the last decade. Usually, farmers place their products in small barns along the roads surrounding their fields and more or less within the vicinity of their farmhouses. The products are mostly vegetables or fruits depending on the season, but many farmers offer also more expensive products such as meat, cheese, honey or self-made confiture. The products are usually furnished with a price tag and the outlet with a cash box. In theory, taking a product without depositing the correct amount into the cashbox is considered stealing by law. However, in practice the outlets are not supervised so that taking a product without paying or paying less than the demanded amount is easily possible. Hence,

customers have basically two options, they can either take a product and honestly pay the required amount or they can take the product without paying. In the absence of any surveillance, detection of "shoplifting" is highly unlikely and often considered a bagatelle such that in reality there will be no prosecution in case of not paying. Furthermore, many cash boxes do not allow a withdrawal of return money so that customers must provide the right change for the products selected. Hence, in case of detection of not paying, customers always have an excuse and can argue that they were lacking the exact amount in cash and intended to pay later.

From the point of view of the customers direct farming outlets are a common-pool resource. However, in difference to natural common-pool resources like pastoral commons or fisheries, the outlets are privately owned. Nonetheless, customers profit from the easy availability of products seven days a week and often 24 hours a day. Paying the right amount secures that the outlet will persist and that customers can profit from the easy availability of food. Yet, customers do face the temptation of not paying or paying less than the demanded amount. In case all customers behave opportunistic and do not cooperate, the outlet will vanish and, hence, payoff-maximizing behavior will lead into a Pareto-inefficient outcome. Hence, an unmonitored direct farming outlet is a common good for the customers. On the one hand, if customers cooperate the outlet will persist. On the other hand, every customer faces the temptation to defect and if many customers defect, the outlet will finally disappear. Therefore, direct farming outlets can be viewed as giving rise to a social dilemma, which is defined as a decision situation in which utility maximizing individuals face the temptation to defect and in which frequent defection results in a Pareto-inefficient equilibrium.

From the point of view of the farmer, providing an outlet is a trust game. The farmer is the trustor who offers the products in the first move, the customers are the trustees who then can decide whether to honor the trustor or whether they take advantage of the trustor. The trust game comes first. It models why (or why not) a farmer sets up the outlet in the first place. Once the outlet is set up the customers play a social dilemma. Hence, temporally the two games are separated. The existence of the outlets raises two questions: Why do farmers offer the outlet in the first place and why do customers pay voluntarily such that many outlets survive?

We will investigate both questions in this paper. First, the second paragraph takes a more elaborate look at the underlying decision structure of the game. Particularly, we will discuss why cooperation should be rather unlikely from a game theoretical perspective. Second, the chapter also considers the eight conditions outlined by Elinor Ostrom (1990) and discusses to what extent they are able to answer the research questions. In section three, we discuss a few studies that are rather similar to this one. Particularly, a study by Pruckner & Sausgruber (2013) investigates the functioning of newspaper honor boxes in a field experiment in Austria. As it turned out the incidence of honorary payment is very low and newspaper boxes would not exist if the papers did not profit from commercial advertisement. Similar results are reported in a study on newspaper honor boxes by Brudermann, Bartel, Fenzl, & Seebauer (2015).

A further example that is similar to ours is a study by Schlüter & Vollan (2015). The authors investigate flower fields in the south of Germany where customers can cut the flowers themselves directly on the field and have to deposit the required price for the flowers into an honor box. Also, the evidence in this study suggests that voluntary pay systems of this kind do not work very well. Section four then takes a look at direct farming outlets in Switzerland. First, we describe our sample and how we conducted the data collection. Particularly, we conducted 240 telephone interviews with farmers who either never had a self-administered outlet, farmers who had one in the past but closed it, and farmers who still run the outlet. Subsequently, we analyze the difference between farms offering and not offering self-administered outlets. Furthermore, the section analyses which outlets are successful and which ones are not and presents the results. Finally, section five summarizes and discusses the findings, points out some limitations of the study and makes suggestions for further research.

2. The Logic of the Provision and Maintenance of Farm Outlets

The decision to put up a self-administered outlet can be modeled as a trust game in which the trustor, in our case the farmer, decides to offer his products and the trustees decide to pay or not to pay for the products. If the game was played once then the trustee would face the temptation of not paying and the trustor foreseeing the temptation would not offer the product. However, if the game is iterated, as in our example, then the trustee wants to profit from buying products in the future if the discounted future payoffs exceed the short-term advantages of not paying. Hence, as we know since Axelrod (1984), cooperation in the trust game is possible even among payoff-maximizing individuals. However, the farm outlets involve not only one trustee but many and among the trustees paying the price or not is like the decision to contribute

to a public good or not. By law, consumers in Switzerland are required to pay for the products and not paying is equivalent to shoplifting. However, in practice, the farm outlets are typically not monitored and the probability of detecting shoplifting at self-administered outlets is practically zero or very close to zero in difference to standard shops. Even if shoplifting were detected, consumers would often have an easy escape by claiming that they were lacking the right amount in cash and intended to return with the demanded cash. Thus, in practice shoplifting is very hard to prosecute. Additionally, many products offered at self-administered outlets are seasonal vegetables and fruits. Their market value is typically low such that stealing small amounts is considered a bagatelle and in practice not prosecuted.

Furthermore, consumers can also display milder forms of free riding by paying less than demanded by the farmer. Hence, in practice paying the right amount is more or less a voluntary decision by the consumer. Given this condition the consumer is confronted with the decision to pay the right amount and thereby contributing to the continued existence of the outlet or to free ride and thereby not to contribute to the maintenance of the outlet. The choice of being honest by one consumer has usually very little effect on the overall revenue of the outlet, since the number of consumers is usually large. Hence, a payoff maximizing consumer will pay less or nothing of the demanded price for a given product and will freeride on the honest payment of all other consumers. Therefore, if every consumer follows the incentive of not paying then maintaining an outlet will soon become costly for the farmer and will disappear.

Given the incentive structure described by the trust game the first question emerging is under which conditions farmers provide a self-administered outlet? The first and most important condition is that farmers must have sufficient trust that consumers return the asked price for their product. Thus, the general level of trust placed into others should be one of the most important factors. Second, farmers should be more willing to sell their products via self-administered outlets if the products they offer are relatively inexpensive. This way the possible loss in case of dishonest behavior from customers is relatively low. As a matter of fact, one would expect that farmers first offer fruits and vegetables and add more expensive products like meat, cheese, honey or confiture later on when the experience with the more inexpensive products is positive. Third, farmers are a small and well-organized group in Switzerland with relatively frequent meetings of the farmers' association. This facilitates the spread of news and experience others have made with self-administered outlets. Hence, the likelihood that a farmer offers a self-administered outlet should increase if neighboring farmers have done so in the past and if they have gathered positive experience. Unfortunately, this information was gathered among farmers with an outlet, but not among farmers without such an outlet. Hence, this hypothesis is not testable with our data. Summing up, we derive two hypotheses concerning the behavior of farmers: H_1: Farmers with high general trust in others should have a higher likelihood of providing a self-administered outlet. H_2: Farmers that produce relatively inexpensive food products such as vegetables and fruits should have a higher probability of offering them through a self-administered outlet.

Next, let us turn to the expected behavior of consumers. First, game theory suggests that consumers are more cooperative if the shadow of the future is sufficiently large. This means that consumers must believe in the extended existence of the outlet, and value future benefits of using the outlet sufficiently high. Both conditions imply that consumers live relatively close to the outlet and thus have the chance of using it more often. These conditions are probably better met if the outlet is located in smaller communities as compared to bigger communities. Second, cooperation rates should be higher if consumers perceive that their behavior is monitored. Monitoring should deter non-cooperation because consumers might fear sanctions. Additionally, monitoring also implies that the visibility of cooperative behavior is higher and, hence, consumers have the chance to invest in their reputation by cooperating. Both push and pull forces are well known of increasing cooperation rates in laboratory studies (Rand et al., 2009). Third, cooperation of consumers should be elevated if the outlet is personalized as opposed to an anonymous supplier. As will be seen later, some farmers personalize the appearance of the outlet by photographs or paintings of the family. Furthermore, such a personalization of suppliers might also be increased by signs that appeal to the honesty of consumers. Fourth, the literature on the broken windows phenomenon (Keizer, Lindenberg, & Steg, 2008) suggests that outlets which are well organized and have an orderly appearance indicate to consumers that norms are adhered to in the area and that the supplier cares. This suggests that others behave cooperative as well, which should lead to increased cooperative behavior of the consumers. Finally, one would additionally expect that expensive products increase the temptation of stealing.

Summing up, there are five hypotheses that specify the influence of the characteristics of the outlets on cooperative behavior: H_3: Cooperation rates should be higher in smaller communities as compared to larger communities since this increases the perception of iterated transactions and increases the shadow of the future. H_4: The perception that consumers are monitored increases cooperation rates and this perception is

increased if the outlet is located within the vicinity of the farming house or other dwellings. H_5: Cooperation rates should be higher if the supplier of the outlet personalizes the outlet by signs appealing to the honesty of the customers. H_6: Outlets that display a well-organized and neat appearance should elicit higher cooperation rates since consumers imitate norm conformity in such an environment. H_7: Finally, expensive products are expected to be stolen more often as compared to inexpensive products, since the temptation not to pay is higher in the former situation.

3. Examples from the Literature

Before we describe our own study of self-administered outlets in Switzerland we take a short look at similar studies of local commons. One study that is similar to ours is an investigation of newspaper honor boxes by Pruckner & Sausgruber (2013). Many newspapers in Germany and Austria sell their papers via so called honor boxes. These are boxes placed on the sidewalks of much-frequented areas in cities which contain daily newspapers. Customers can purchase such papers by paying the price of the paper into a closed cash box and by taking the paper from the box. The paper box is open and not locked such that papers can also be taken without paying the price. Hence, such newspaper honor boxes work very similar to self-administered outlets in Switzerland. By law customers are required to pay the demanded price. However, monitoring whether they really do so is almost impossible so that in reality paying the price is voluntary and consumers are faced with the incentive to take the paper without paying.

Pruckner & Sausgruber (2013) investigated via a field experiment the effect of legal and moral appeals to customers on the payment rate. For this purpose, they installed three different boxes in an Austrian city. In the control condition a sign on the box read "This paper costs 0.60 Euro". In the legal treatment the inscription said "This paper costs 0.60 Euro. Stealing a paper is illegal". In the moral condition the sign said "This paper costs 0.60 Euro. Thank you for being honest." The authors then observed after each transaction whether a price was paid by customers and how much was paid. The three boxes were observed during three days until 40 papers were taken from every box. The results show that only 13% to 15% of the customers paid something and that the other 85% made zero payments. Concerning the zero payment-rate there was no statistically significant difference between the three conditions. The overall average price paid was 0.05 Euro per paper in the control and legal condition and 0.14 Euro in the moral condition, and thus slightly higher than in the control and legal condition.

The result of the field experiment was complemented by an observational study in which the authors observed 250 newspaper honor boxes over a period of 7 weeks with 12,985 transactions. Again, the average observed payment per paper was 0.05 Euro. Very similar results are reported in another study about newspaper honor boxes in Austria by Brudermann et al. (2015). The authors observed newspaper sales bags in Vienna for a period of 24 weeks. The average payment per paper which had a price of two Euro (weekend edition) was about 0.1 Euro. Furthermore, the authors investigate the effect of descriptive norms ("the majority of our readers pay for their copy") and watching eyes (Haley & Fessler, 2005) on the payment rate. However, both interventions as well as a combination of both result only in very small and inconsistent increases in the payment rate. Hence, the results of these studies demonstrate how commons of this type can fail. Newspapers only continue to use honor boxes because their revenues from advertisement depend on the print number put in circulation. But aside from advertisement generated by the print number the commons would definitely have vanished.

Another example stems from Schlüter & Vollan (2015). Also, these authors conducted a field study by observing a flower field in southern Germany in which customers can pick their own flowers. For this purpose, the authors set up a small barn and observed after each transaction whether customers paid for the flowers or not. In the control condition the proportion of customers who paid was 57%. When the honor box was accompanied by a moral appeal ("Thank you for being honest") the payment rate was 60%. In the legal treatment ("Stealing flowers is illegal. Non-compliance will incur a €20 fine and violators will be reported to the police") the payment rate was 61%. Furthermore, the authors investigated the payment rate if the honor box was accompanied by a family sign stating that the field belongs to a family (the sign also contained a child drawing of the family), and in a further condition a sign saying that the field belongs to a company. In this latter case, the payment rate was 62%, and in the family condition the payment rate was 65%.

Hence, even though the payment rate found by Schlüter & Vollan (2015) is much larger than in the studies with newspaper boxes, it still demonstrates that commons with a more or less voluntary payment regime run a serious threat of non-cooperation and depletion. Moreover, legal and moral appeals seem to have only very small effects on the payment rate and similar conclusions hold true with respect to personalized messages (family sign) of the providers.

4. Self-Administered Outlets in Switzerland: Data and Methods

In Switzerland, self-administered outlets are a relatively common phenomenon and the trend over the last seven years shows that the number of farmers offering such outlets is increasing (**Figure 1**). To study the outlets, we first obtained a complete list of all existing farms that are located in the vicinity of the city of Bern. This list contained 1043 farms which are located in 27 surrounding communities. **Figure 2** shows the survey region. We then sent a letter to all 1043 farmers introducing the study on farming in Switzerland and announced a telephone call within the next few days for the purpose of interviewing a person who is familiar with the farm. Before writing the letter, we contacted the regional Swiss Farmers' Association and asked for support of the study which they kindly agreed to do. This recommendation was included in our contact letter. We then contacted all 1043 farms by telephone and were able to conduct 787 interviews which results in a response rate of 75%. The interviews were conducted between March and May 2015 in the University's own computer assisted telephone laboratory (CATI) and took on average
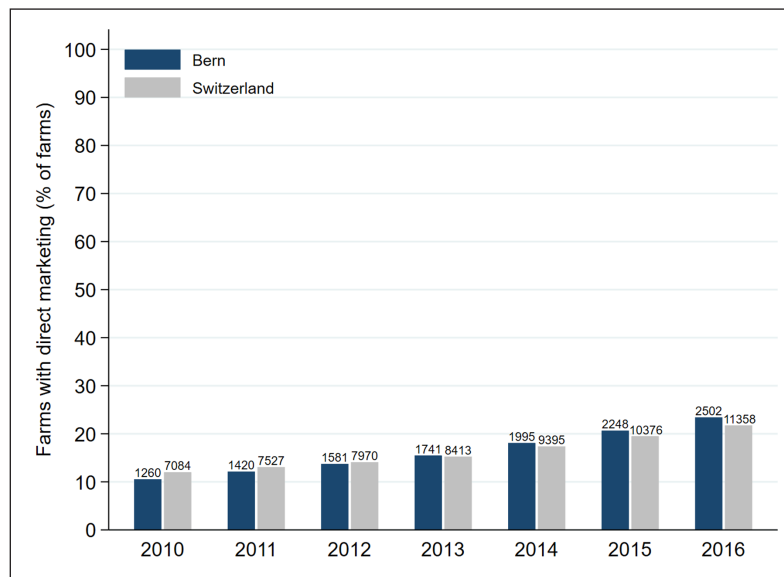

Figure 1: Farms with direct marketing in Switzerland.
Note: Data source is the Federal Statistical Office of Switzerland (2017, 2018). Numbers on top of the bars indicate the absolute numbers of farms with direct marketing. This also includes administered shops at the farm. We estimate that about half of the shown total number are self-administered outlets.
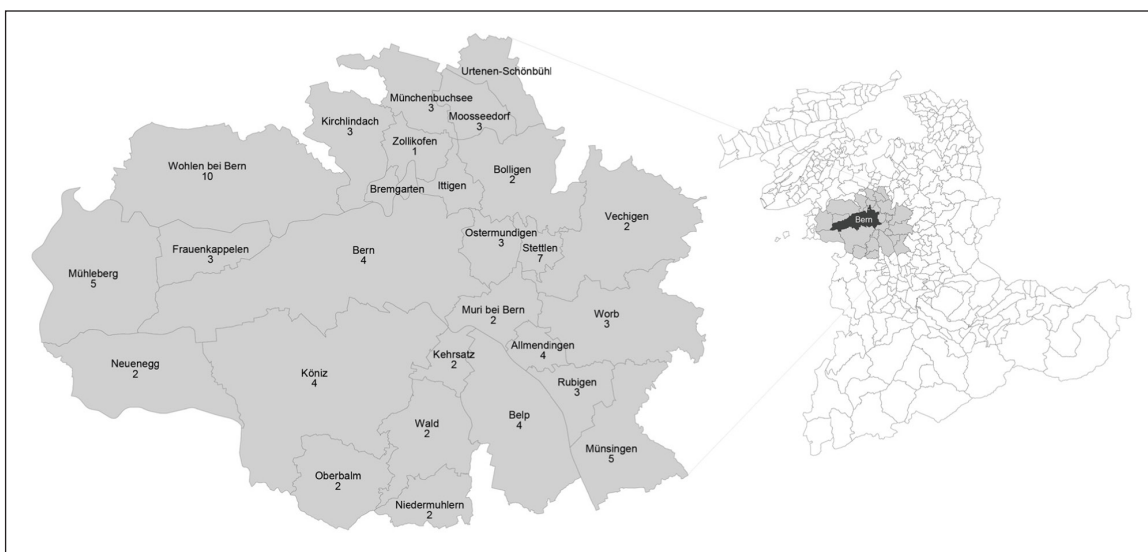

Figure 2: The survey region of the study in the Canton of Bern, Switzerland.
Note: Map of the Canton Bern, Switzerland. Numbers below the names of the communities indicate the numbers of farms with a self-administered outlet in the sample.

30 minutes. One of the first questions was whether the farm has a self-administered outlet, had one in the past but not anymore, or never had such an outlet. 83 farmers reported that they run a self-administered outlet, 40 responded that they had one in the past but gave it up, and the remaining 664 farmers never had an outlet. From this latter group we conducted the full interview by randomly choosing 1 out of 6 which results in 117 full interviews. Thus, overall the study contains 240 full interviews. Hence, the sample of farmers in our study is small and not representative for Switzerland, and also not for the Canton of Bern, but is limited to the region surrounding the largest city (and the capital of Switzerland) of the canton of Bern (see **Figure 2**). However, the proportion and trend of self-administered outlets in the Canton of Bern resembles very closely the trend and proportion in all of Switzerland, and there is no reason assuming that the survey region would be very different from other regions at least in the German speaking part of Switzerland.

5. Results

We first analyze the probability of having a self-administered outlet by comparing the group of farmers who never had such an outlet with those who have or had an outlet in the past. Results of such a logistic regression analysis are depicted in **Figure 3**. We formulated the hypothesis, that farmers with high general trust in others are more likely to run a self-administered outlet. As can be seen from the results the hypothesis receives empirical support. Trust was measured as in the World Values Survey via the question "Do you think most people can be trusted or that one cannot be too careful in dealing with others?" Farmers who answered that they trust others (measured on a 11-point answering scale) do have a higher likelihood of running an outlet. The effect is statistically significant but small. Furthermore, we expect that farmers who grow predominantly relatively inexpensive products (fruits and vegetables) have a higher chance of having a self-administered outlet. This hypothesis is not supported by our data. The effect is positive but statistically not significant. Moreover, the analysis contains also two indicators that measure the size of the farm, the number of employees and the hectares of land cultivated. The number of hectares does not seem to matter for the probability of having an outlet. However, the number of employees increases the likelihood by a probability of 0.08 for every additional employee on the farm.

Next, we turn to the question which outlets are successful and which ones are not. We use two indicators of success in our study. First, we asked farmers how often products were stolen from the outlet during the last year. The indicator is of course not perfect since it is a retrospective question covering a long time period,
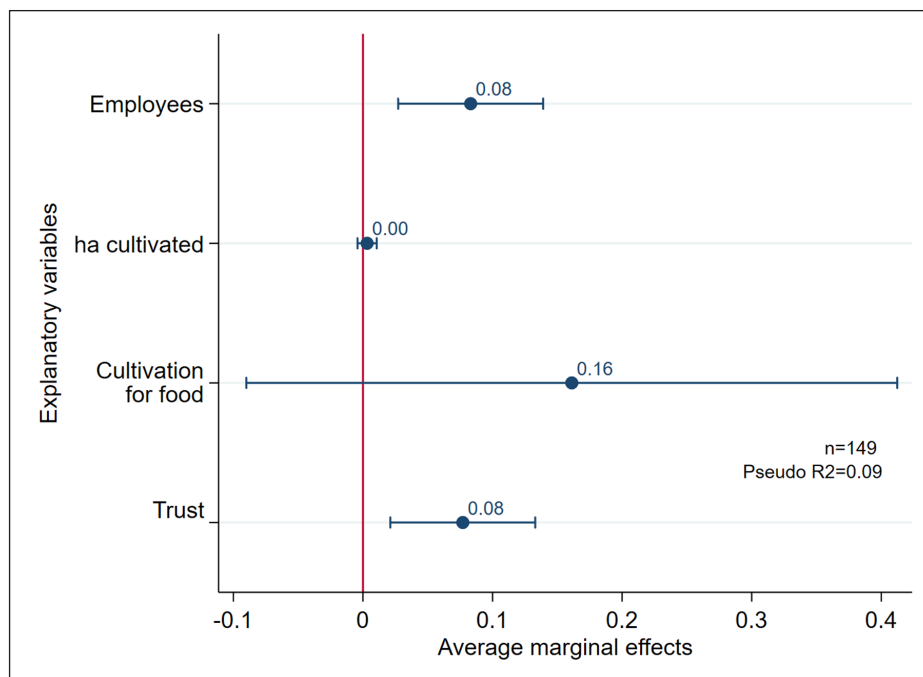

Figure 3: Determinants of having a self-administered outlet.
Note: Coefficient plot of average marginal effects of the logistic regression of self-administered outlet ownership (none vs. former + current) on farm and farmer's characteristics including 95% confidence intervals (see Table S1 in the supplement for details).

the last year. Hence, the numbers are probably rough estimates rather than exact numbers. **Figure 4** shows the distribution of stealing. 53% of the farmers report a stealing rate of zero, and there are only very few outlets for which a stealing rate of more or equal to 10 during the last year is reported. Hence, stealing is not a big problem among the farms that do offer self-administered outlets. Our second indicator concerns the proportion of the demanded price obtained for the products. Farmers were asked "how many percent of the indicated price did you obtain last year". The distribution of the payment rate is depicted in **Figure 5**, and indicates that farmers receive on average 95% of the demanded price from customers. Hence, both indicators suggest that free riding is relatively rare and that most customers pay the full price.

   Figure 6a presents the results of a multiple negative binomial model of the frequency of stealing. The hypothesis (H$_3$), that outlets should work better in smaller communities as compared to bigger ones because
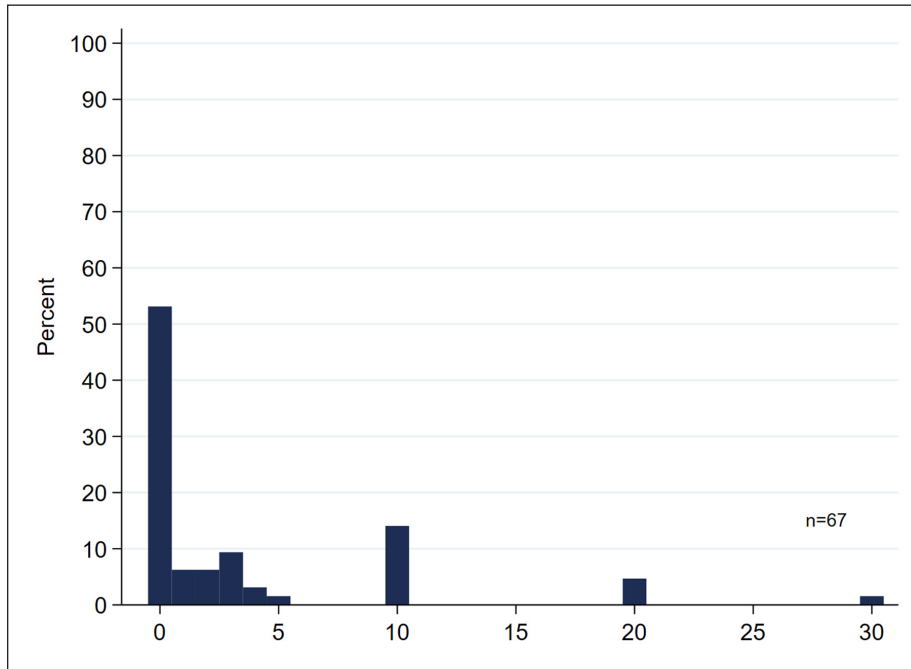
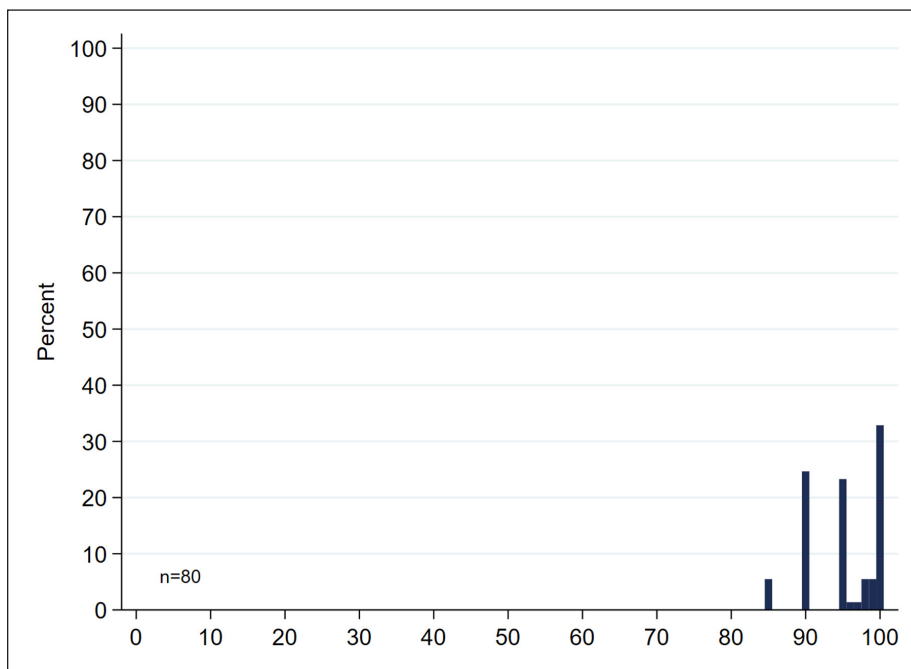

Figure 4: The frequency of stealing.

Figure 5: The distribution of the payment rate.

consumers would have more contact with the outlet and should have an increased "shadow of the future" is not corroborated. The effect of community size (number of inhabitants) is zero. In addition, we also asked farmers to estimate the proportion of regularly returning customers. However, also this effect is zero in our analysis depicted in **Figure 6a** (effect of steady customers).

Hypothesis H_4 concerns the effect of monitoring the outlet. We used a number of different indicators to investigate this hypothesis. The results suggest that an outlet works indeed somewhat better if it is located within the vicinity of a dwelling or farmhouse. Farmers who operate an outlet outside the village in the countryside report 4.25% more shoplifting. Furthermore, we ask farmers whether they monitor the outlet either by video cameras (real or fake), or by visiting the outlet often in person. The results suggest that active attempts of monitoring do indeed reduce the stealing rate. However, the effect is small in this study. The next hypothesis (H_5) specifies the effect of moral appeals to be honest. Outlets that do have such a sign are paradoxically more often affected by stealing. Again, this effect is small (4% higher shoplifting rate) but statistically significant, and refutes our hypothesis. However, the effect of moral appeals can probably not be interpreted causally. Rather, putting up such an appeal might be a reaction of farmers to increased stealing and, hence, is a reaction but not the cause of stealing. Hypothesis six specifies that outlets which have a well-organized appearance should have lower shoplifting rates. We measured the appearance in the questionnaire by asking farmers whether they would say their outlet is neat and well-maintained or less well maintained. This hypothesis is not confirmed by our data. Obviously, the appearance does not matter much. But it should be kept in mind that we measure maintenance by self-report which might not reflect the "objective" level. Finally, hypothesis seven says that expensive products (meat, cheese, honey, etc.) are stolen more often as compared to less expensive products like fruits and vegetables. This hypothesis is corroborated in our study, the stealing rate of outlets containing expensive products is 4% higher, and the effect is independent of the overall revenue of the outlet which we included as a control variable.

Figure 6b displays the result of a multiple OLS regression analysis of the percentage received of the demanded price. Two effects of our former analysis on stealing are fully replicated by this second analysis: the payment rate of expensive products is lower than of inexpensive products, and monitoring increases the
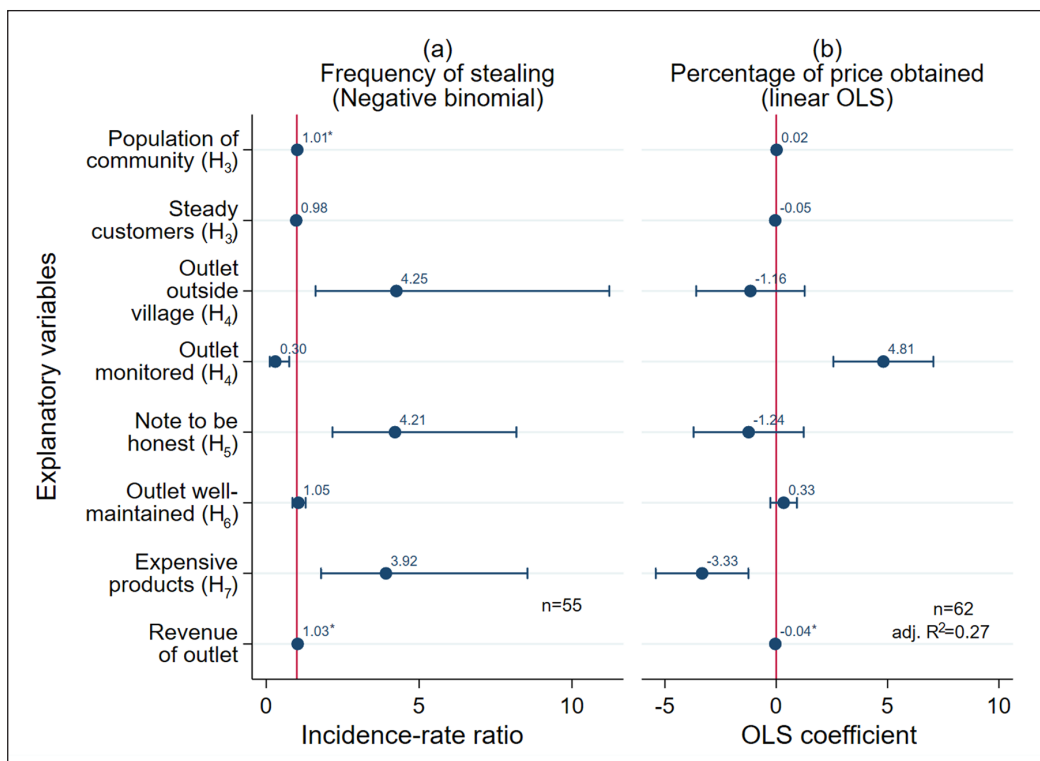

Figure 6: Analyses of the stealing frequency and payment rate.
Note: Coefficient plots of the negative binomial regression of the frequency of stealing **(a)** and the linear ordinary least squares (OLS) regression of the percentage of the price obtained **(b)** at current self-administered outlets on various characteristics including 95% confidence intervals (see Table S2 in the supplement for details).

payment rate. The two other former results on moral appeal and the location of the outlet are replicated in tendency but statistically not significant.

One might wonder whether the stealing rate and the percentage of price obtained are valid indicators of success. We investigate this question by comparing farmers who have had an outlet in the past with those who currently run an outlet. If the indicators are valid then stealing should decrease the likelihood of the survival of the outlet and a high percentage of price obtained should increase it. Hence, we regress the dichotomous dependent variable (former outlet versus current outlet) on the frequency of stealing and on the percentage of price obtained. The results confirm both hypotheses. If the frequency of stealing increases by 1% the chance of survival is reduced by 0.11% ($p < 0.05$), and if the percentage of price obtained increases by 1% the survival chance increases by 0.56% ($p < 0.05$) (see models 1 and 2 in Table S5).

We conducted several robustness tests for the models reported in **Figures 3, 6a,** and **6b**. First, we checked all models with respect to outliers (leverage for logistic regression and Cook's D for negative binomial and linear OLS regression). Second, the robustness of standard errors was investigated via non-parametric bootstrapping. None of these checks had any substantial influence on the estimates. In addition, the robustness of all estimates with respect to model specification was assessed using the procedure suggested by Young & Holsteen (2017). The potential influence of omitted variables was examined using the method suggested by Frank (2000). Also these checks detected no fundamental deviations from the reported results. The analyses were conducted using the statistical software package STATA 16.0.

6. Discussion and Limitations

Compared to other examples in the literature, self-administered outlets work very well in Switzerland. First, the proportion of farmers offering such outlets is steadily increasing. Outlets would probably not experience such an increase in popularity if they encountered frequent misuse. Second, our study results of a small sample of farmers who offer such outlets in the vicinity of Bern suggest that stealing from self-administered outlets is rare and that the rate of payment of the demanded price is very high. Putting it into a nutshell, self-administered outlets in Switzerland are a success story if shoplifting rates and percent of prices paid are the criteria. Other similar common goods like newspaper honor boxes or self-picking flower fields do not work as well by these criteria. This raises the question of how this success of the outlets can be explained. Our results suggest two reasons: First, self-administered outlets do work particularly well when they are monitored, and if they are located close to dwellings such that the customers have the feeling that they are observed. Second, those outlets with inexpensive goods function better than those with more expensive products, where the temptation of stealing is higher. Thus, cooperation becomes more likely in low-cost situations, when cooperating, or paying the required price for a product does not hurt much. This condition is also given in the newspaper honor box example. However, newspaper boxes are typically located in larger cities where monitoring is lower and anonymity higher. Hence, in cities anonymity and a lack of the shadow of the future seems to offset the low-cost effect.

The absence of monitoring could also explain the comparatively low payment rates in the example of self-picking flower fields in Germany. Most of these flower fields are not in direct vicinity of residential houses but rather located in the countryside, and hence, customers might feel less observed when picking flowers.

Summing up, our investigation of self-administered outlets suggests two important conclusions: commons can flourish in low cost situations and in situations with at least some monitoring. Hence, not all of the eight rules outlined by Elinor Ostrom (1990) are necessary conditions for the survival of commons: they can be maintained even if Ostrom's first rule, restriction of access, is not fulfilled. Also, Ostrom's second rule that there must be regulations that limit the intensity of usage does not apply to the functioning of self-administered outlets. Moreover, rule number three, that users of the commons must be involved in designing the rules of usage seems to be dispensable. However, rule number four, stating that monitoring is in need seems to be important also with respect to the functioning of self-administered outlets. Monitoring might work in various ways. First, the mere perception of being monitored leads, like watching-eyes, to increased norm conformity. Second, it might also elicit consideration about customers' reputation.

Ostrom's fifth rule states that sanctioning violators must be possible. Also, this rule is not fulfilled in our case, at least not in practice since shoplifting is very hard to detect and prosecute. Rule number six requires that there are institutions that regulate conflicts in case they emerge among group members. This rule seems to contribute to the functioning of self-regulated outlets. In case a conflict between farmers and consumers should emerge, either party could easily turn to Swiss legal institutions such as the public attorney. Finally, rules number seven and eight seem again to be dispensable: the community of farmers or consumers do not need to be autonomous for commons to function properly.

Our study suffers from a few drawbacks that should be kept in mind. First, we do not have a random sample of self-administered outlets in Switzerland but only a full sample of a small geographical area of the city of Bern and a few surrounding communities. There is no obvious indication that this area is any different from the rest of Switzerland, but generalizations must still be made with care. Second, much of our analysis is based on self-reported information of the farmers offering the outlet. This induces selectivity since outlets that were not successful dropped out of the sample. We tried to avoid this shortcoming by also interviewing farmers who closed their outlet. However, they are missing in the analysis of the criteria of success, since it is by logic impossible to obtain information on shoplifting and payment rates in 2014 of already closed outlets. The selectivity of our sample censors outlets with high shoplifting rates and low payment rates and our analysis might therefore underestimate the importance of some independent factors, particularly the effects of monitoring and low-cost products. This drawback can only be removed in longitudinal studies in which the survival of outlets is observed for a longer time-period. However, it also suggests that our estimates are conservative and might increase in importance if there were no selectivity. Moreover, in some of our results the direction of causality cannot be conclusively determined. Particularly, this is the case with respect to the finding that farmers with high general trust have a higher probability of offering an outlet. Here, the causality might as well be reversed such that farmers' trust is a consequence (and not a cause) of successful outlets. The argument applies also to the number of employees. In principle, these causality issues can only be remedied with panel data.

Finally, commons may also work very well in Switzerland, because of the long tradition of commons like the one described by Elinor Ostrom in Törbel. Hence, the conviction that rules are necessary and need to be adhered is very widespread and accepted in Switzerland and might very well contribute to cooperation (Boyd & Richerson, 2018). And this might also explain why so many farmers place trust in their customers and set up self-administered outlets in the first place.

Additional Files
The additional files for this article can be found as follows:

- **Table S1.** Logistic regression of self-administered outlet ownership on farm and farmer's characteristics. DOI: https://doi.org/10.5334/ijc.960.s1
- **Table S2.** Regressions of stealing frequency and percentage of price obtained at current self-administered outlets. DOI: https://doi.org/10.5334/ijc.960.s2
- **Table S3.** Descriptive statistics of all variables of Table S1. DOI: https://doi.org/10.5334/ijc.960.s3
- **Table S4.** Descriptive statistics of all variables of Table S2. DOI: https://doi.org/10.5334/ijc.960.s4
- **Table S5.** Logistic regressions of self-administered outlet ownership (former vs. current) on success indicators. DOI: https://doi.org/10.5334/ijc.960.s5

Competing Interests
The authors have no competing interests to declare.

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