

## Variables consider for the regression analysis in the paper [Sustainability 2018:xy]

Variable in Regression models	Question-number in the original survey (German Version)
Livestock endowment ( $W_i$ )	801
Appropriation ( $a_i$ )	801-808
Provision ( $p_i$ )	901
Opportunity costs ( $O_i$ )	1105-1107
Land use intensity (control)	601; 801
Agricultural income (control)	401-404; 1107
Leadership (control)	108
Successor (control)	203
Years left to retirement (control)	103
Maximum sustainable yields ( $MSY_c$ )	QUALITATIVE DATA – structured interviews with the monitors of the corporations
Provision rules ( $inst_c$ )	"..."
Fine for provision defection ( $F_c$ )	"..."
Group appropriation ( $a_{-i}$ )	107; 801-808
Group provision ( $p_{-i}$ )	107; 901

For the original questionnaire in German please see: <https://osf.io/w3sg6>

## Survey questions: Only those used to calculate the variables as used in the regression models

### 1) Farm identification

101	Are you the owner of the farm?	Yes No	→ <input type="checkbox"/> 1 → <input type="checkbox"/> 2
102	In which year have did you become the owner of the farm?	_ _ _ _	
103	In which year were you born	19 _ _	
...	...		
107	To which corporation do you belong or feel most attached?	→ <input type="checkbox"/> none    → <input type="checkbox"/> Grindel    → <input type="checkbox"/> Itramen    → <input type="checkbox"/> Bach    → <input type="checkbox"/> Bussalp    → <input type="checkbox"/> Wärgistal    → <input type="checkbox"/> Scheidegg    → <input type="checkbox"/> Holzmatten	

108	Are you currently holding a formal position in this corporation?
	Yes → <input type="checkbox"/> which ____ - _____
	No → <input type="checkbox"/> 2

## 2) Household structure

203	Do you have a successor in your family for your farm?	Yes, most likely → <input type="checkbox"/> 1 Somewhat likely → <input type="checkbox"/> 2 Don't know yet → <input type="checkbox"/> 3 Somewhat unlikely → <input type="checkbox"/> 4 No, very unlikely → <input type="checkbox"/> 5
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## 4) Labor

401	How many labor hours per day do you spend on average working on the farm?	Summer →  _ _  hours/day Winter →  _ _  hours/day
402	How many additional labor hours on a average day derive from unpaid workforce?	Summer →  _ _  hours/day Winter →  _ _  hours/day
403	How many days per week do you usually spend working on your farm?	Summer →  _ _  hours/day Winter →  _ _  hours/day

## 6) Land holdings

		Today	10 years ago	10 years from now
601	How much agricultural area do you cultivate	_ _  ha	_ _  ha	_ _  ha
602	Whereof leasehold	_ _  ha	_ _  ha	_ _  ha
603	Whereof family succession	_ _  ha	_ _  ha	_ _  ha
604	How much agricultural land that you are cultivating?	_ _  ha	_ _  ha	_ _  ha

## 8) Livestock endowment and appropriation

801	How many livestock units do you currently hold?  _ _  [Number LU]				How many of did you sent to the common pasture?  _ _  [Number LU]				
	In which corporation do you hold use rights?	How many use rights do you hold?			How many of these animals have you sent to graze common pastures in the following corporations ?				
		Full right	Quarter	Eight	cows	young cattle	calf	sheep	goat
802	Scheidegg <input type="checkbox"/> 1	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
803	Grindel <input type="checkbox"/> 2	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
804	Wärgistal <input type="checkbox"/> 3	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
805	Holzmatten <input type="checkbox"/> 4	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
806	Ittramen <input type="checkbox"/> 5	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
807	Bussalp <input type="checkbox"/> 6	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
808	Bach <input type="checkbox"/> 7	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

## 9) Provision

901	How much of your provision duties do you normally fulfill?	Much more than I have to A little more than I have to Exactly the amount I have to A little less than I have to Much less than I have to	→ <input type="checkbox"/> 1 → <input type="checkbox"/> 2 → <input type="checkbox"/> 3 → <input type="checkbox"/> 4 → <input type="checkbox"/> 5
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### 11) Income

1105	How much of your total household income results from agricultural activities?		_ _ %
1106	How do the following activities contribute to your income?	Sails of alpine cheese  _ _ % Milk  _ _ % Direct payments  _ _ % Meat production  _ _ % Animal sales & breeding  _ _ % Other	
	Other _____		
1107	How much of your total household income results from agricultural activities?		_ _ %

### 12) Personal Information

1207	What is your current gross household income? (before tax and social insurance)?  CHF  _ _ _ _ _	<input type="checkbox"/> <50'000 CHF <input type="checkbox"/> 50-99'999 CHF <input type="checkbox"/> 100'000-149'000 CHF <input type="checkbox"/> >150'000 CHF
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## STATA codes for the regression models

Also available at <https://osf.io/vyskq>

```
import excel "\\Client\C$\Users\.....", sheet("cleaned") firstrow clear

rename T prov_binary2
rename U area1
rename V area

ssc inst univar
rename payoff payoff_gve
*univar return_slv returnr_summering
*rename return_slv rev_slv
*sum rev_slv
rename gve_total_2010 gve
*univar share_farmincome
*univar opp_c
*sum rev_totslv
**socio-demo
*univar bornlocal
*univar leadership
*univar succ_d
*univar y_left
*univar yearspast
*univar age

gen appl00 = app_ratio*100

sum gve
sum gve if gve>4 & gve<30
sum gve if gve>4
sum gve if opp_c > 0
univar gve

tab A_1

*****
*Appropriation models*
*****
ssc inst outreg2

** Model 1. ok
reg appl00 gve LU_intens share_farmincome opp_c kv jv leadership succ_d
y_left if gve>2 & gve<30
estat vif
estat imtest
outreg2 using App_Provision.xls, e(all) append bdec(1) ctitle(App OLS)

**Model with subsamples**
*Split by MEAN
*testing Opp_i for big farmers N=38
```

```

reg app100 gve LU_intens share_farmincome opp_c kv jv leadership succ_d
y_left if gve>11.5 & gve<30
estat vif
estat imtest
outreg2 using App_Provision.xls, e(all) append bdec(1) ctitle(App OLS N=38
large)

*testing Opp_i for small farmers N=41
reg app100 gve LU_intens share_farmincome opp_c kv jv leadership succ_d
y_left if gve>2 & gve<11.5
estat vif
estat imtest
outreg2 using App_Provision.xls, e(all) append bdec(1) ctitle(App OLS N=41
small)

*****Multilevel Appropriation*****
**Multilevel with random intercepts and coefficients intercepts by Alp
**without group behavior (A, P)
mixed app100 gve LU_intens share_farmincome opp_c kv jv leadership succ_d
y_left p_duty penalty || Alp_belo: p_duty penalty if gve>2 & gve<30
outreg2 using App_Provision.xls, e(all) append bdec(1) ctitle(App HML RE
Inter omit A&P)

***leadership
mixed app100 gve LU_intens share_farmincome opp_c kv jv leadership succ_d
y_left p_duty penalty || Alp_belo: p_duty penalty if leadership == 1 & gve>2
& gve<30
outreg2 using App_Provision.xls, e(all) append bdec(1) ctitle(App HML RE for
leaders)

mixed app100 gve LU_intens share_farmincome opp_c kv jv leadership succ_d
y_left p_duty penalty || Alp_belo: p_duty penalty if leadership == 0 & gve>2
& gve<30
outreg2 using App_Provision.xls, e(all) append bdec(1) ctitle(App HML RE for
non-leaders)

mixed app100 gve LU_intens share_farmincome opp_c kv jv leadership succ_d
y_left p_duty penalty Aj_1 || Alp_belo: p_duty penalty Aj_1 if leadership ==
0 & gve>2 & gve<30
outreg2 using App_Provision.xls, e(all) append bdec(1) ctitle(App HML RE for
non-leaders incld leader behavior)

***leadership behavior Aj
*mixed app100 gve LU_intens share_farmincome opp_c kv jv leadership succ_d
y_left p_duty penalty Aj_1 || Alp_belo: p_duty penalty Aj_1 if gve>2 & gve<30
*outreg2 using App_Provision.xls, e(all) append bdec(1) ctitle(App with
leaders appropriation behavior (Aj_1))

*****
***Provision models
*****

***PROVISION MODELS*****

sum provision_binary

```

```

sum Provision
tab Provision

tab Prov_ord
recode Prov_ord 1=5 2=4 3=3 4=2 5=1 6=1
tab Prov_ord
** higher numbers means higher provision

**much better when dep. variable is ordinal
ologit Prov_ord_5 gve app_ratio LU_intens share_farmincome opp_c leadership
succ_d y_left
outreg2 using App_Provision.xls, e(all) append bdec(1) ctitle(Provision
Ologit)

*mixed effects

*without group behavior
meologit Prov_ord_5 gve app100 LU_intens share_farmincome opp_c leadership
succ_d y_left p_duty penalty || Alp_belo:
outreg2 using App_Provision.xls, e(all) append bdec(1) ctitle(Provision mixed
effects, institutions but no group behavior)

*** Including group behavior
meologit Prov_ord_5 gve app100 LU_intens share_farmincome opp_c leadership
succ_d y_left p_duty penalty Aj Pj || Alp_belo:
outreg2 using App_Provision.xls, e(all) append bdec(1) ctitle(Provision mixed
effects, institutions but no group behavior)

** Including leader behavior

**leader split in

meologit Prov_ord_5 gve app100 LU_intens share_farmincome opp_c leadership
succ_d y_left p_duty penalty Aj Pj || Alp_belo: || if leadership == 1
outreg2 using App_Provision.xls, e(all) append bdec(1) ctitle(Provision mixed
effects only the leaders incl group behavior)

meologit Prov_ord_5 gve app100 LU_intens share_farmincome opp_c leadership
succ_d y_left p_duty penalty Aj Pj || Alp_belo: || if leadership == 0
outreg2 using App_Provision.xls, e(all) append bdec(1) ctitle(Provision mixed
effects only the leaders incl group behavior)

*leader split including group behavior

**non leader with leader behavior

meologit Prov_ord_5 gve app100 LU_intens share_farmincome opp_c leadership
succ_d y_left p_duty penalty Aj_l Pj_l || Alp_belo: || if leadership == 0
outreg2 using App_Provision.xls, e(all) append bdec(1) ctitle(Provision mixed
effects only the leaders incl group behavior)

meologit Prov_ord_5 gve app100 LU_intens share_farmincome opp_c leadership
succ_d y_left p_duty penalty Aj_l Pj_l || Alp_belo:
outreg2 using App_Provision.xls, e(all) append bdec(1) ctitle(Provision mixed
effects only the leaders incl group behavior)

```