BUNDESANSTALT für Agrarwirtschaft
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MINISTERIUM FÜR EIN LEBENSWERTES ÖSTERREICH

An Analysis of farm income over time based on Austrian farm accountancy data: Challenges, Methods, and Results

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Sampling Plan

- 30 Strata to reflect diversity of farms and to ensure representativeness
  - 6 distinct farm types characterized by predominant production areas
  - 5 classes of economic size between 15.000 and 350.000 € standard output
- Sampling plan is adapted to changing circumstances, e.g.
  - Average farm gets larger -> classes of economic farm sizes are adapted
  - Standard output replaces standard gross margin to characterize farm size
- Consistent time series crucial for analyzing developments and trends

Population

Agricultural Structure Survey conducted every few years - **Agricultural Structure Survey 2013:**

Type/Thousands of € SO	[0, 15)	[15, 25)	[25, 40)	[40, 60)	[60, 100)	[100, 350)	[350, Inf)	**Total**	**% in field of observation**
Forestry	36.096	3.079	1.809	1.302	787	378	1	**7.356**	**10%**
Field crops	10.397	2.798	2.313	2.143	2.171	1.885	187	**11.469**	**15%**
Permanent crops	4.947	996	1.100	1.228	1.134	1.533	68	**6.051**	**8%**
Livestock	23.643	8.688	9.532	9.128	7.864	4.049	32	**39.292**	**51%**
Granivores	567	115	298	383	890	3.327	380	**5.334**	**7%**
Mixed	4.430	1.361	1.306	1.310	1.789	2.340	62	**8.167**	**11%**
Total	**80.080**	**17.037**	**16.358**	**15.494**	**14.635**	**13.512**	**730**	**77.036**	
% in field of observation		**22%**	**21%**	**20%**	**19%**	**18%**			

- 77.036 farms in field of observation – coverage: 49% of farms and 85% of SO
- Difference Austrian national Data - FADN:
  - Forestry enterprises are included in SO
  - Forestry is one of 6 specialist agricultural holdings
  - Farm type horticulture is not included

Sample

- Annual sample of about 2.000 farms that provide accountancy data. Highly constant sample, but also changes due to drop outs
- Sample size within each stratum chosen by optimum allocation
- With every new Agricultural Structure Survey sample weights and (sometimes) selection plan updated
- Starting 2016, new selection plan with new threshold and economic size classes
- For time series: adaption to new sampling plan for years 2010 to 2015

	2010	2011	2012	2013	2014	2015	2016
Number of farms in sample	2.178	2.144	2.105	2.110	2.082	2.065	1.980
Number of farms in all samples (Panel data set)	1.524						

Indices related to farm income

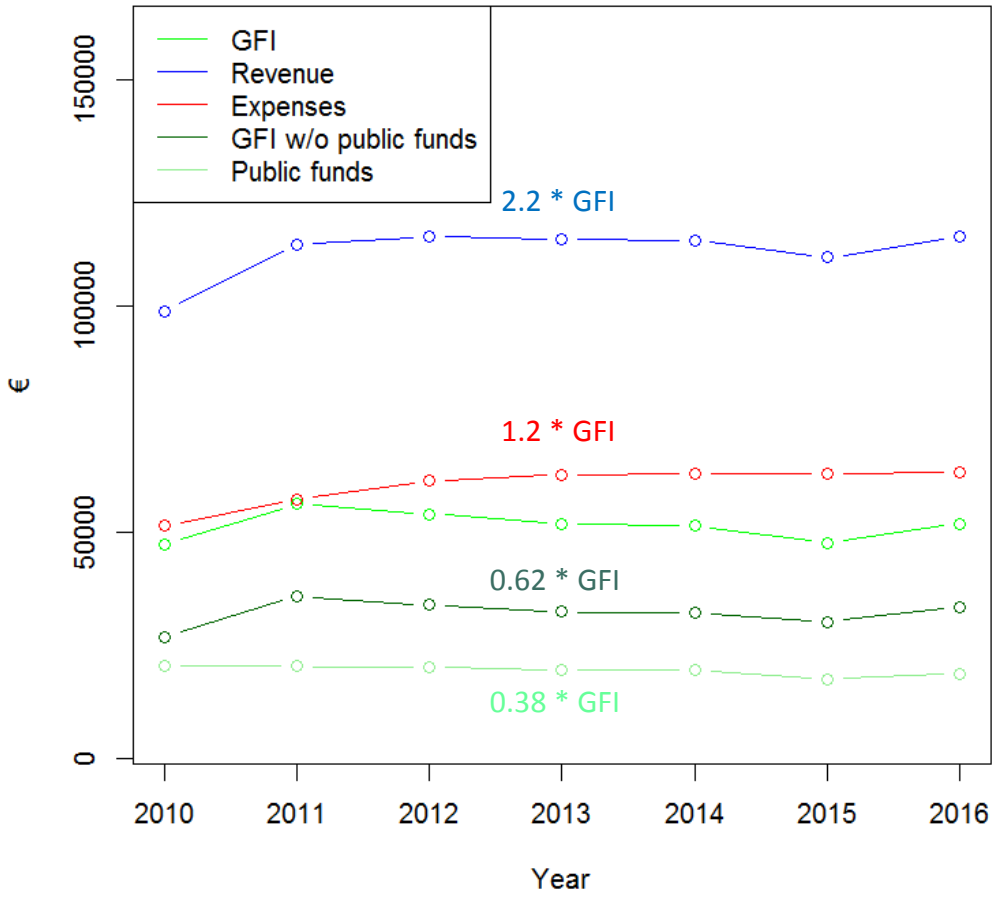
Revenues

- Expenses

= Gross farm income (GFI)

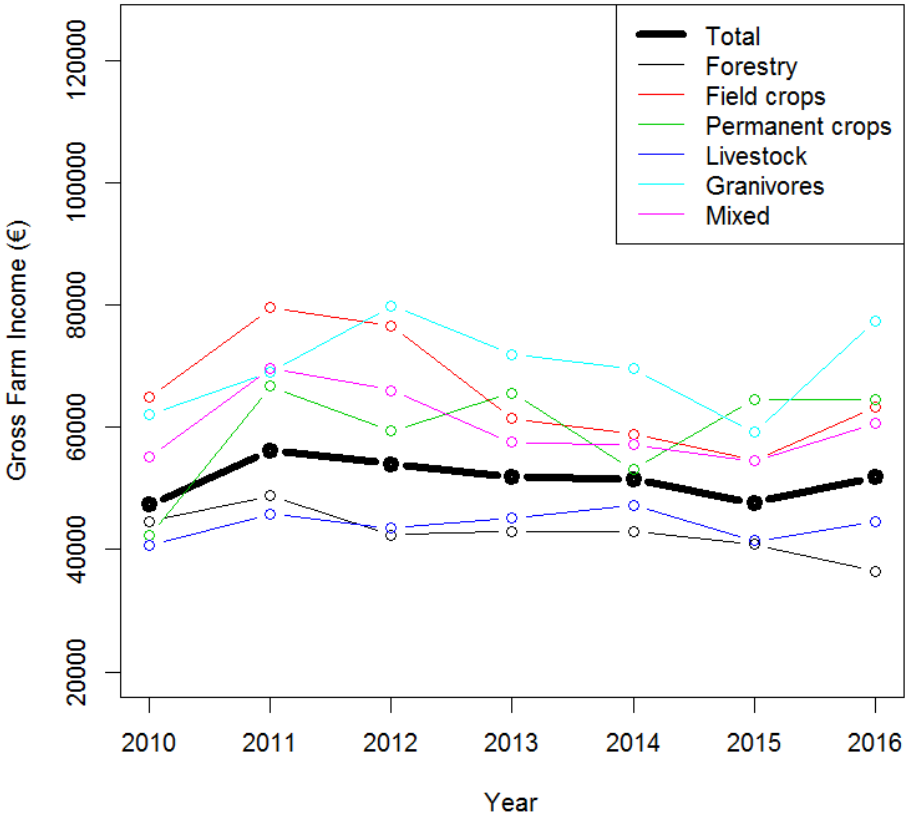
- Public funds

= GFI without public funds

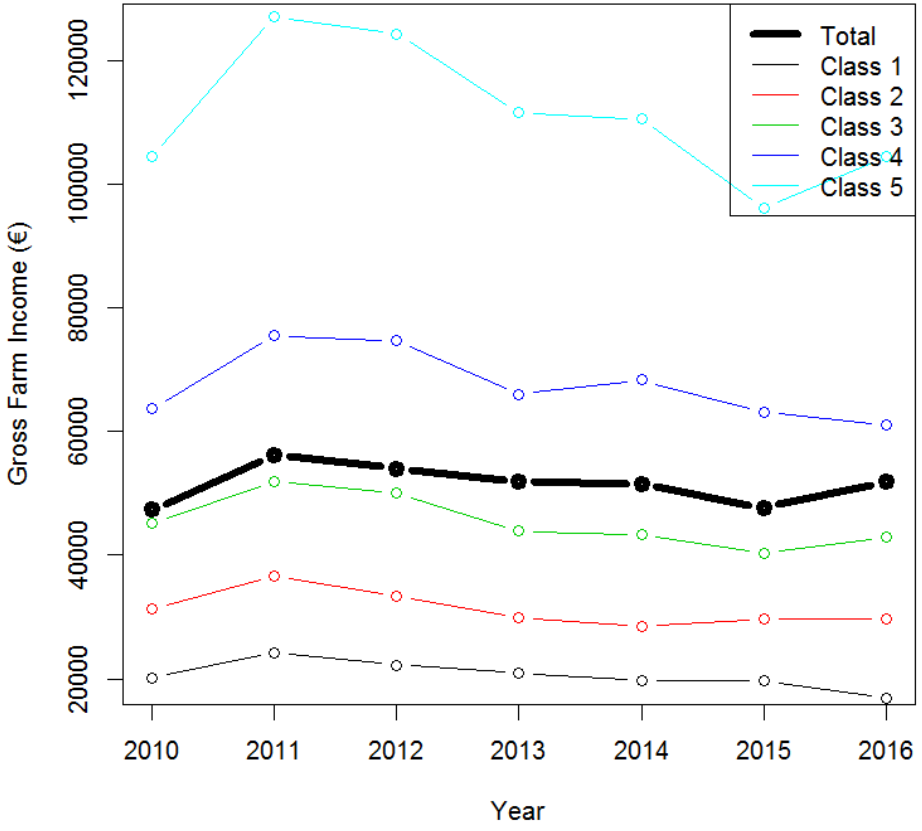


Gross farm income by groups

GFI development by farm type



GFI development by farm size

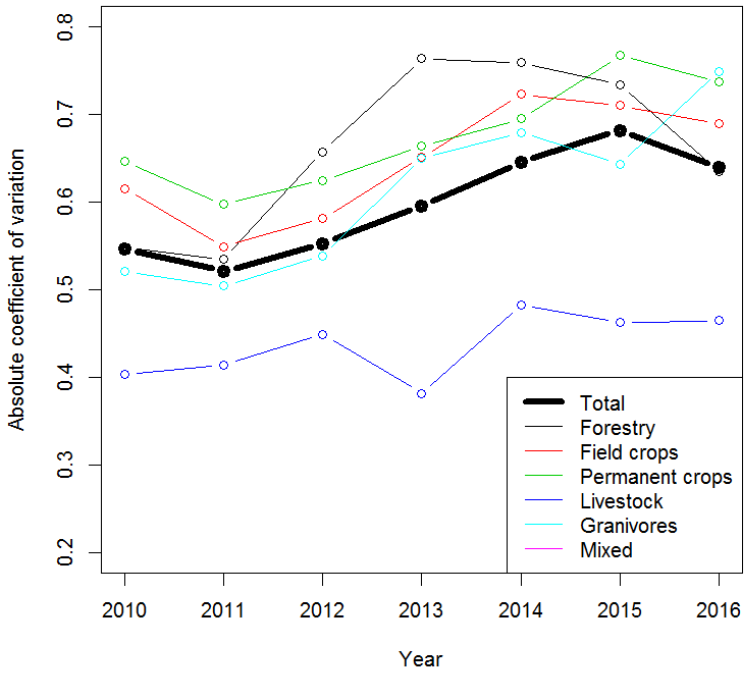


Cross-section analysis of GFI variation

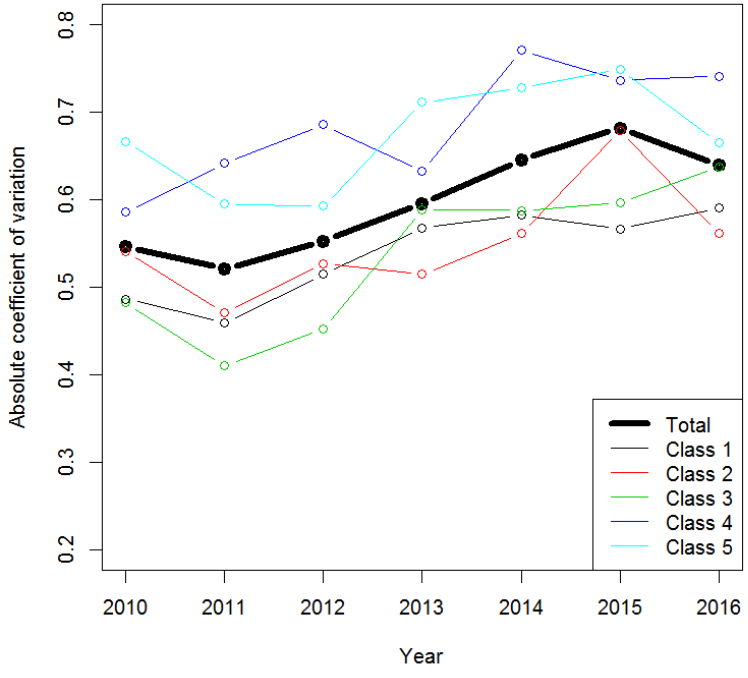
- Absolut coefficient of variation (ACV) : ACV = SD/ |Mean|
- Higher ACV -> more diversity within type or class

ACV development by farm type

Permanent crops: farms with fruit plantations versus high quality wine production farms.
Forestry: pure forestry farms versus farms that also produce livestock or poultry.

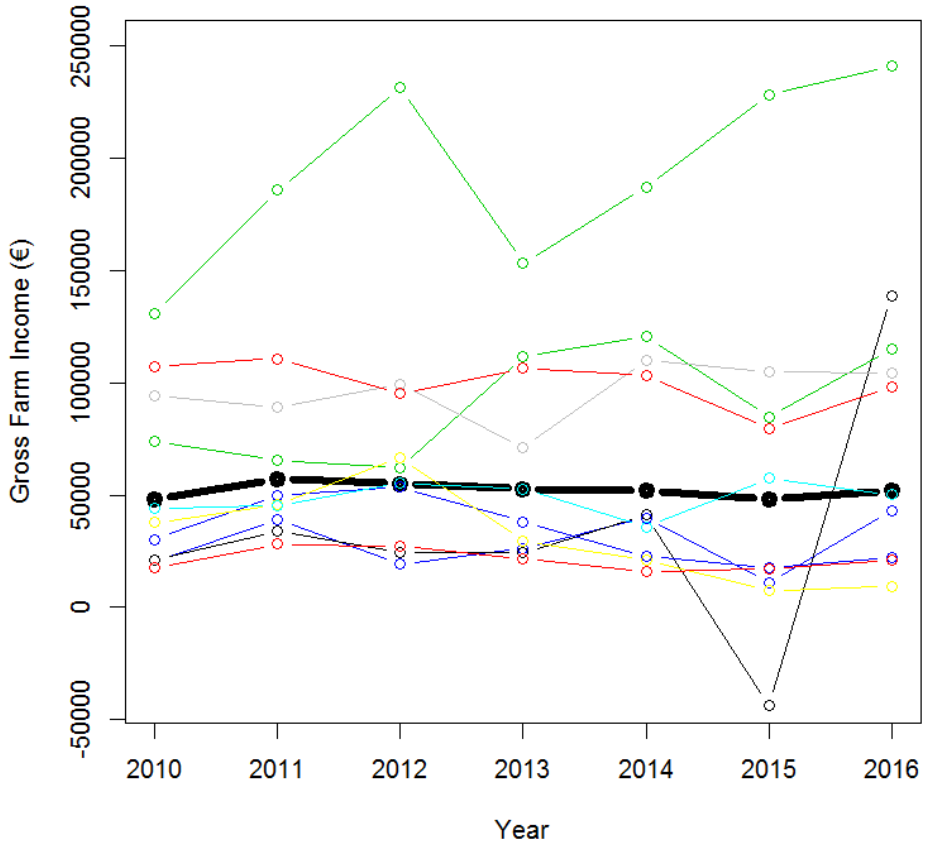


ACV development by farm size



Single farm analysis

- Annual sample provides accurate information on status quo
- For many questions, development of single farms is of interest (e.g. volatility in farm income)
- Weighted summary statistics on single farm data



Weighting in single farm analysis

- For each farm weights change as population and/or stratum changes
- We use optimal, not (self-weighting) proportional allocation
- In our sample large livestock farms highly overrepresentated
- Unweighted data is biased towards these farms

	Unweighted sample	Weighted sample	Difference in %	Reduction to PanelDS	Weights of 2013
GFI - Total	64.867 € (2013)	51.927 € (2013)	24 to 28%	0 to 2 %	0 to 1%

- **Choice of data and weights for single farm analysis:**
  - Panel data with 1.524 farms
  - Weights in reduced sample are adjusted
  - Farms were weighted with weights of 2013

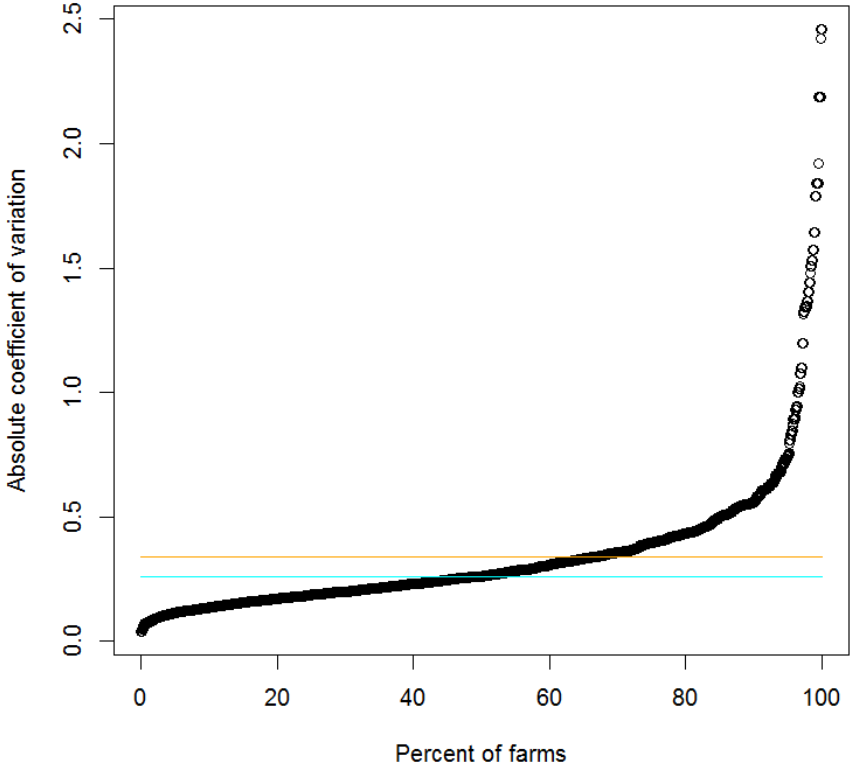
GFI volatility based on single farm data

- Absolute coefficient of variation: $ACV_i = SD_i / |Mean_i|$ for each farm i
- Only few (under 1 %) of farms with negative GFI in each year

Summary statistics

GFI	ACV
Minimum	0,04
1st Quartile	0,19
Median	0,26
Mean	0,34
3rd Quartile	0,40
Maximum	2,46
Standard Deviation (SD)	0,28

Distribution function



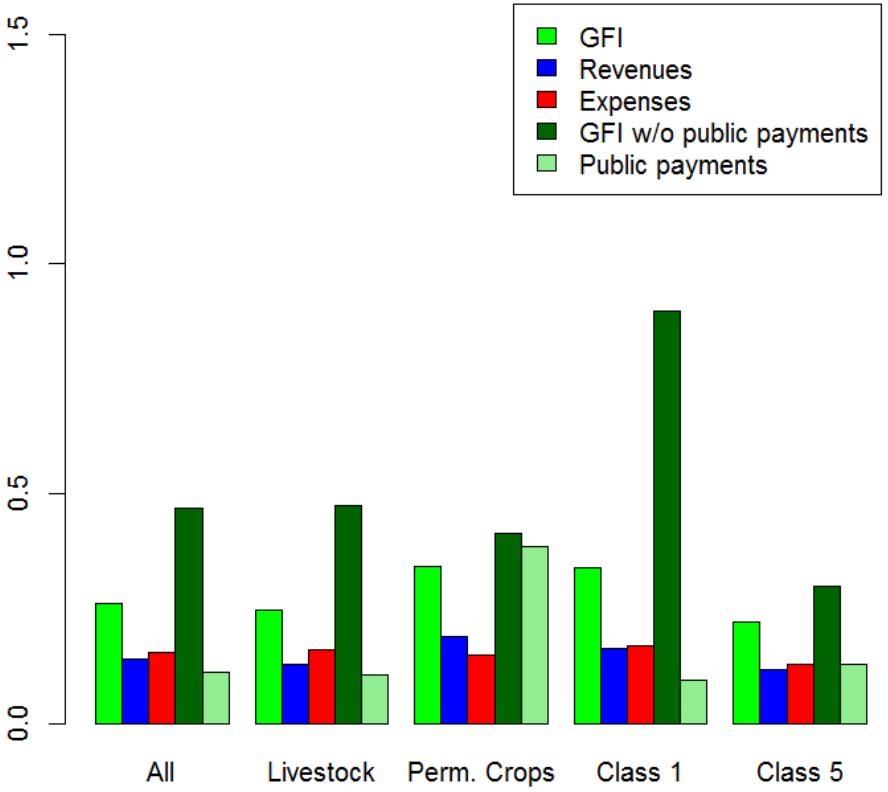
GFI volatility by groups

Summary statistics on single farm absolute coefficients of variation

Gross farm income	Minimum	1st Quartile	Median	Mean	3rd Quartile	Maximum	Standard Deviation
Total	**0,04**	**0,19**	**0,26**	**0,34**	**0,40**	**2,46**	**0,28**
Forestry	0,10	0,23	0,36	0,46	0,53	1,92	0,39
Field crops	0,07	0,20	0,27	0,34	0,40	1,84	0,26
Permanent crops	0,11	0,25	0,34	0,47	0,49	2,19	0,44
Livestock	0,04	0,17	0,25	0,31	0,36	2,46	0,24
Granivores	0,08	0,19	0,26	0,30	0,39	1,35	0,17
Mixed	0,07	0,18	0,24	0,31	0,34	1,48	0,23
Economic class 1 (15-25 k € SO)	0,04	0,22	0,34	0,47	0,52	2,19	0,41
Economic class 2 (25-40 k € SO)	0,07	0,21	0,30	0,39	0,46	2,46	0,32
Economic class 3 (40-60 k € SO)	0,05	0,18	0,26	0,30	0,37	2,42	0,20
Economic class 4 (60 to 100 k € SO)	0,06	0,17	0,22	0,26	0,32	1,35	0,15
Economic class 5 (100 to 350 k € SO)	0,05	0,16	0,22	0,24	0,30	0,73	0,11
Range	**0,04 - 0,11**	**0,16 - 0,25**	**0,22 - 0,36**	**0,24 - 0,47**	**0,30 - 0,53**	**0,73 - 2,46**	**0,11 - 0,44**

Volatility of farm income indices based on single farm data

Medians of absolute coefficients of variation for selected farm types and sizes



Gross farm income volatility is higher than volatility of revenues and expenses. Overall values close to predominant farm type livestock. High public payments volatility for permanent crops farms due to compensation in years with frost damages. Positions more volatile for small farms. Stabilizing effect of public funds on GFI is of varying extent.

Group	Share of Public payments on GFI
All	38%
Livestock	48%
Permanent crops	15%
Economic class size 1	59%
Economic class size 5	28%

Conclusion and Outlook

- Cross section analysis showed GFI slightly decreasing between 2011 and 2015, recovering 2016
- For single farm analysis
  - in our sample weighting is essential
  - at least for short periods using constant weights seems OK
- About 1/3 of farms have ACV above average
- Pronounced differences in ACV between farm types and economic size classes

- Include data for years 2003 to 2009 (SGM -> SO)
- Detailed analysis of causes for income volatility (e.g. yields, public payments) including covariance analysis
- Regression analysis to incorporate more explanatory variables (e.g. education, off-farm income)