



**University of Natural Resources
and Life Sciences, Vienna**
Department of Economics and Social Sciences

Delimitation of forestry within the framework of the Austrian Farm Accountancy Data Network

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Introduction



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- Small scale farm forestry is a substantial element of the forest sector in Austria
 - Little specific economic data is available
 - High cost of data collection for samples of small units
 - More than 90% of farms participating in the FADN manage also some forest
- Representative forest-related information as a fringe benefit of agricultural investigations!!
- How to overcome the problem, that inputs are not comprehensively differentiated between agriculture and forestry??

Research questions



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- I. How to best utilize the data of the network of small-scale farm forests (SSFN) for specifying the required models?
- II. How can the forestry-specific inputs be assessed properly as well as comprehensively at farm level given the limitations of the FADN?
- III. To what extent do the results differ from and exceed the information provided by the SSFN?

Material and Methods



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- Austria shares a long tradition of running Forest Accountancy Data Networks
- Small Scale Farm Forestry is represented by farms engaged in agriculture as well as in forestry
- Documentation of small scale forestry:
 - Farm Accountancy Data Network FADN (~ 2200 farms)
 - Small Scale Forestry Network SSFN (~ 110 farms; forest area between 5ha and 200ha)



**Insufficient delimitation of inputs
→ Profitability of forestry
cannot be assessed**



**Small and biased sample
→ Non-representative results**

Material and Methods₍₂₎

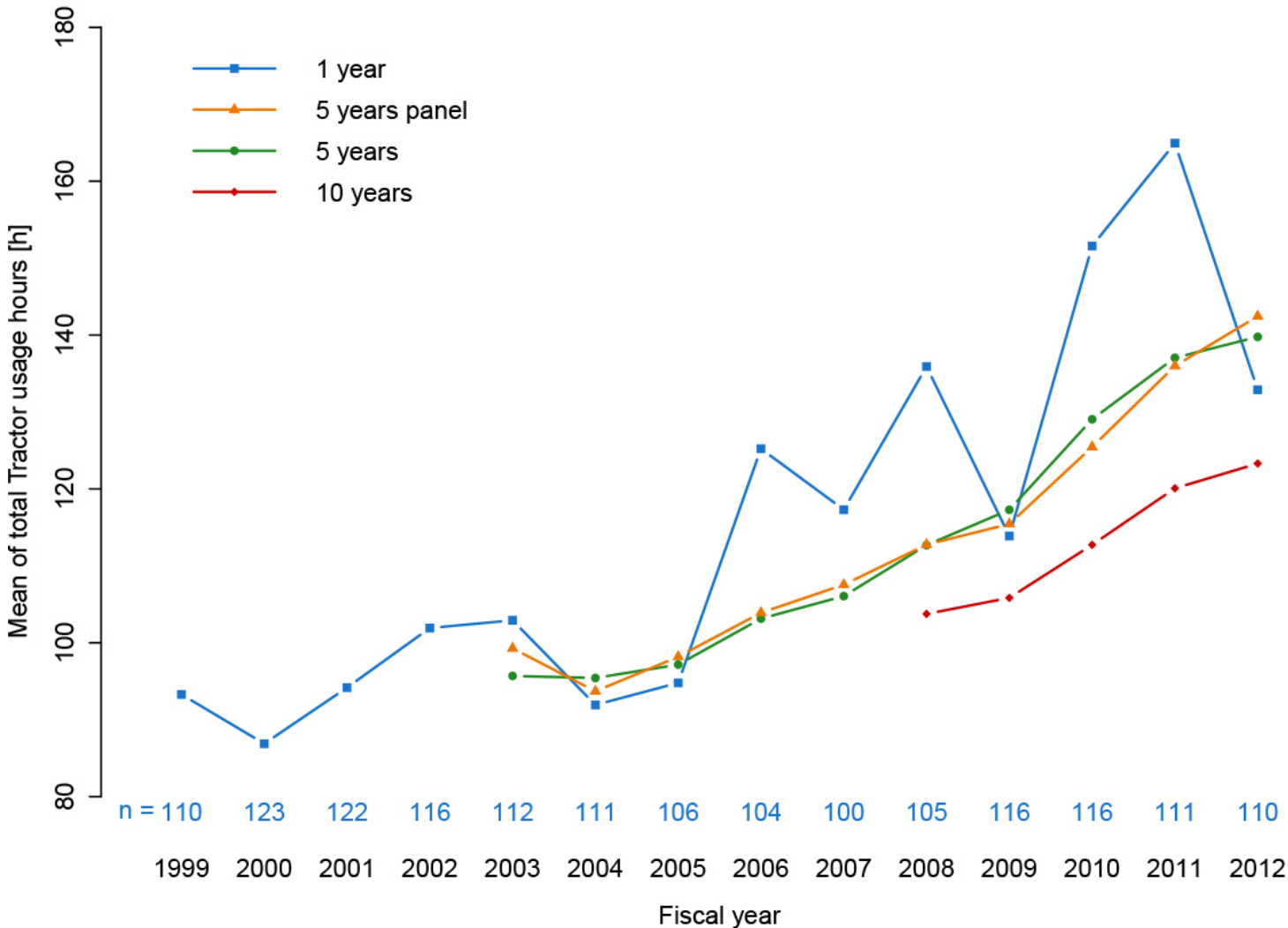


Modelling and analysis

- Assessment of cost items which are not recorded specifically in regard to forestry within the FADN
- Explaining variables available in the FADN (e.g. forest area, volume of harvest) are used to estimate values of the SSFN
- Individual values for every farm of the FADN are estimated
- Inflation-adjustments allows using monetary values of different periods documented by the SSFN
- Validity is indicated by the coefficients of correlation (Pearson's r) between imputed and recorded figures

Results

Reference data for model specification



Average estimated tractor hours for the FADN 2012

| | |
|---------------|------|
| 1 year | 61.6 |
| 5 years panel | 58.5 |
| 5 years | 54.8 |
| 10 years | 51.3 |

Results - Models for assessing individual types of cost



Linear regression approach

Example: tractor cost (TC)

- Assessment in two steps:
 1. Estimation of tractor usage hours (TRh)
 2. Elicitation of tractor cost based on TRh

Relation approach

Example: other contracted services (OCS)

- Assessment in relation to family labour and tractor cost

Tractor usage hours (TRh)



Regression:

- Tractor usage hours explained through productive forest area (PFA), cutting volume (CV), family working hours (FWh) and employee working hours (EWh).

Model:

$$TRh[h] = \begin{cases} 0[h] \\ a+b*PFA+c*CV+d*FWh[h]+e*EWh[h] \end{cases}$$

| Coefficients | | | | | R ² | r (FADN / SSFN) |
|--------------|-------|-------|-------|-------|----------------|--------------------|
| a | b | c | d | e | | |
| -4.120 | 0.242 | 0.043 | 0.198 | 0.137 | 0.622 | 0.738 |

Side condition:

- If TRh is negative or neither FWh nor EWh are documented → TRh = 0

Tractor cost (TC)



Input:

- Common hourly rates for tractors [€/kWh]
- Tractor usage hours in forestry (TRh) [h]
- Average tractor power (TP) [kW]

Calculation:

$$TC[\text{€}] = \frac{1}{n} \sum_{i=1}^n \left(TP_i[\text{kW}] * 0,47 \left[\frac{\text{€}}{\text{kWh}} \right] * 0,63 \right) * TRh[\text{h}]$$

| |
|--------------------|
| r (FADN / SSFN) |
| 0.822 |

Other contracted services (OCS)



- Small but heterogeneous category of cost comprising items such as legal advice, maintenance services and cost of car
→ Assessed in relation to the main inputs: imputed family labour (FL) [€] and tractor costs (TC) [€]

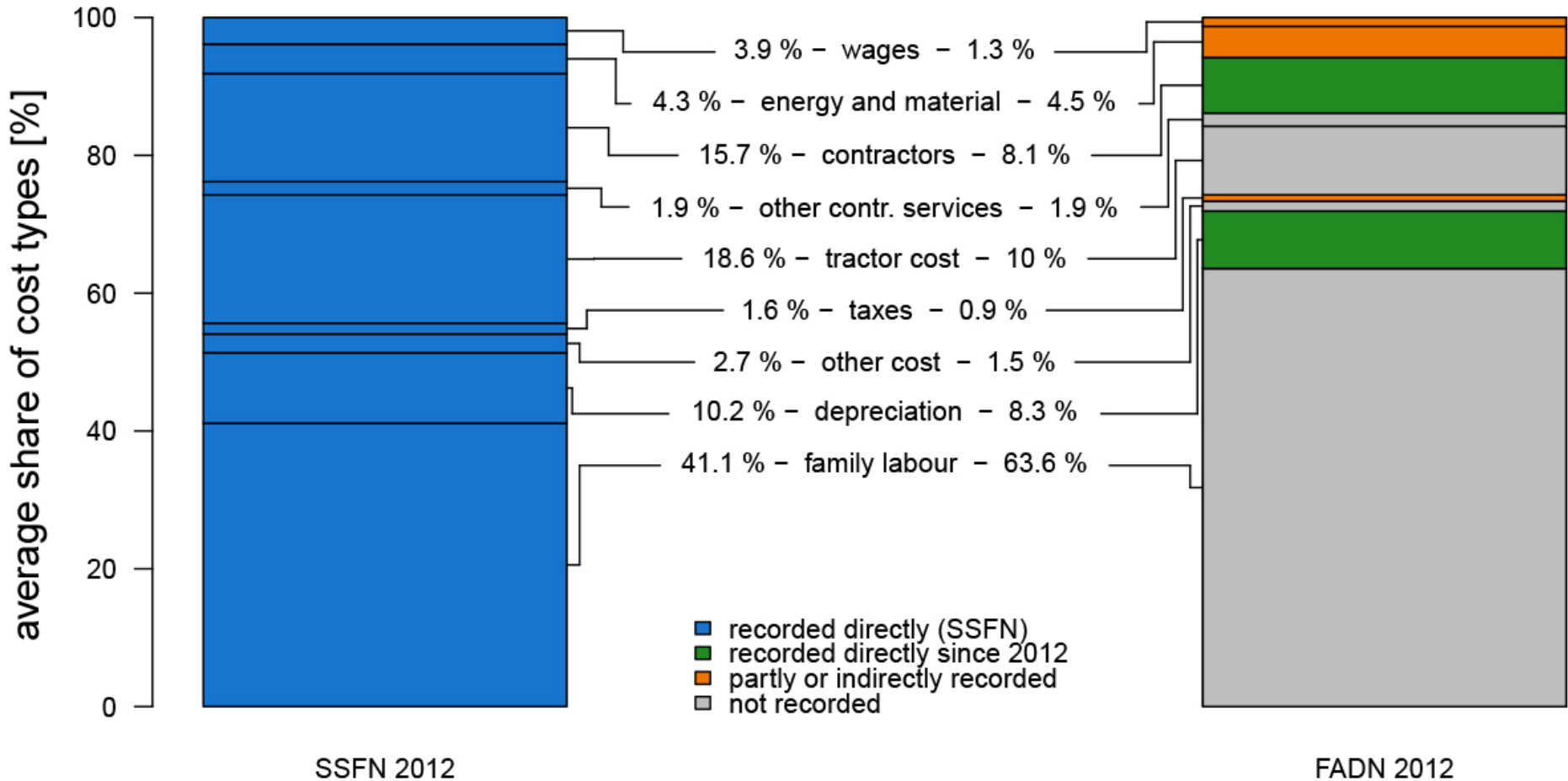
Calculation:

$$OCS[€] = (FL[€] + TC[€]) * 0.020$$

| |
|--------------------|
| r (FADN / SSFN) |
| 0.312 |

Numerical results

Composition of total cost



Numerical results

Determination of income



| | SSFN | FADN | | FADN _{FE} | |
|----------------------------------|---------------|---------------|----------|--------------------|----------|
| | 2012 | 2012 | relation | 2012 | relation |
| | [€/ha] | [€/ha] | 5aP/10a | [€/ha] | 5aP/10a |
| Total revenues | 517.39 | 486.47 | 100 % | 413.53 | 100 % |
| - Wages | 14.43 | 6.82 | 100 % | 8.64 | 100 % |
| - Energy and material | 16.06 | 24.07 | 107 % | 15.40 | 106 % |
| - Contractors | 58.67 | 42.79 | 100 % | 22.63 | 100 % |
| - Other contracted services | 7.19 | 10.12 | 106 % | 5.76 | 106 % |
| - Tractor cost | 69.55 | 53.00 | 114 % | 32.21 | 113 % |
| - Taxes | 5.92 | 4.75 | 101 % | 4.94 | 101 % |
| - Other cost | 10.21 | 7.71 | 117 % | 4.39 | 117 % |
| - Depreciation | 38.23 | 44.35 | 100 % | 38.92 | 100 % |
| Family income | 297.13 | 292.85 | 96 % | 280.65 | 98 % |
| - Imputed value of family labour | 153.84 | 337.83 | 101 % | 190.29 | 101 % |
| Operating income | 143.30 | -44.97 | 133 % | 90.36 | 91 % |

Numerical results

Calculation of mean values



| Income from forestry | Weighted mean | Artihmetic mean | National farm |
|---|---------------|-----------------|---------------|
| Family income per ha [€/ha] | 293 | 340 | 303 |
| Operating income per ha [€/ha] | -45 | -327 | -29 |
| Family income per m ³ total cut [€/m ³] | 41 | 20 | 41 |
| Operating income per m ³ total cut [€/m ³] | -6 | -67 | -4 |
| Family income per FWh [€/h] | 17 | 26 | 18 |
| Operating income per FWh [€/h] | -3 | 10 | -2 |

Numerical results

Additional ratios



| | SSFN | FADN | FADN _{FE} |
|---|-------|-------|--------------------|
| Productive forest area per farm [ha] | 54 | 14 | 49 |
| Annual allowable cut [m ³ /ha] | 6.14 | 6.10 | 6.03 |
| Total cut [m ³ /ha] | 7.46 | 7.17 | 6.06 |
| Total cut in % of annual allowable cut | 121 | 117 | 101 |
| Family working hours per hectare [h/ha] | 7.69 | 16.84 | 9.43 |
| Productivity of felling [m ³ /FW _h in harvesting] | 1.17 | 0.54 | 0.80 |
| Total revenues forestry [€/m ³] | 69.35 | 67.86 | 68.19 |
| Family income forestry [€/m ³] | 39.83 | 40.85 | 46.28 |
| Total revenues forestry [€/FW _h] | 67.32 | 28.88 | 43.83 |
| Family income forestry [€/FW _h] | 38.66 | 17.39 | 29.75 |

Conclusions and outlook



- Economic information on small scale farm forestry can be derived from an established agricultural monitoring system
- The continuation of the SSFN is a pre-requisite for (annually) updating the whole framework
- A range of statistical subsets (e.g. alpine, non-alpine) can be addressed representatively based on the scheme of quota-sampling
- Interrelationships between agriculture and forestry can be investigated and monitored



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Thanks for your attention!

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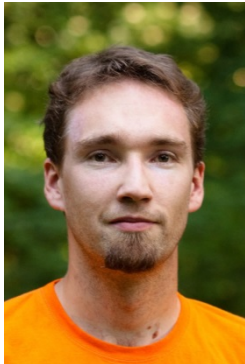
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