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Spatial effects of alternative direct payment systems on Swiss Alpine regions

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Research issues

Differences in land productivity, input and technology requirements and production costs are functions of topographic, climatic, environmental, agronomic and infrastructural characteristics which lead to considerable variations in land use intensity. This contribution investigates the effects of different policy assumptions relating to land use payments on economic and ecological parameters. A spatial linear programming model is described and implemented for two Swiss Alpine regions with the following particular characteristics:

- Region 1: approx. 6500 hectares of agricultural land, important vertical extent of land use (fields from 600 to over 1800 metres above sea level), agrarian-touristic predominance.
- Region 2: approx. 1400 hectares of agricultural land, less important vertical extent of land use (fields from 1200 to over 1800 metres above sea level), touristic predominance.
- 6 levels of altitude and 4 categories of slope in a per-hectare grid (see fig.).
- Transportation and harvesting costs as a function of distance from fields to farms, slope and land use intensity.

No mechanical harvesting is possible on very steep slopes (>51%) which increases the risk of fallow land. Fallow land is particularly hazardous from the point of view of avalanches and landslides. Special reference is therefore made to the effects of different types of direct payments on the prevention of fallow land. The study investigates the effects of abolition of base payments (a transitional measure which ensures farmers' incomes) amounting to CHF 1200.- per hectare and their substitution by slope payments with a view to preventing fallow land on the steepest category of slope. It is shown that efficient slope payments vary strongly between regions depending on their topographic characteristics.

Fallow land with base payments

Region 1
- Base payments and slope payments (as a function of slope category) are granted.
- No fallow land exists in Region 2 due to lower transportation costs from fields to farms resulting from comparably shorter vertical transport distances.
- The higher above sea level, the greater the share of fallow land since physical yields decrease with increasing altitude.
- The entire area in the steepest category (>51%) lies fallow in Region 1. Steepest categories are harvested in Region 2 because this region has relatively high milk quotas compared with Region 1. Milk production is profitable enough to harvest steepest slopes in that region.
- Considerable amounts of fallow land exist at slopes <16% because no slope payments are granted for this category.

Region 2
- Base payments are no longer granted. Slope payments remain unchanged.
- Fallow land arises also in Region 2 at all altitudes.
- The entire area in the steepest category lies fallow in both regions.
- The entire area above 1500 metres altitude becomes fallow land in Region 1.

Fallow land without base payments

Region 1
- Base payments are no longer granted. Slope payments remain unchanged.
- Fallow land arises also in Region 2 at all altitudes.
- The entire area in the steepest category lies fallow in both regions.
- The entire area above 1500 metres altitude becomes fallow land in Region 1.

Region 2
- Base payments are no longer granted. Slope payments remain unchanged.
- Fallow land arises also in Region 2 at all altitudes.
- The entire area in the steepest category lies fallow in both regions.
- The entire area above 1500 metres altitude becomes fallow land in Region 1.

Efficient slope payments to prevent fallow land on steepest slopes

- Current slope payments amount to CHF 510.- per hectare for the steepest category (>51%). Additional payments for the cultivation of steep land must be forthcoming to prevent this land from laying fallow when base payments are no longer granted.
- Additional slope payments vary from approx. CHF 1100.- per hectare at 600-900 m above sea level to CHF 2300.- per hectare at >1800 m above sea level.
- Milk production is profitable enough to harvest steepest slopes in Region 1 when base payments are no longer granted and it appears for the first time in Region 2.
- In Region 2 they vary from approx. CHF 500.- per hectare at 1200-1500 m above sea to CHF 950.- per hectare at >1800 m above sea level. Compensation can be reduced in this region as transportation costs from fields to farms are lower.

Conclusion

- A comparison of the first and second columns for each region shows that fallow land more than doubles in Region 1 when base payments are no longer granted and it appears for the first time in Region 2.
- The elimination of base payments reduces the taxpayers’ burden by more than 80% (by an overall CHF 8.5 million from CHF 10.4 million to CHF 1.8 million) at the cost of sectoral revenue (-38%) and the number of farms (-21%) in both regions.
- A comparison of the second and third columns for each region reveals a considerable overall reduction in fallow land when payments are granted which aim at the elimination of fallow land in the steepest, ecologically most sensitive category (>51%).
- The taxpayer pays for the provision of this public good with additional direct payments amounting to CHF 400000.- corresponding to an increase of 22%.
- Only a minor proportion of these additional payments contribute to an increase in the sectoral revenue and the number of farms because a substantial share is absorbed by the remuneration of the additional labour needed for the cultivation of steep land.