



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
<http://ageconsearch.umn.edu>
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Technical Efficiency of Farms under Multiple Output Technology

Phatima Mamardashvili and Raushan Bokusheva,

Agri-food and Agri-environmental Economics Group,
Institute for Environmental Decisions, ETH Zürich,
Zurich, Switzerland

phatimam@ethz.ch; bokushev@ethz.ch

Selected Poster prepared for presentation at the International Association of Agricultural Economists (IAAE) Triennial Conference, Foz do Iguaçu, Brazil, 18-24 August, 2012.

Copyright 2012 by Phatima Mamardashvili and Raushan Bokusheva. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Technical Efficiency of Farms under Multiple Output Technology

Phatima Mamardashvili,
Raushan Bokusheva

BACKGROUND

Agricultural policies in most OECD countries recognize and promote multifunctionality of farms. In that sense, more and more farms will diversify their outputs and will be engaged in different activities which go beyond agriculture. These activities include ecosystem services such as protection of biodiversity, maintenance of rural landscape etc. Furthermore, competitiveness of rural areas implies a further diversification of farm businesses, e.g. the involvement in rural tourism, on-farm direct selling etc.



Since farm outputs are heterogeneous in their nature, it could be appropriate to model them separately when assessing farm performance. In this study, we analyze performance of Swiss dairy farms in three different regions considering multiple output technology. Outputs produced by Swiss farms can be divided into three types: (1) agricultural output; (2) para-agricultural output and (3) goods and services of public interest which are remunerated through direct payments.

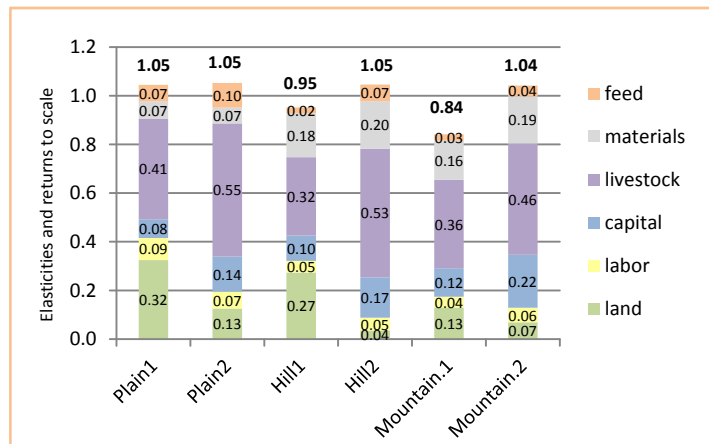
METHOD

We use distance function approach which allows representation of the production technology with multiple inputs and multiple outputs. A stochastic output distance function model is expressed as follows: $1 = D_o(x, y; \beta) \cdot \exp\{u_i - v_i\}$, where x denotes the vector of inputs, y is the output vector, v_i is noise component $\sim N(0, \sigma_v^2)$; u_i is technical inefficiency $\sim N_+(0, \sigma_u^2)$; both are heteroscedastic [1].
- Distance function is specified by translog functional form.

Analysis is based on unbalanced panel data for dairy farms in plain, hill and mountainous region of Switzerland from 2003 to 2009 (Source: Swiss FADN). We use 6 inputs (land, labor, livestock, capital, intermediates, feed) and 3 outputs listed above ((1), (2), (3)). Furthermore, for the comparison we distinguish between 2 models according to types of direct payments considered: model1 includes all direct payments (general and ecological) and model2 includes only ecological direct payments.

RESULTS

Elasticities of inputs and returns to scale



Efficiency scores

	Mean TE	St. Dev.
Plain1	0.95	0.05
Plain2	0.92	0.08
Hill1	0.95	0.05
Hill2	0.91	0.08
Mountain.1	0.94	0.05
Mountain.2	0.90	0.10

Swiss dairy farms in the sample show high technical efficiency on average. However, the efficiency scores range between 0.37 - 1.00 indicating potentials for improvement.

Determinants of technical inefficiency

	Plain1	Hill1	Mountain.1
Share off-farm income	-0.043 ***	-0.031 ***	-0.028 ***
Share rented land	0.004 n.s.	0.015 ***	0.014 ***
Share para-agriculture	-0.052 **	-0.244 **	-0.097 ***
Altitude	0.002 **	0.002 ***	0.002 ***
Age	-0.018 *	-0.003 n.s.	0.003 n.s.
Education	0.584 ***	-0.133 n.s.	0.179 **
Share hired labor	0.020 ***	0.016 ***	0.022 ***
Ecologic. direct paym. per anim.	0.012 ***	0.010 ***	0.006 ***

CONCLUSION AND POLICY IMPLICATIONS

- Swiss farms are closer to optimal scale when general direct payments are not considered in the outputs (models 2). Especially notable is this for dairy farms in mountainous region of Switzerland. This could be an indication for the fact that by using general direct payments Swiss agricultural policy sent false signals to farmers regarding optimal use of their resources. Another study also found suboptimal scale of production for Swiss farms [2].
- Farms with higher share of para-agricultural activities seem to be more efficient. Thus, in order to support development and competitiveness of rural areas policy should encourage those kind of activities.
- Negative influence of ecological direct payments on technical efficiency of farms can be explained by the fact that farms receiving higher payments are strongly dependent on policy and typically use more extensive farming practices. In order to compensate those farmers for losses caused by extensive production a better targeting of this political instrument is required.