

Farm Level Effects of EU Policy Liberalization: Simulations Based on an EU-Wide Agricultural Sector Model and a Supply Model of the German Agricultural Sector

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Outline of Presentation

- 1) Approaches for Linking Simulation Models
 - 2) Our Approach
 - 3) Models and Model Linkage
 - 4) Model Harmonization
 - 5) Scenarios
 - 6) Results
 - 7) Conclusion and Outlook
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Approaches for Linking Simulation Models

- Policy scenarios have effects on different levels of aggregation
- The use of single models may not be sufficient for various analyses (e.g. EU policy liberalization)
- Linking approaches:
 - Mapping results from models of a higher aggregation stage to a lower aggregation stage (e.g. Banse and Grethe, 2008; Nowicki et al. 2009)
 - Aiming at full consistency via iteratively running models at different aggregation stages (e.g. Kuhlmann et al., 2006; Britz, 2008)

Our Approach

Fully integrated interface between the European Simulation Model (ESIM) and the Farm Modelling Information System (FARMIS)

- ESIM: quantification of effects of agricultural policies at the European level
- FARMIS: Measurement of impacts on intra-sectoral income distribution among German farmers

Models and Model Linkage

- ESIM

- Comparative static partial equilibrium multi-country model for the agricultural sector
- Isoelastic supply functions (separate for yield and area) and demand functions
- 31 regions (EU Member States; USA, Croatia, Turkey, Western Balkans, RoW)
- Product coverage:
 - 15 crops
 - 6 animal products
 - 21 processed products

Models and Model Linkage

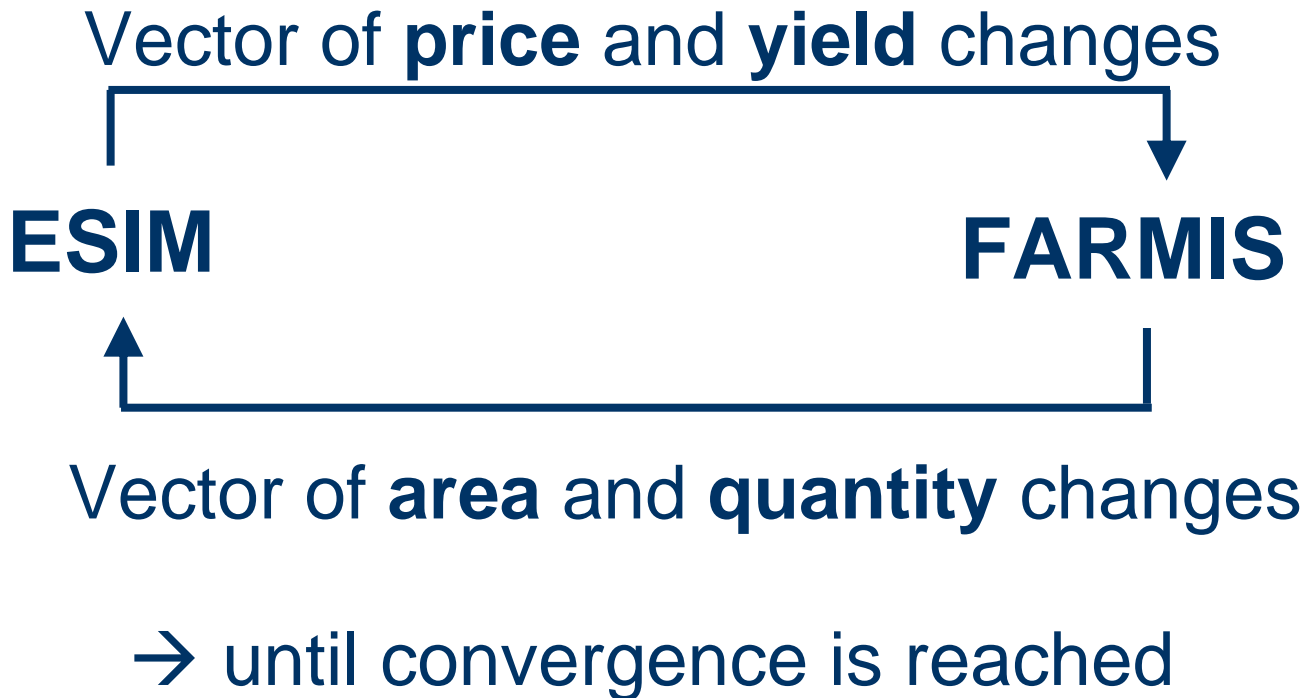
- FARMIS

- Comparative-static process-analytical programming model for farm groups
 - Representing the German agricultural sector
 - Main database: German Farm Accountancy Data Network (FADN)
 - Product coverage:
 - 27 main activities of crop production
 - 15 activities of livestock production
 - Detailed representation of production technology and regions as well as specific farm types
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Models and Model Linkage

- ESIM-FARMIS Interface

Iterative process



Models and Model Linkage

- ESIM-FARMIS Interface

Preliminary work

- Agreement on modelling of policy parameters in the base period
- Agreement on policy assumptions and parameters exogenous to both models for the baseline
- Definition of consistent product interfaces
- Detailed comparison and analysis of the reactions of both models to the same vector of price changes

Model Harmonization

- Intention:
 - Achieve a high degree of analogous model behaviour
 - Understand differences among the models
- Examples:
 - Treatment of the impacts of obligatory set-aside
 - Biophysical constraints in beef production

Model Harmonization

- Obligatory Set-Aside

- Treatment of the impacts of obligatory set-aside is different in the two models
- FARMIS: all formerly set-aside land can be used for production
- ESIM: only 50% of set-aside land can become productive again → because marginal land is more likely to be set-aside
- To match this effect on total production for the model linkage, the yield changes generated by ESIM were downwardly adjusted

Model Harmonization

- Biophysical Constraints in Beef Production

- Divergence in reaction of beef production due to biophysical constraints implemented in FARMIS
- FARMIS: calf stocks are reduced because of an increase of milk output per animal and a binding milk quota → drop in beef production
- ESIM: positive cross price elasticities between milk and beef; technical link between milk output change per animal and beef production was missing
- To improve the depiction of beef supply in ESIM, such a link was implemented

Scenarios

- Baseline

- Projection year: 2015
- World market prices calibrated to FAPRI projections
- Full implementation of the 2003 Reform and the Health Check except for the abolishment of milk quotas
- Constant levels of tariffs, export subsidies, tariff rate quotas (except for sugar) compared to the base year and the current system of intervention prices
- Biofuel share of almost 6% in total EU transport fuel consumption is assumed by 2015

Scenarios

- Policy Scenario

Full market liberalization of EU agricultural policies:

- Abolishment of all price policies
- Cut in direct payments by 50%

Results

- Baseline

Products	Before iteration			After iteration			
	Change in price	Change in area/supply in ESIM	Change in area/supply in FARMIS	Change in price		Change in area/supply	
	% comp. to 2005 (1)	% comp. to 2005 (2)	% comp. to 2005	% comp. to 2005	% points difference with (1)	% comp. to 2005	% points difference with (2)
Crops							
Wheat	18	4	3	18	0	3	1
Barley	44	15	21	44	0	20	5
Rapeseed	33	28	36	32	1	36	8
Rye	47	12	19	45	2	16	4
Potatoes	-22	-14	-4	-30	8	-11	3
Fodder	-	2	8	-	-	9	7
Set-aside	-	-73	-90	-	-	-90	17
Animal products							
Beef	8	9	-11	8	0	-11	2
Milk	-24	5	5	-24	0	5	0

Results

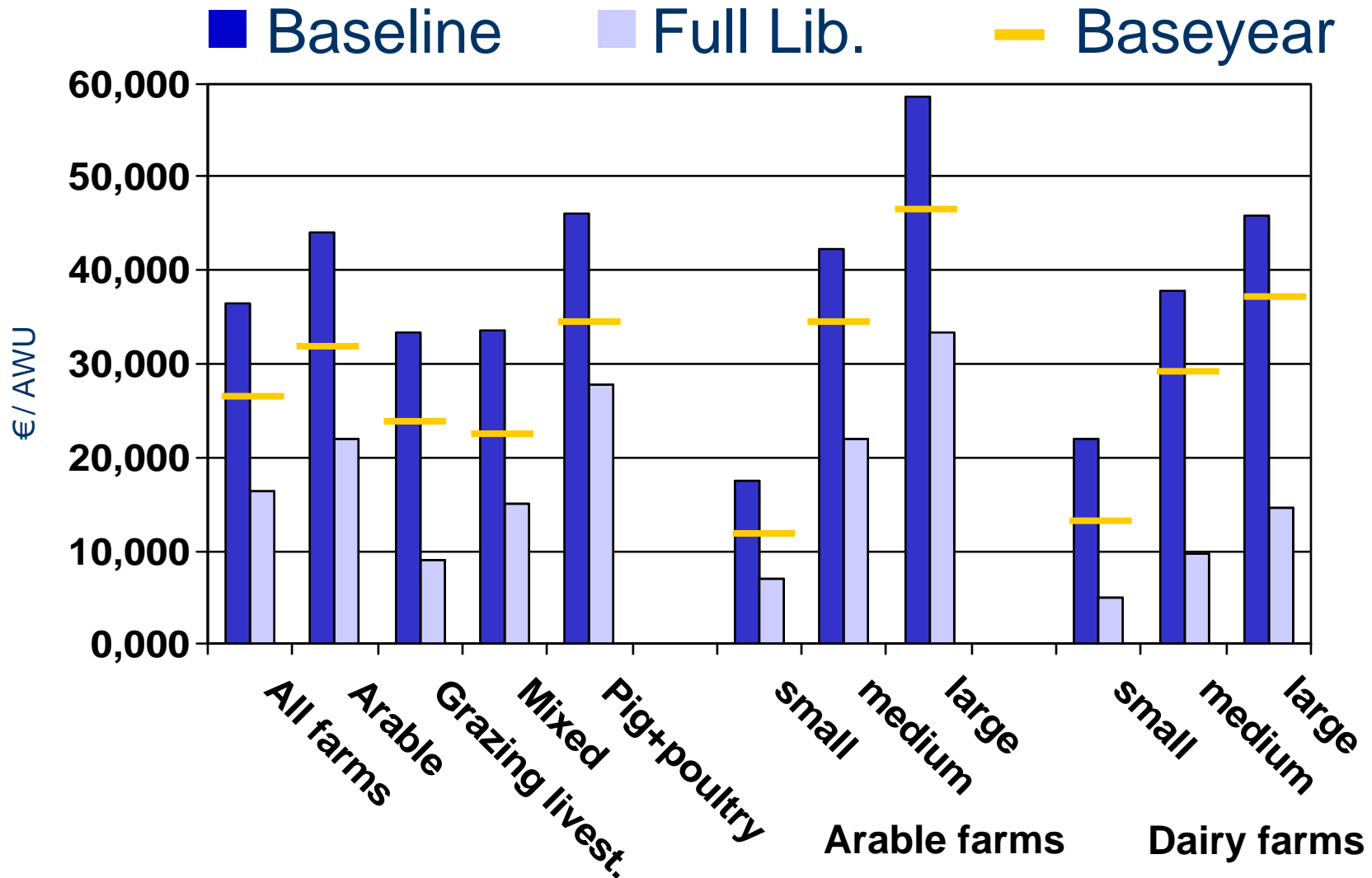
- Full Liberalization

Products	Before iteration			After iteration			
	Change in price	Change in area/supply in ESIM	Change in area/supply in FARMIS	Change in price		Change in area/supply	
	% (1)	% (2)	%	%	% points difference with (1)	%	% points difference with (2)
Crops							
Wheat	-8	0	-3	-8	0	-2	2
Barley	-8	0	-3	-7	1	-3	3
Rapeseed	-6	6	-4	-6	0	-3	9
Rye	-9	0	-5	-7	2	-3	3
Set-aside	-	-4	34	-	-	30	34
Fodder	-	-21	-4	-	-	-7	14
Animal products							
Beef	-55	-50	-27	-55	0	-27	23
Milk	-21	-7	5	-27	6	0	7

% - changes compared to Baseline

Results

- Farm Net Value Added per Agricultural Work Unit



Results

- Farm Net Value Added per Agricultural Work Unit cont'd

- Liberalization of agricultural market leads to a strong reduction of farm incomes
 - Average income in the baseline is substantially higher than in the base year
 - The impact on family farm income is often much smaller as the reduction of direct payments reduces land rental prices
 - Projections should be interpreted against the background of low-income levels that indicate that significant structural change can be expected
- Not depicted in the current model specifications!

Conclusion and Outlook

- Analysis of model reactions was most important step in the linking process
- Iterative process mostly is relevant for non-tradable goods and such goods for which the country is large
- Detailed analysis of scenarios with respect to income distribution among different farm groups can be carried out
- An extension of the FARMIS model to explicitly and endogenously account for farm exits is envisaged

Thank you for your attention !

References

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