The improved CAPRI Partial Equilibrium model

A Gocht\textsuperscript{1}, J Helming\textsuperscript{2}, H P Witzke\textsuperscript{3}

\textsuperscript{1}vTI, \textsuperscript{2}LEI, \textsuperscript{3}Uni Bonn,

Project conference
Novotel Leuven Centrum
14 - 15\textsuperscript{th} February 2013
Reviewing the implementation of the Single Farm Payment

Adjusted farm type typology and methodology to link farm types

Improved methodology for modelling the price building mechanism
Effects of decoupled payments on production: theory and empirical evidence

First step: literature review of theory

- Theory suggests possible production effects of decoupled related to risk attitude and impacts of increased liquidity/income
  ⇒ Both cannot be covered by (current) deterministic supply models of CAPRI with no explicit coverage of investment decisions
- Empirical evidence finds very small impact
  ⇒ Decision to neglect these indirect effects

Second step: literature review of how decoupled payments are treated in 12 partial equilibrium models

- Either implemented as direct payments to land
- Or in ad-hoc manner (decoupling factors)
- Entitlements not reflected
  ⇒ Decision to focus on effect on land use and interactions with entitlements
Improved methodology to model post 2003 CAP Reforms in CAPRI

- **Improved data**
  - Detailed reflection of implementation of Single Farm Payment (historic – flat rate – hybrid) and remaining coupled support, including national support under article 69/68/63
  - Detailed input from law book, e.g. with regard to budgetary ceilings and eligible areas

- **Improved methodology**
  - Additional land cannot claim the SFP (= entitlement are binding)
  - Premiums or prices changes can thus generate rents on entitlements
  - Algorithm to trade entitlement during iterations, between farm types or regions
  - Draws on existing land supply curve

- **Improved implementation**
  - Revised code
  - Updated documentation
Adjusted farm type typology

Background

- Each farm type (also the residual) is an independent supply model
- Data and typology from FSS (Farm Structure Survey) and FADN data
- Farm type (FT) module provides consistent break down of NUTS2 to up to nine FTs (Type of Farming x Economics Size Unit) plus residual farm group

Decisions

- **Keep FT definition** but
  - Econometric estimation on single FADN records of how AgriEnv payments relate to farm program
  - Refactor code for data base, baseline generation and reporting
- Discussion of new selection routine to improve coverage - could not be done within CAPRI-RD, covered in IPTS project FARM 2012 along with complete data update
Results

- Successful update of FSS and FADN data and partially inclusion in the model, also data prepared for the future
- Parallel execution: higher speed, full use of multiple processor computers => allows more tests and thus improves the results
- Improved modular code of CAPRI FT

Outlook

- From 1,800 to 2,200 FTs, from EU25 to EU27
- Compared to current version: 6.7 million Livestock Units and 10 Million Used Agricultural Area (UAA) less in residual farm type for EU25
- Adjustment necessary with the new Standard Output (SO) approach in FADN (replaces Standard Gross Margins)
Methodology to link farm types

Market for own produced fodder
- FT-fodder mix = own produced & tradable; totals consistent to Nuts2
- Problems mainly due to confidentiality limits:
  - Data either on fodder production or on herds deleted => non-consistent input data
  - Selection routines detects these cases and takes appropriate actions
  - Improved code avoids that processing steps generate inconsistent farm programs (Gocht and Britz, 2011)

Inclusion of interaction between farm types for nutrient
- Particular pig and poultry FTs often cannot legally dispose all produce manure on their managed land => export to other FTs
- Requires additional net-trade position for manure, Note: not yet completed
Application of the FT in CAPRI-RD

Background

- Using FT layer we can approximate the impact on farm types, regions and MS when the SPS scheme and/or the allocation of payments between regions change

Application

- Analysis of the proposal Oct. 2011
- EU, Nuts1, MS wide regional SPS

Approach

- Calculation of ceiling values change
- Modelling the SPS scheme change
- Entitlement trade module

Results

- Impact assessment in WP6, Gocht et. al 2013, Britz, W. et. al, 2012
Problem: price linkage to EU15/EU10 with fixed absolute (CMrg) or relative (PMrg) margins cannot reflect regional surplus situations

Literature review => no intra EU Armington or Takayama-Judge

Instead reduced form estimation: \( P(MS) = f[P(EU), \text{net trade}(MS)] \)

Data on 12 products from 1988-2010

- Monthly data => many obs, but error correction model needed to get long run relationship for CAPRI
- Prices from DG Agri, in logs, outlier checked and deseasonalised
- Trade index based on Comext, (outlier cleaned after Baveno)

\[
 tpd = \frac{(EXPORT - IMPORT)}{(PRODUCTION + DEMAND)} 
\]
Intra EU price transmission (UBO): ECM

Estimation as ECM (error correction model)

\[ d (p_m) = \alpha_m + \sum_{i=1}^{4} \left( \beta_{m,i} d (p_{m,t-i}^d) + \gamma_{m,i} d (p_{m,t-i}^{eu}) + \delta_{m,i} d (tpd_{m,t-i}) \right) \]

\[ + \lambda \cdot (p_{m,t-1}^d - p_{m,t-1}^{eu}) + \mu \cdot F (tpd_{t-1}) \]

Country dummies

Long run price transmission elasticity = 1

Long run net trade effect

\[ F (tpd) = \text{sign} (tpd) \cdot [\text{abs} (tpd)]^x \]

\[ x = 0.2 \]

- Detailed specification + estimation method optimised for Tstat*AIC

=> Significance, autocorrelation: ok

\[ \Rightarrow -\mu / \lambda \in [-0.3, -0.05] \] in 16 of 22 cases (ok)
Implemented as update of producer margins between solution steps

Consumer margin changes “accordingly” (considering share of domestic production in production+imports)

Imputed responsiveness for products not estimated (low - sugar, oils; medium – cereals; high - fruit&veg)

No margin responsiveness in Bulgaria/Romania
  • Weak data
  • “BUR” only combines 2 countries

Reduced form gives reasonable results but no specific behavioural model for food industry
  • => Welfare calculation will be ad hoc, so far missing
“Food scare” scenario: selected to test large (max?) effects => egg consumption in Poland down exogenously by 50%
  • Perhaps more relevant: Milk quota expiry or reform of coupled support

Traditional specification => similar response of prices in all of EU10

Revised specification => above average response in MS where shock originates
References


- Britz, W., Gocht, A., Pèrez Dominguez, I., Jansson, T., Grosche, S. and Zhao, N.: EU-Wide (Regional and Farm Level) Effects of Premium Decoupling and Harmonisation Following the Health Check Reform (2012) *German Journal of Agricultural Economics*, vol. 61, p. 44-56