1.2 General Introduction to CAPRI

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Model types and classification

Product/agent coverage:

- **partial** equilibrium / general equilibrium
- **supply / market models**

Spatial coverage and representation:

- **global** / national / regional models, **regionalized models**,
- net trade / **spatial representation**

Representation of time:

- **comparative static** / recursive dynamic / fully dynamic /**ex-ante**, ex-post

Source of parameters:

- **econometric models / synthetic models**

Representation of chance:

- Stochastic / **deterministic** models

CAPRI CAPMOD – core characteristics

Global, **comparative static**, **partial equilibrium** model for primary and secondary agricultural commodities

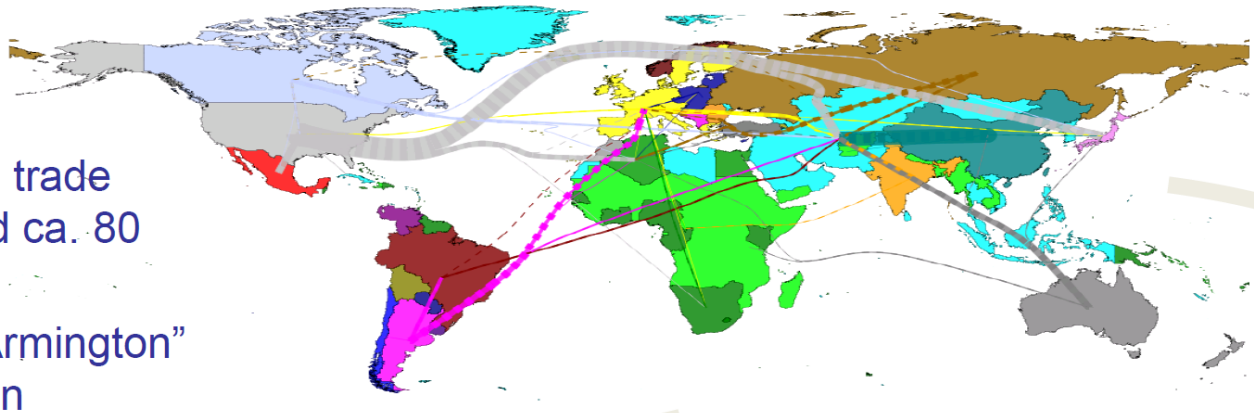
Designed for **ex-ante impact assessment**

European focus:

- EU, Norway, Turkey and Western Balkans are covered by **regional/farm type programming models** which deliver detailed results, 1x1 km downscaling component for EU27
- CAP premiums and market instruments well represented
- Regional and commodity coverage of global, spatial trade model targeted to analysis of EU agri-food policy questions

Rather **unique combination** of **spatial global trade** model with **regional, aggregate programming** models based on sequential calibration – allows for a wide range of applications

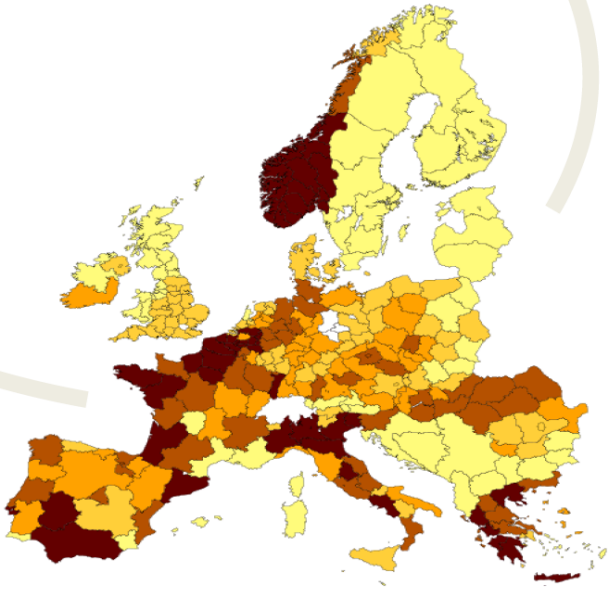
www.capri-model.org



- Global: 40 trade blocks and ca. 80 countries
- Spatial: “Armington” assumption (=> goods differ by origin)
- Detailed trade policy

Price

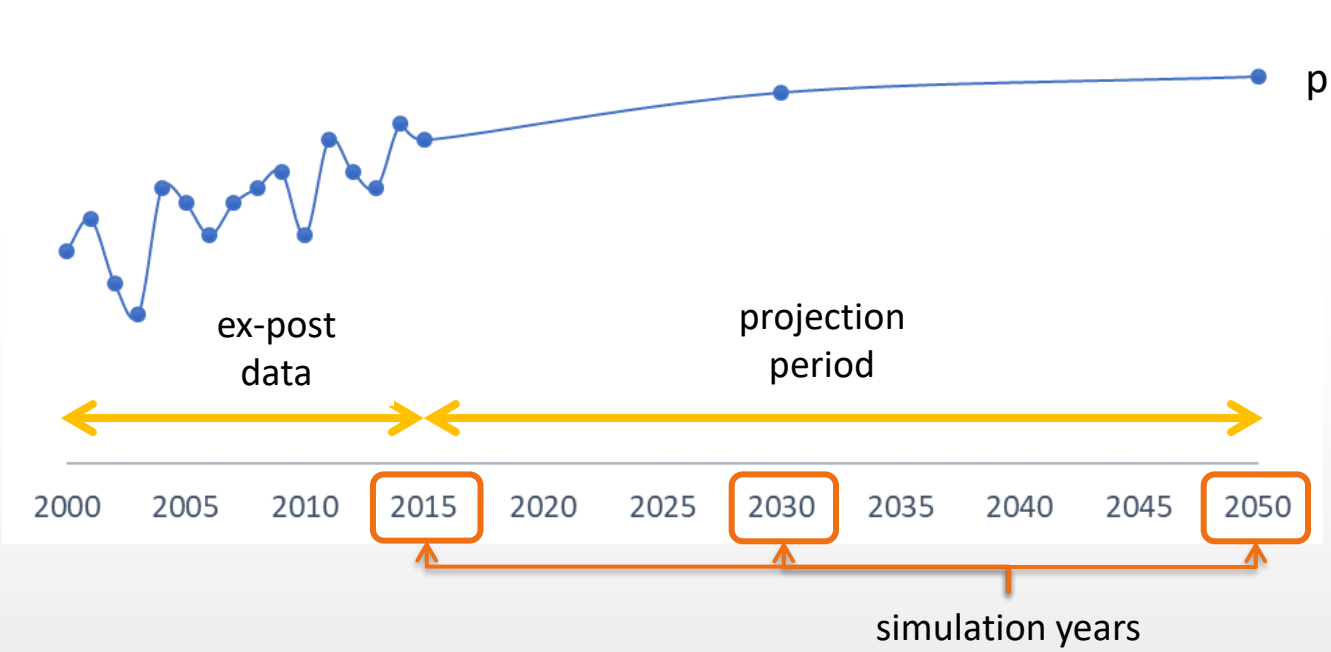
Supply + Feed demand



- Non-linear programming models for 280 regions or 2.200 farm types
- Profit maximization under constraints
- => detailed policy representation (premiums, quotas…)
- … and links to environment

Scenario analysis: baseline

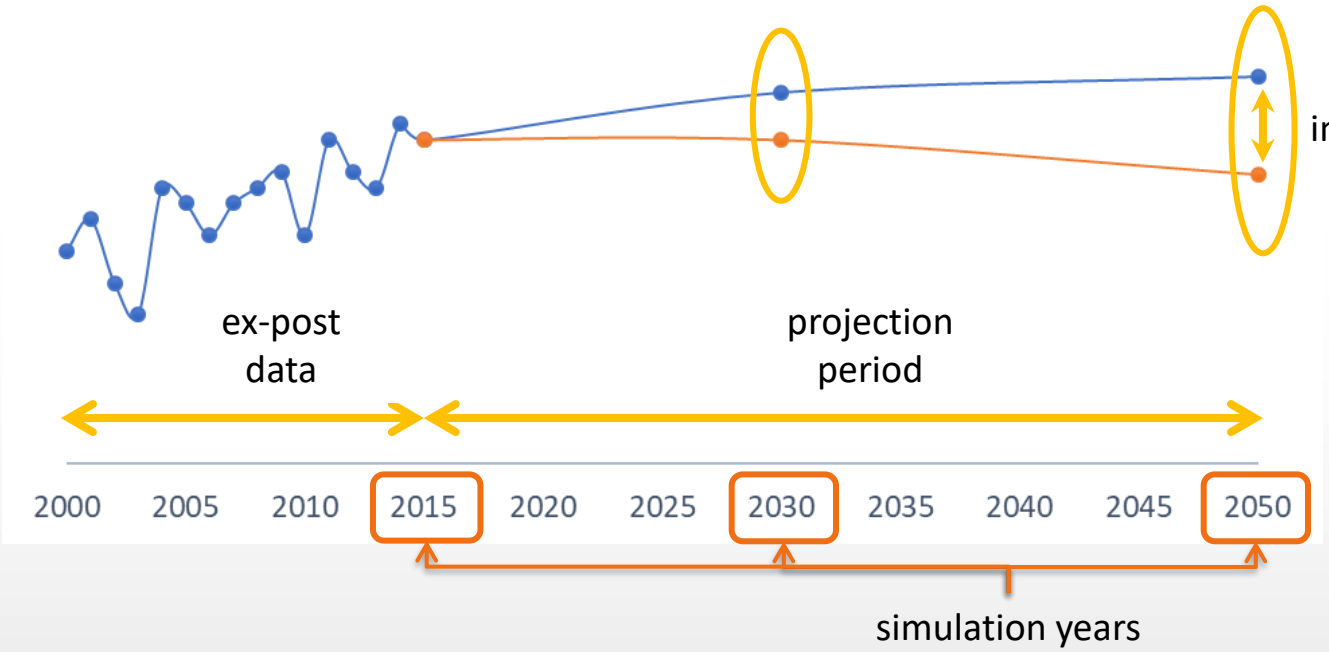
The **baseline** provides a reference or business as usual scenario for ex-ante assessment



The CAPRI baseline projects a high number of variables for each regional unit

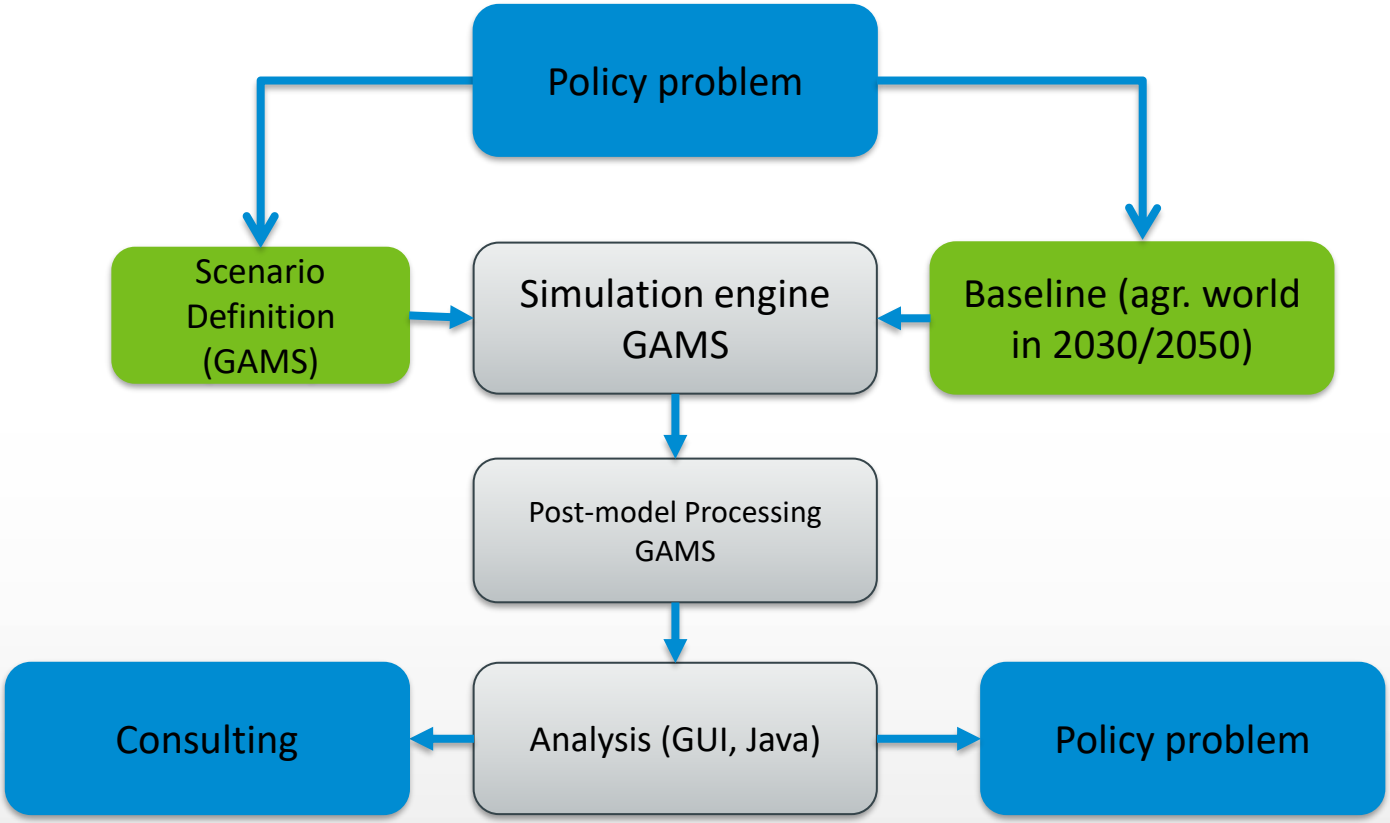
Scenario analysis: policy impact assessment

Assuming that the baseline is the picture of the world if everything goes on just as expected, then **what if** a new policy is implemented?

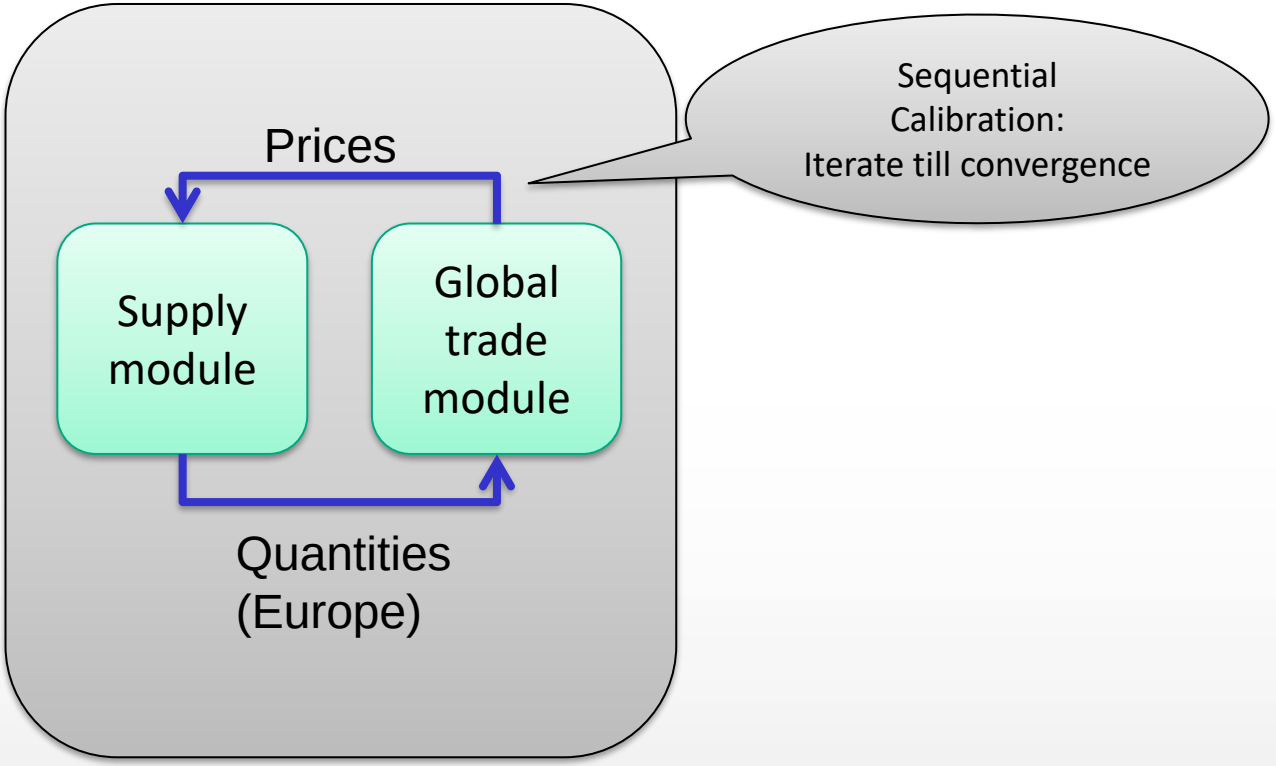


Impact is measured as difference from the baseline in the chosen simulation year

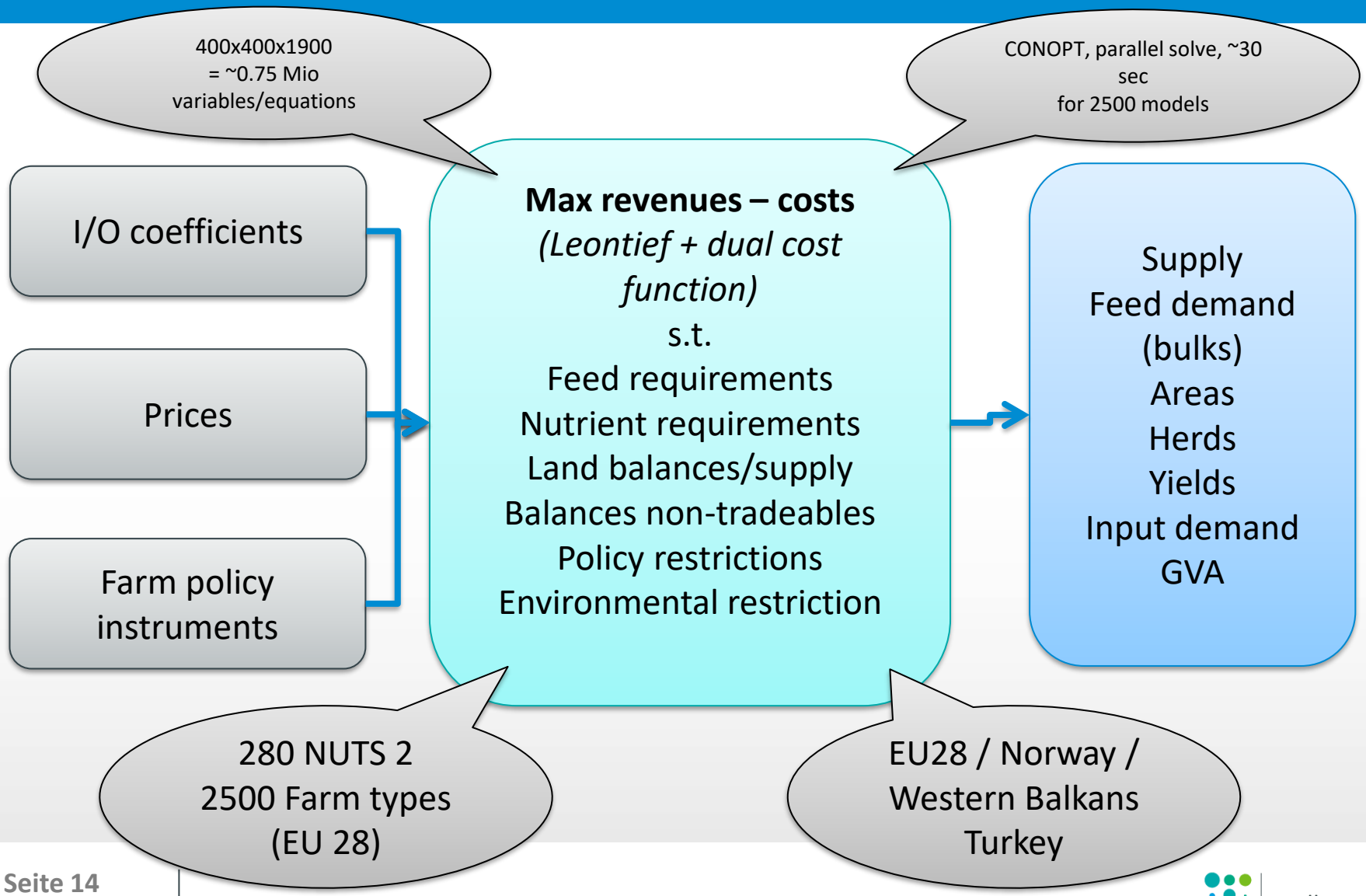
CAPRI CAPMOD – Architecture



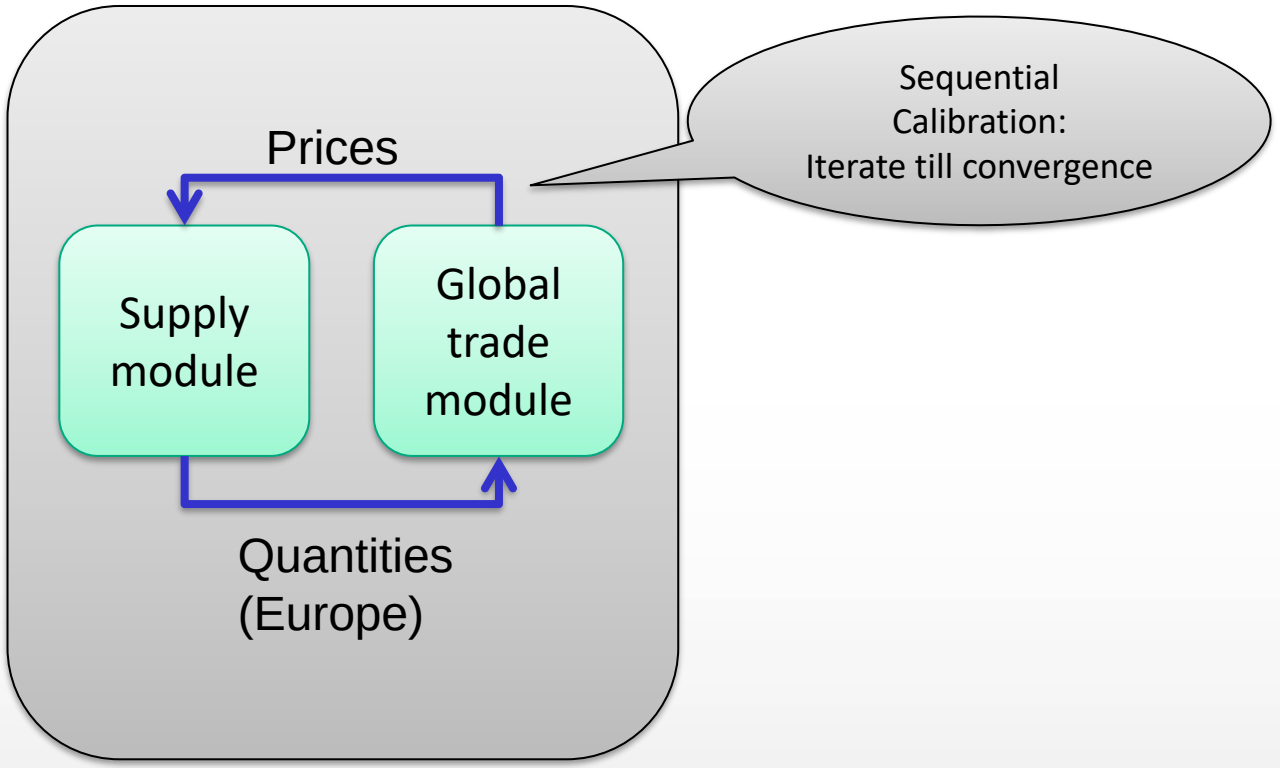
CAPRI CAPMOD – Architecture: Simulation engine



CAPRI CAPMOD – Supply module: MP-Models



CAPRI CAPMOD – Architecture: Simulation engine



CAPRI CAPMOD – Global Trade Module

CNS
~40.000 x 40.000
Highly non-linear

CONOPT, parallel pre-solves,
~5 sec with good starting point

Exchange rates
Population/GDP
Taste shifts

Supply/Feed demand from supply module

Border Protection, EU market policies

Comparative static
Spatial
Multi-Commodity Model

(Find fix point
in global markets)

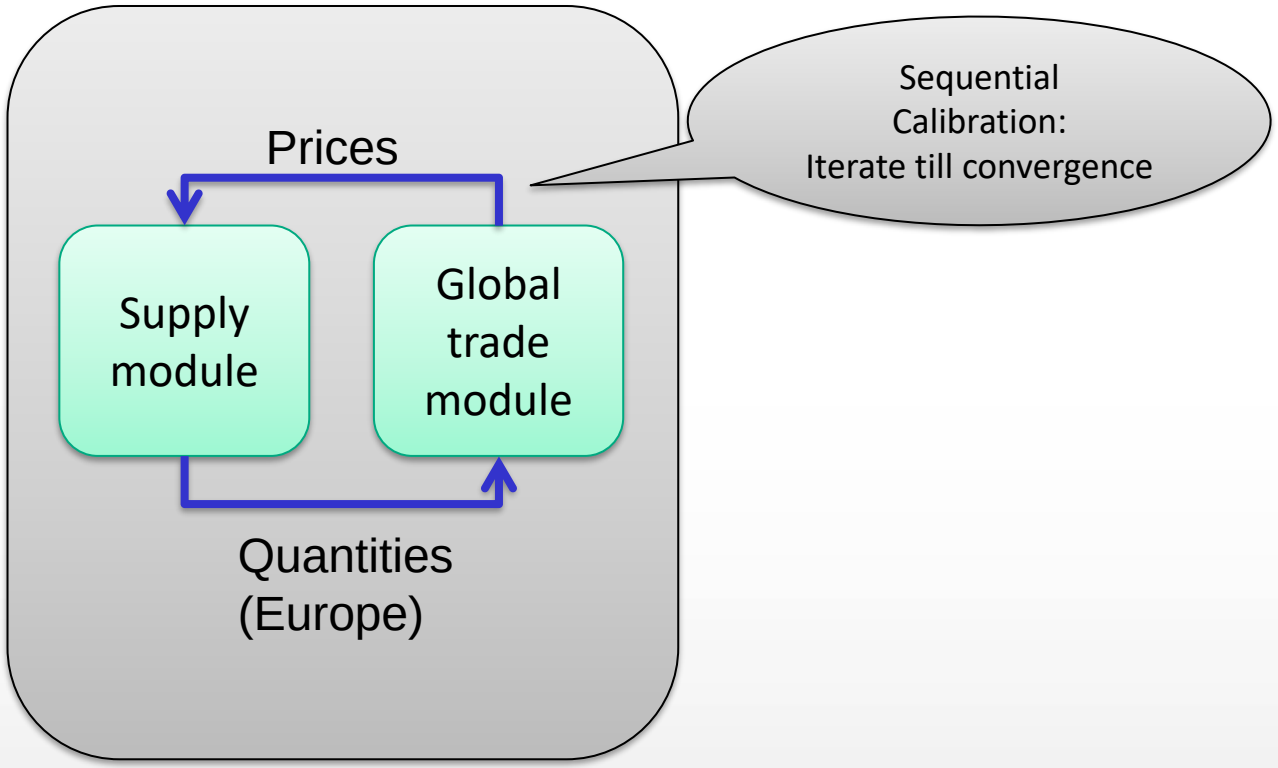
Armington assumption
Flexible function form
Well behaved parameterization

Supply
Final demand
Feed
Processing
Prices (producer /consumer)
Trade flows

~80 countries/country blocks in 40 trade blocks

Globally closed

CAPRI CAPMOD – Architecture: Simulation engine



Comparative Static Equilibrium

Sequential iteration between the reg. supply and the market model:

Supply function of NUTS2 models is unknown (black)

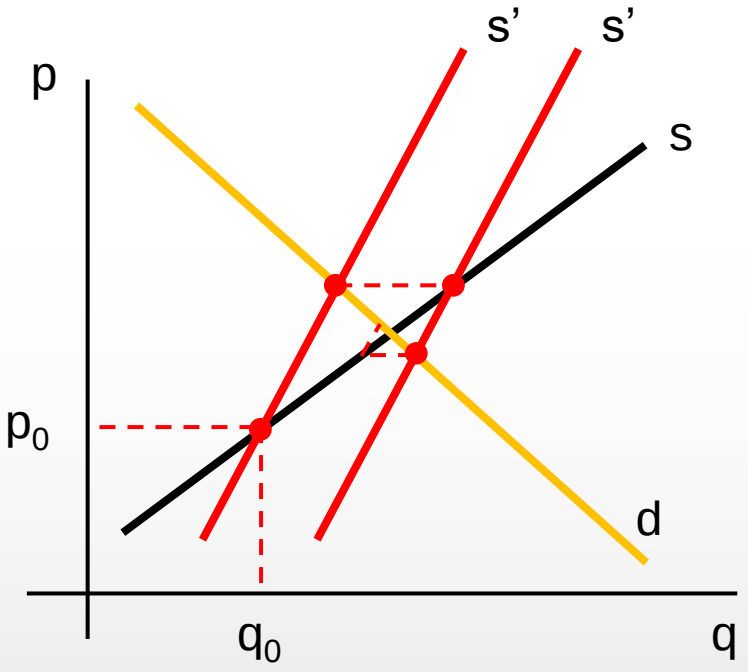
Assume any supply function (red) in market model for EU East and EU West

Starting with some price, simulate supply with NUTS2 models in EU E-W

Calibrate the assumed supply function to that point

Solve supply + demand in market model simultaneously for new price

Iterate until convergence…



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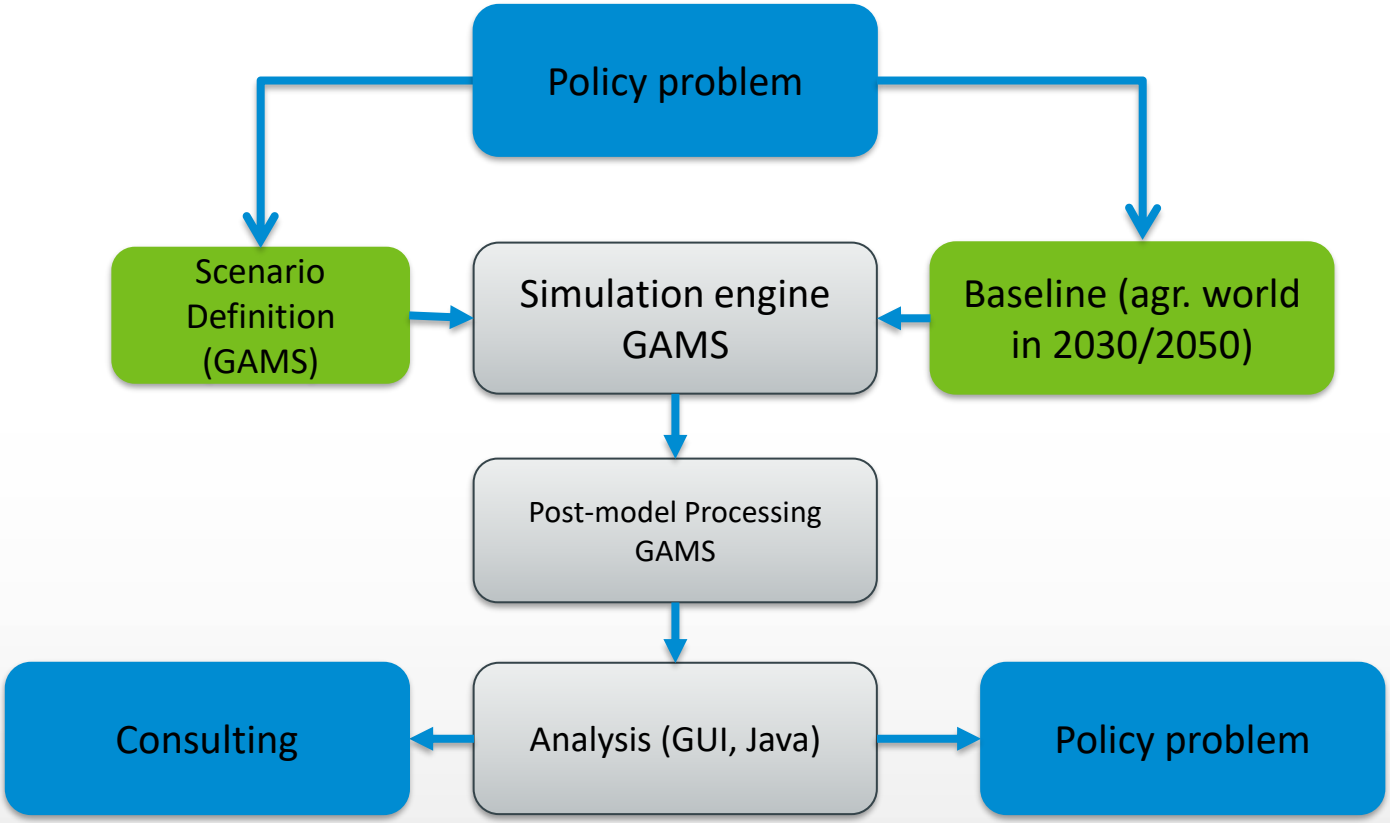

CAPRI CAPMOD –Post Model Processing

Support of result analysis

- Aggregation over scales/products/activities
- Decomposition: yield response, behavioral functions market model

Economics

- Farm income indicators (activities/regions)
- Welfare analysis
- CAP budget, CAP instruments

Environmental indicators

- Gaseous emissions
- N,P,K balances
- GHG inventories (IPCC for Europe, emission coefficient based approach for regions in market model)
- Energy use in European agriculture

Spatial downscaling

Gams-file	Task	Key input file(s)	Key output file(s)
COCO1	Prepare national database	[Raw data]	coco\coco1_output
COCO2	Finish national database	coco\coco1_output	coco\coco2_output
Compile_rdp_data	Compile RDP data	[Raw data]	policy\rd_budget
CAPREG	Build regional time series	coco\coco2_output policy\rd_budget	capreg\res_time_seriesBBMS
CAPREG	Build regional database	capreg\res_time_seriesBBMS	capreg\res_BBMS
Prepare_faostat_database	Prepare FAOSTAT database	[Raw data]	fao\faodata
Global_database	Build global database	fao\faodata?	global\fao_agg_BB_new
Est_emission_factors	Estimate GHG emission coefficients	global\fao_agg_BB_new capreg\res_BBMS [Raw data]	envind\ghg_emission_trends
CAPTRD	Generate trend projection	capreg\res_time_seriesBBMS	baseline\trends_BBYY
CAPMOD	Baseline calibration market model	capreg\res_BBMS baseline\trends_BBYY global\fao_agg_BB_new	baseline\data_market_BBYY baseline\data_uvagBBYY
CAPMOD	Baseline calibration supply models	capreg\res_BBMS baseline\trends_BBYY baseline\data_uvagBBYY	baseline\pmppar_NBBYY
CAPMOD	Run scenario with market model	baseline\pmppar_NBBYY baseline\data_market_BBYY	capmod\res_NBBYYscen
CAPMOD	Run scenario without market model	baseline\pmppar_NBBYY baseline\data_uvagBBYY	capmod\res_NBBYYscen
CAPMOD	Run scenario with only market model	baseline\data_market_BBYY	capmod\res_NBBYYscen

CAPRI – data sources

EUROSTAT: market balances, acreages, herd sizes, yields, slaughtering statistics, Economic Accounts for Agriculture, household surveys, macro-econ indicators, regional agricultural and land use statistics, farm structure survey, standard gross margins ..

FAOSTAT: supply utilization accounts, trade matrices

AMAD: tariffs

FADN/FSS: for the farm type module and estimation of parameters like input allocation

Policy: WTO commitments, CAP policies, FTAs ..

CAPRI – data sources: input from other models

Data base / parameterization:

- GTAP/DynaClue: land supply curve
- MITERRA/GAINS: nitrogen emission factors

Baseline:

- AGLINK/COSIMO: market balances, prices
- PRIMES and POLES: bio-energy
- IMPACT and GLOBIOM: long term trends

Wrap-up: Some not so nice features

- Most of the work is on the database “consolidation”
- black box feeling, high learning costs
- One approach fits all (template approach for the regional supply models)
- Long execution time: iteration between the modules time consuming or sometimes does not converge

Wrap-up: Some nice feature

- full representation of the ag. Sector (detailed in the EU and world wide)
- technological details for the EU
- real units: number of animals, hectare, tones
- TRQ, import tariffs, …
- Many economic and environmental indicators are automatically produced during each run

Questions? Comments?

See also www.capri-model.org