Uncertainties in impact assessment of policies or external drivers on agricultural markets

the case of the Russian crisis

Measuring agriculture and rural planning with advanced methods
Impact evaluation of policies and projects for agricultural and rural development
31 August 2015, Italian Pavilion, EXPO 2015, Milan

Fabien Santini
European Commission
Joint Research Centre - IPTS

- Background : the JRC and and ex ante policy impact assesments

- Baseline versus counterfactual scenarios
  - Russian economic crisis
  - Russian ban

- Uncertainties / Stochastic analysis

- Conclusions

European Commission

DG JRC Role: facts & figures

- **Independent** of private, commercial or national interests
- has no policy agenda of its own
- **Focus** on the **priorities** of the Commission
- Work for **more than 20 policy DGs**
- Expertise in a **wide range of areas** from economic analysis through to agriculture and food security, energy, environment etc.
- Provides support throughout the **whole policy cycle**
- **Transversal** service - cuts across policy silos

- **7 institutes** in 6 locations
- **Around 3000 staff**, including PhDs and visiting scientists
- More than 100 economical, bio-physical and nuclear models

Joint Research Centre

European Commission

iMAP platform for agricultural policies

- Agro-Economic Modelling Platform
- hosted by JRC-IPTS in cooperation with DG AGRI
- widely used, robust and scientifically acknowledged tools
- partial-equilibrium (PE) and general equilibrium (CGE) models; links to biophysical models
- Also used for support to DG DEVCO and DG SANTE

MODELS

- AGLINK-COSIMO (EU module of OECD-FAO model)
- CAPRI (highly disaggregated in regions and products)
- AGMEMOD (EU Member States)
- MAGNET or GLOBE (multi-regional, multi-sector CGE model)
- IFM-CAP (Farm model)
- Etc.

Integrated Modelling Platform

iMAP

Agro-economic Analysis

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Baseline vs counterfactual scenario
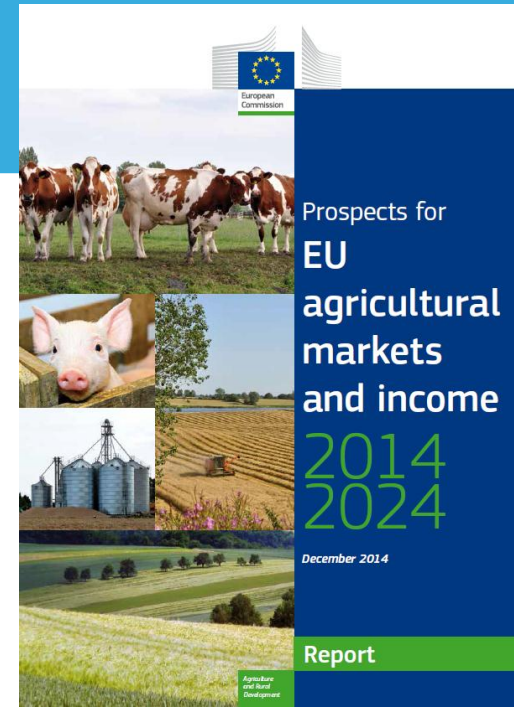
Baseline

- Annual release (EU in December as contribution to World (OECD-FAO) in June N+1)

- Assumptions

    - macroeconomic environment assumptions (IHS) : GDP, inflation, exchange rates, population, energy prices

    - normal weather conditions - > yield trends

    - policy (CAP, Trade, RED, CC, ..) as decided (no anticipation)

- One solution

- Calibration of other models

Prospects for EU agricultural markets and income 2014 2024

December 2014

Report
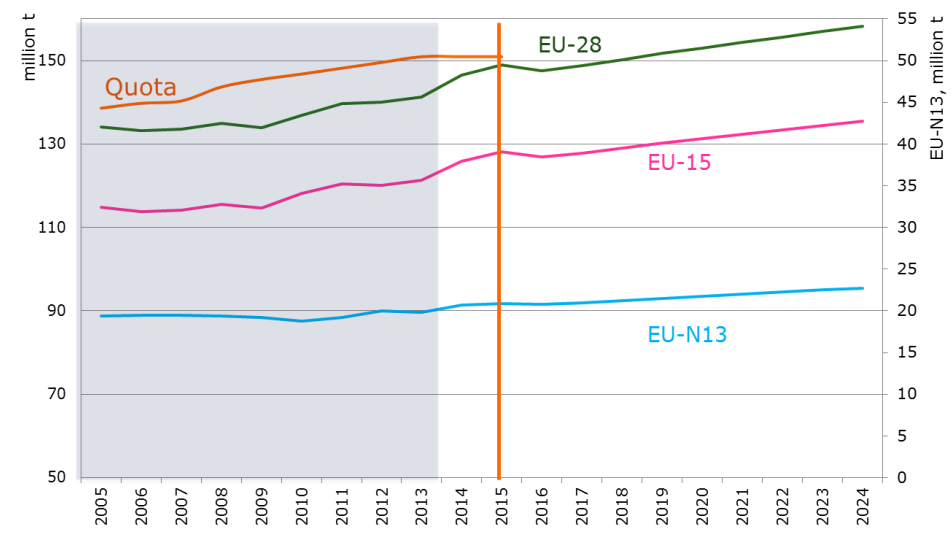
Scenario analysis

- Alternative deterministic scenarios
  - alternative policy, macroeconomic environment and/or yield pattern, etc.
  - affecting exogenous variables and/or equations/parameters

- One solution

- Examples concerning Russia:
  - different macroeconomic conditions in Russia
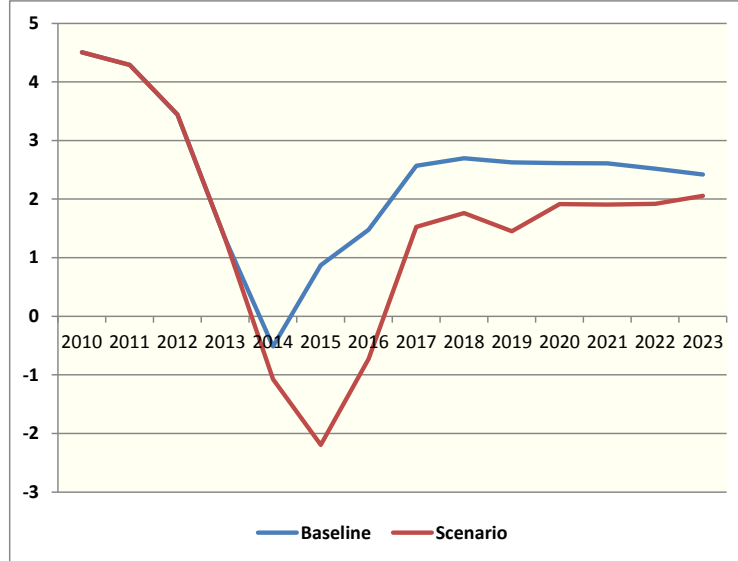 - ban on the import from EU, US, Canada etc.
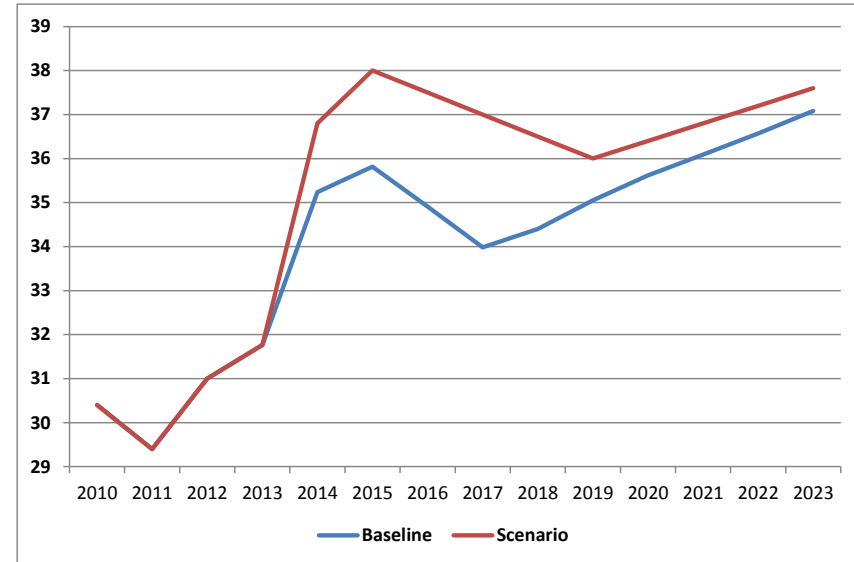
Baseline vs counterfactual scenario

European Commission

Scenario - economic downturn in Russia

Temporary recession in Russia and depreciation of the Ruble
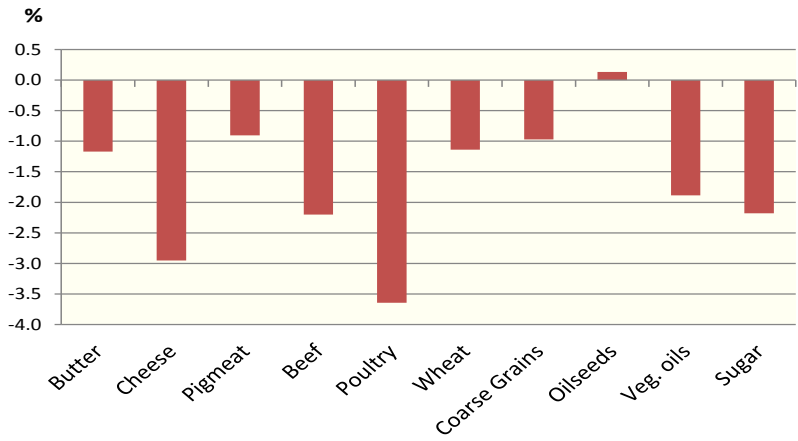
Growth rate in Russia (%)

USD/Ruble rate

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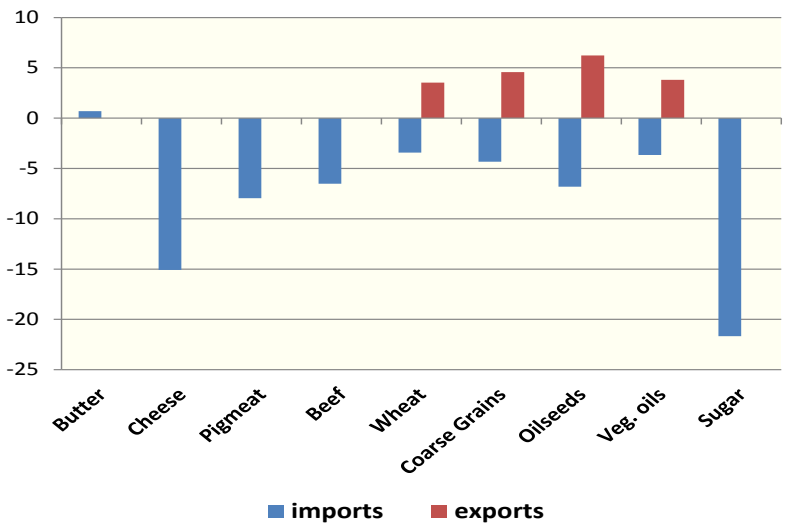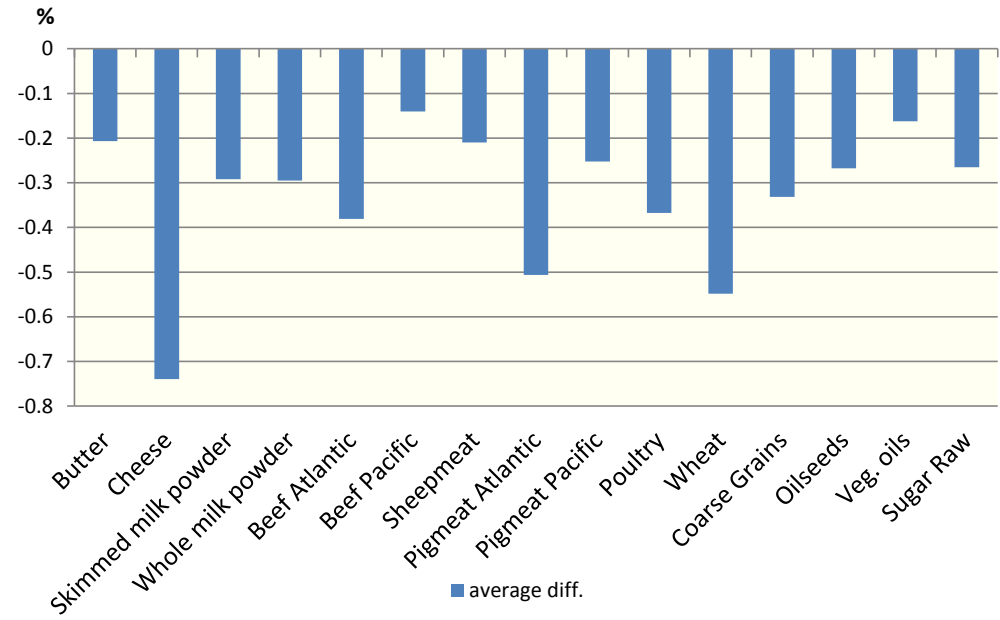# Baseline vs counterfactual scenario

Consumption in Russia (% diff)

Reduced consumption in Russia is mostly compensated by reduced imports and (some) increased exports; impact on world prices moderated

Russia trade (% diff)


World prices (% diff)

Baseline vs counterfactual scenario

Scenario – Russian ban

Exports of certain goods to Russia interrupted -> complex adjustments

- Decreased imports from Russia
- Lower world prices
- Increased consumption out of Russia
- Reallocation of commercial flows (intra and extra)

- Three modelling exercises: Aglink, Capri, Magnet

- Main impact for the EU : dairy products and fruit&vegetables
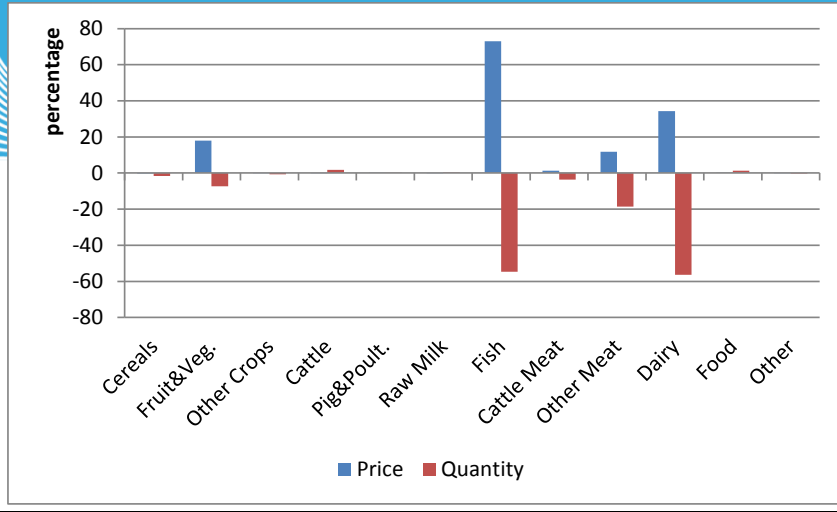
|	EU exports to Russia	Total EU exports	Total EU imports
FRUITS and VEGETABLES.			
Tomatoes	-161.8	-159.6	-78.7
Other vegetables	-528.0	-512.6	-32.7
Apples, pears and peaches	-972.8	-868.8	-676.8
Citrus fruits	-127.2	-110.6	-102.1
Other fruits	-485.9	-449.3	-186.8
MEATS			
Beef	-34.5	-21.7	-0.6
Pig meat	0*	19.4	0.7
Poultry meat	-58.0	0.4	-6.8
DAIRY PRODUCTS			
Butter	-38.5	-28.1	1.8
Skimmed milk powder	-20.9	-8.3	-1.5
Cheese	-278.8	-260.7	-1.9
Fresh milk products	-35.1	-29.6	-1.1
Whey powder	-24.4	-15.9	-2.4

Uncertainty analysis

The reality is unfortunately never fitting to scenario assumptions

Growth rate in Russia (%)

USD/Ruble rate
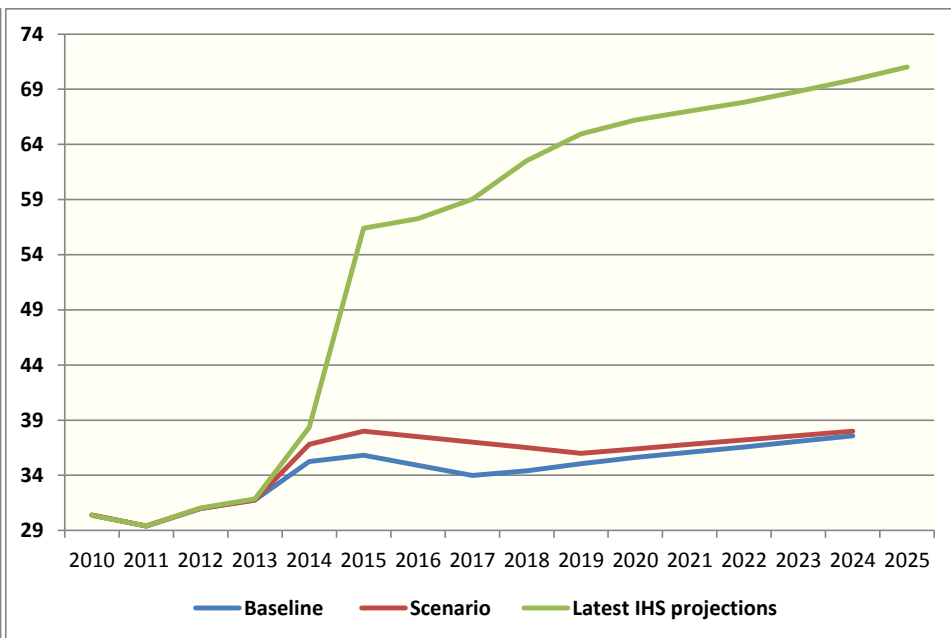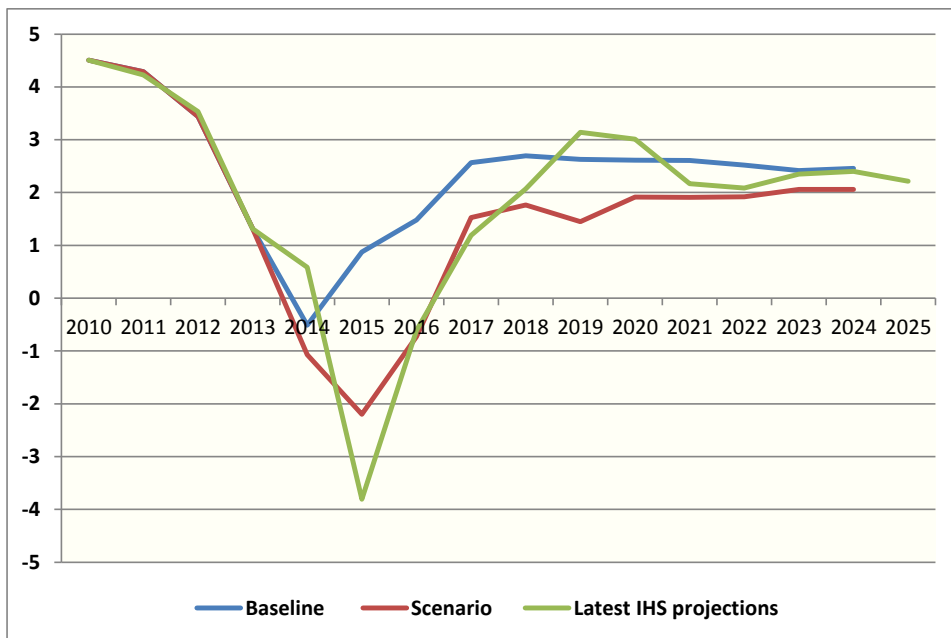
Partial Stochastic Analysis

- Partial stochastic (probabilistic) analysis (of about 40 macroeconomic and 70 yield variables) – 600 solutions

- Macroeconomic uncertainty (GDP index, GDP deflator, CPI, exchange rate, oil price)
  - Based on forecast error

- Yield uncertainty for crops (cereals, oilseeds, sugar beet and cane) and milk
  - Based on deviations to an OLS regression

- Part only or all the variables concerned can be treated stochastically
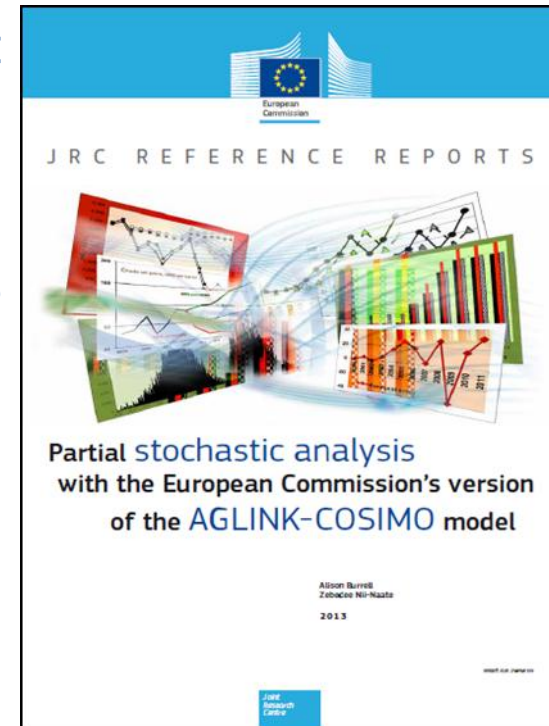
JRC IPTS Reference report: A. Burrell, Z. Nii-Naate (2013)

Partial Stochastic Analysis

- Stochastic model is run 600 times, of which more than 85% solve

- **Two types of analysis:**

  - **Uncertainty in general** measured with the interdecile range (ie between 10th and 90th percentiles) expressed in % of the baseline value (for a specific year or as an average over the projection period)

  - **Subsets**: isolation of solutions of the model where one or several variables are contained within determined boundaries

EUR/USD exchange rate

IR = 11%

10th percentile — Baseline — 90th percentile
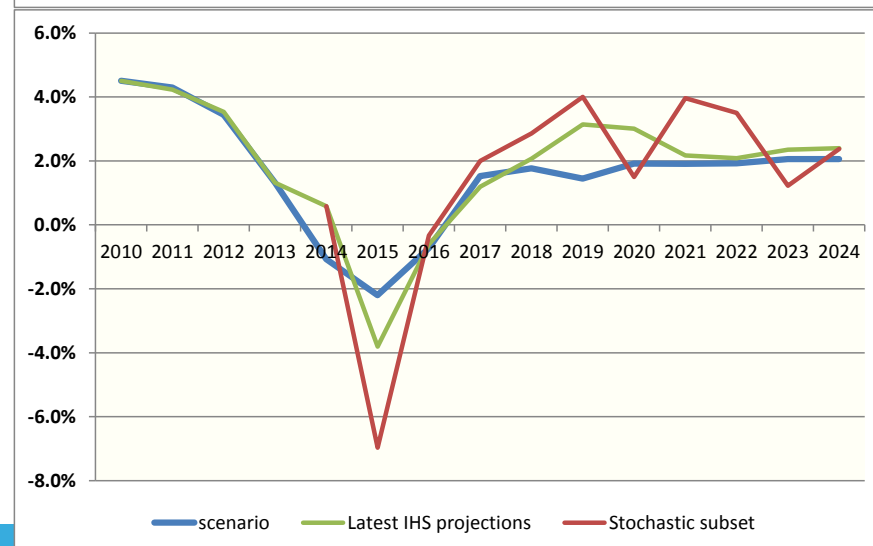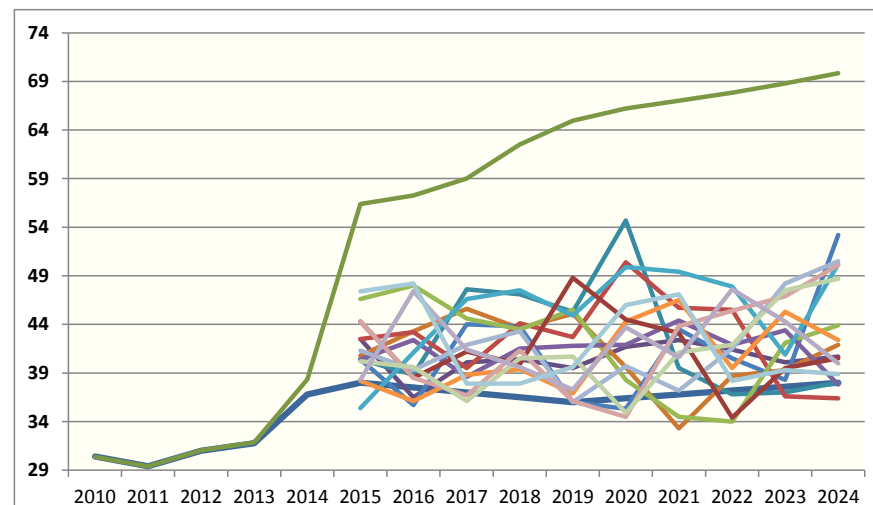
IR (%) –EU Production
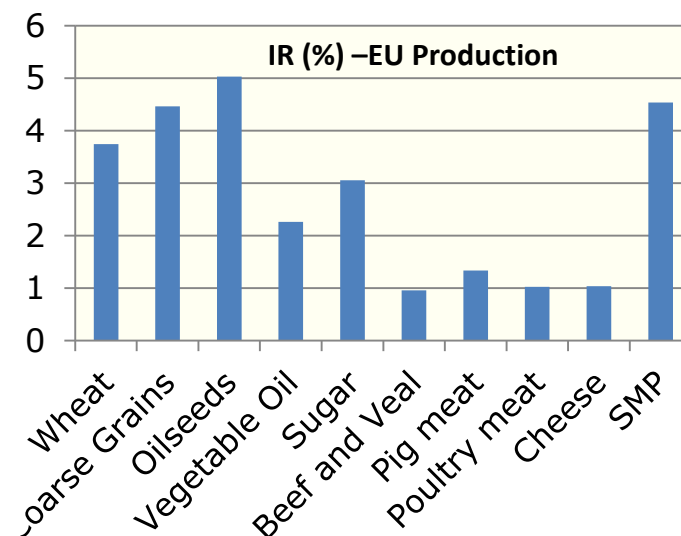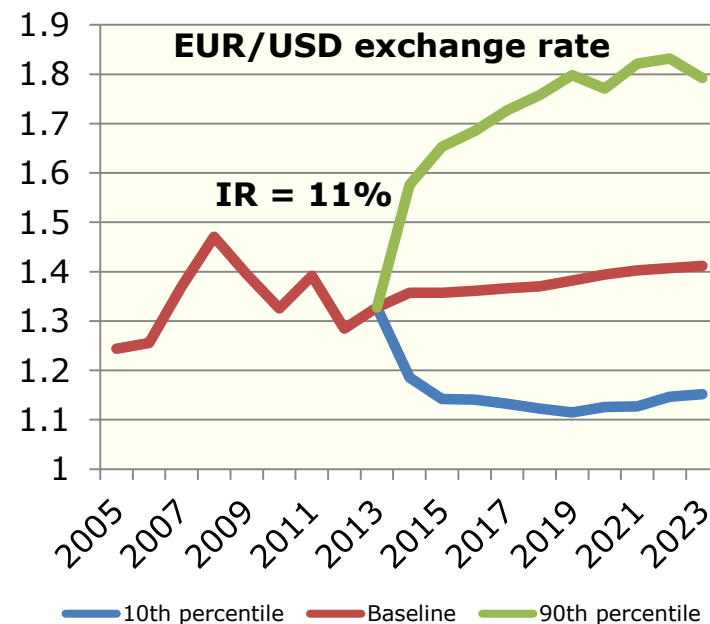
Uncertainty analysis

Would a stochastic subset be closer than a deterministic scenario?

- 0-30th percentile for GDPI 2015-2016
- 25-75th percentile for GDPI 2019-2024
- 75-100th percentile Ruble exchange rate

- 15 draws

- Slightly closer to the most recent macroeconomic projections

Uncertainty analysis

- **For dairy products, confirmation that the contraction of the Russian market (less growth, devaluated ruble) affects the world markets**

- **For other markets, uncertainties in the rest of the world might counterbalance the situation**

World prices (% diff)

Conclusions
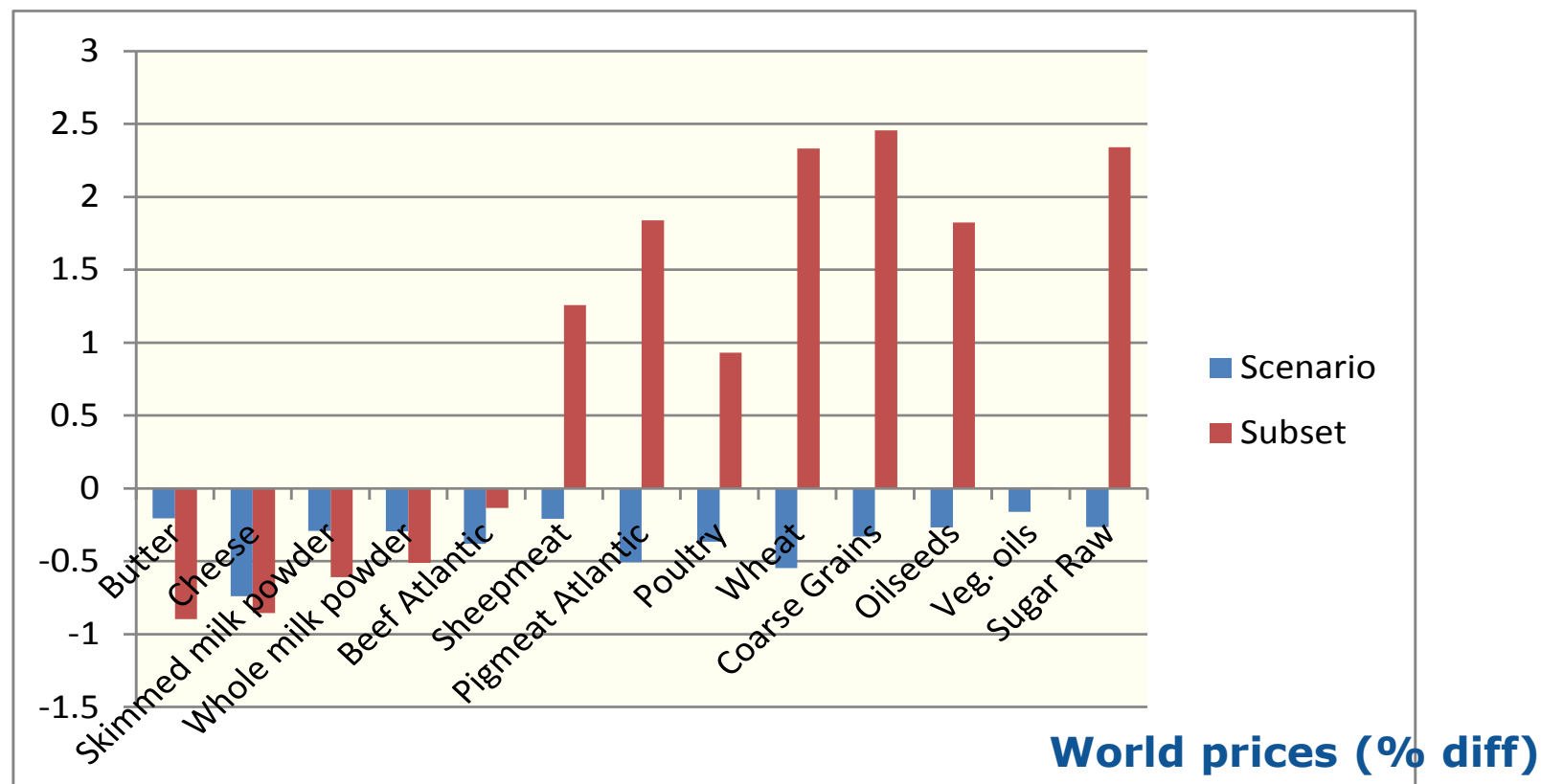
- **Scenario analysis and probabilistic / stochastic analysis complement themselves**

- **Uncertainty analysis should be improved, relying on longer time series and better capturing the relationship between the different variables at stake**

- **There will always be 'black swans'**

Thank you
for your attention

Joint Research Centre

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Stimulating innovation
Supporting legislation