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CGE Model & dashboard: an introduction to CGE models

InnWater Summer School, hybrid

28 September 2025, 13h00 to 15h30 CET

Speaker: Martin HENSELER

URN-Team: Olivier BEAUMAIS, Martin HENSELER, H el ene MAISONNAVE



INN WATER

Promoting social innovation to renew multi-level and cross sector water governance



Part 1 (13:00-14:15 CET)

- 1- Introduction
 - Definition
 - Usage, Application & Limits
 - Differentiation
- 2- Methodology
 - Key features
 - Database: The Social Accounting Matrix (SAM)
 - Economic model
- 3- Results
 - CGE in InnWater Governance Platform
 - Overview
 - Model info section
 - Scenario section
 - Results section
- 4- Conclusion
 - Summary & Take-Home-Messages: Factsheet

Break (14:15-14:30 CET)

- Coffee break ~ 15min

Part 2 (14:30-15:30 CET)

- Wooclap Quiz and Questions
 - Repeating the Take-Home-Messages
 - Answering questions

Part 3 (week after summer school)

- Answers to questions asked in the chat

-1- Introduction: Definition



What is a CGE model?

- CGE model (Computable General Equilibrium model):
- **Computable:** applied, not theoretical, real data based, numerically solvable
- **General:**
 - Represents the entire economy as interdependent
 - Markets
 - Sectors
 - Agents
 - Production factors
 - Interaction of producers, consumers, governments, and trade
- **Equilibrium**
 - Supply and demand balance in each market

-1- Introduction: Users and Application



Who is using CGE models?

Users of CGE models (e.g.):

- International organisations (World Bank, IMF, WTO, OECD, UN)
- National governments (ministries of finances...)
- Research institutions (GTAP, IFPRI, CEPII, universities)
- Consultancies/think tanks.

-1- Introduction: Users and Application

For which purposes are CGE models applied?

Applications of CGE models:

- Policy Simulation & Impact Analysis
- Distributional Analysis (with microsimulation models)
- Environmental & Climate Policy
- Trade & Globalization
- Development & Poverty Analysis
- Public Finance & Taxation
- Energy & Resource Economics.

-1- Introduction: Users and Application

In which domains are CGE models applied?

In domains (e.g.):

- International Trade & Globalization
- Public Finance & Tax Policy
- Environmental and Energy Economics
- Agricultural & Food Policy
- Regional Development & Urban Economics
- Labor Market & Income Distribution
- Health & Education Policy.

-1- Introduction: Advantages and Limits

What are the advantages of CGE models?

Advantages of CGE Models:

- Economy-wide perspective
- Strong microeconomic foundations
- Flexibility for policy analysis
- Counterfactual experiments
- Distributional analysis
- Integration with environment
- Calibration with real data
- Global/regional linkages.

-1- Introduction: Advantages and Limits

What are the limitations of CGE Models?

Limitations of CGE models:

- Simplifying assumptions
- Static structures
- Data challenges
- Sensitivity to parameters
- Abstract representation of households/firms
- Exclusion of financial/institutional factors
- Transparency issues (black box tool and confusion with forecasting tools)

-1- Introduction: CGE vs Forecasting



What is the difference between a forecasting tool and a CGE model?

- CGE is **not** a forecasting tool!
- CGE models **are impact analysis** tools

Difference between Forecast vs Impact Analysis

- Forecast = prediction (like weather forecast), 'what-will-happen' (rain at noon)
- Impact analysis = 'what-if' scenario consequences (what happen if it rains?)
- CGE models are impact analysis tools, not forecasts.

-1- Introduction: PE versus CGE

	Partial Equilibrium Model	CGE model
Scope	One specific aspect of the economy (e.g., specific sector, households)	Economy wide assessment (i.e., all sectors, markets & agents)
Assumption	Aspect of interest is variable, the rest of the economy is exogenous (fixed)	Most of the economy is variable, only few aspects are fixed (i.e. the model closures)
Results	Often precise absolute results in specific units (e.g., Euros, hectares, kilogramm)	Interpret results rather in direction and magnitude, in relative terms (i.e., % change from reference) and considering multiple results at the same time

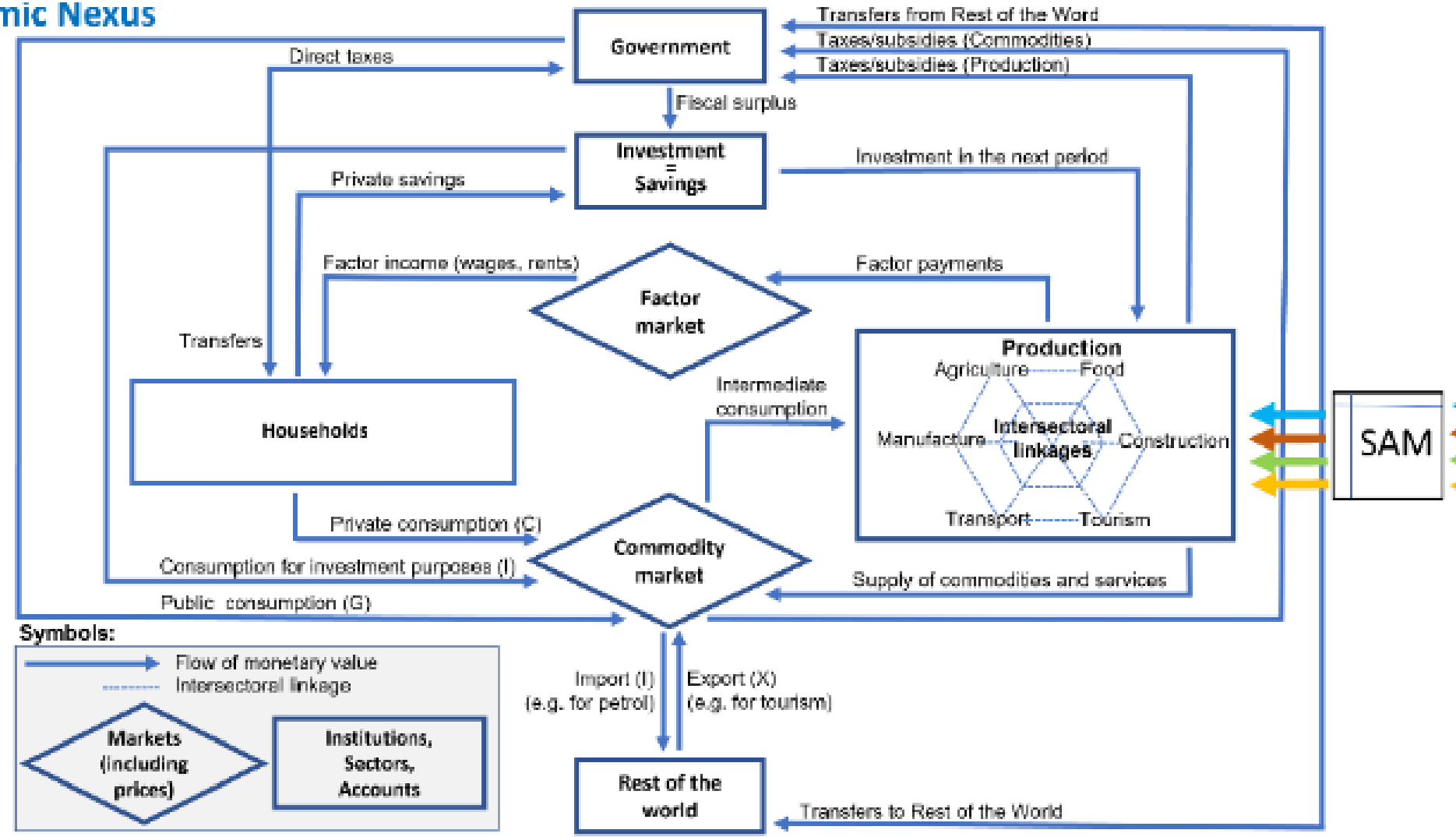
-2- Methodology: Key features

Key features:

- Basic elements: Economic equations represent agents, sectors, markets, factors
- Monetary circular flow
- Microeconomic principles (cost minimization, utility maximization)
- System in equilibrium (supply = demand)
- Equilibrium adjustment of endogenous variables
- Simulation / economic shock = disturbing the equilibrium
- SAM (Social Accounting Matrix) for calibration.

-2- Methodology: Key features

Economic Nexus



-2- Methodology: Key features



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Information flow Social Accounting Matrix



Macro economic
data

Aggregated
agents, markets,
sectors,

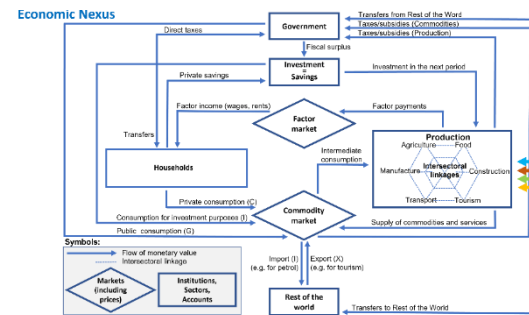
Monetary values

Calibration

Computation of
functional
parameters

Making the model
replicate the SAM

Economic Model



replicates the SAM

Simulation



Economic
shock

Changes the equilibrium

Causes adjustments of
variables (prices, supply,
demand)

Results

Relative changes of the
impacted variables

Change in % from the
reference scenario.

-2- Methodology: The data SAM (simplified)



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Cols represent expenses (purchase)



Rows represent incomes



Labour
Capital
Water



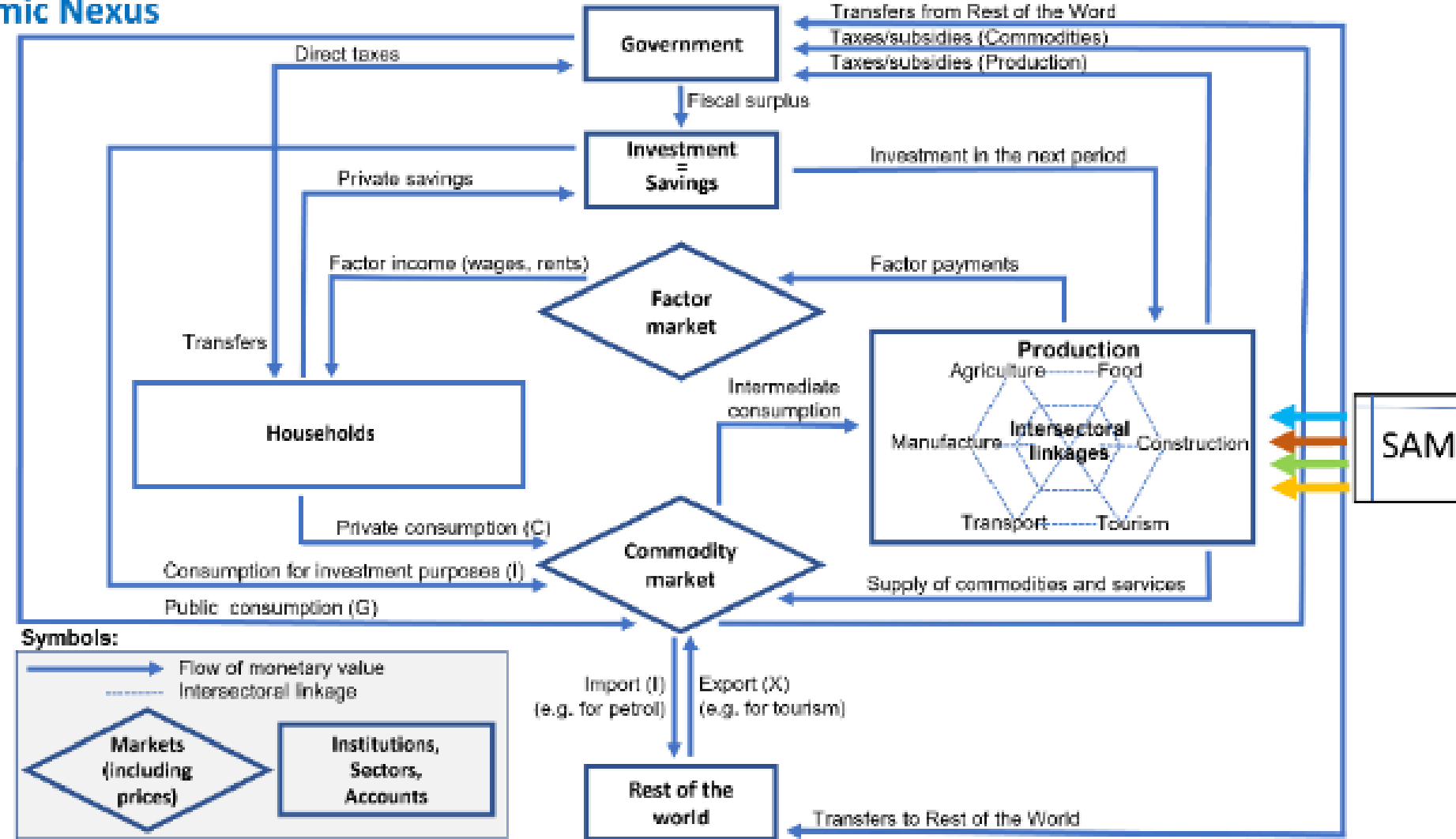
	Activities	Commodities	Factors	House hold	Government	Rest of the world
Activities		Production				Exports
Commodities	Intermediate consumption			Final consumption	Final consumption	
Factors	Factor demand					
House hold			Factor income		Transfers (e.g. social aid)	
Government		Taxes/subsidies		Taxes		
Rest of the world		Imports				

-2- Methodology: Economic model



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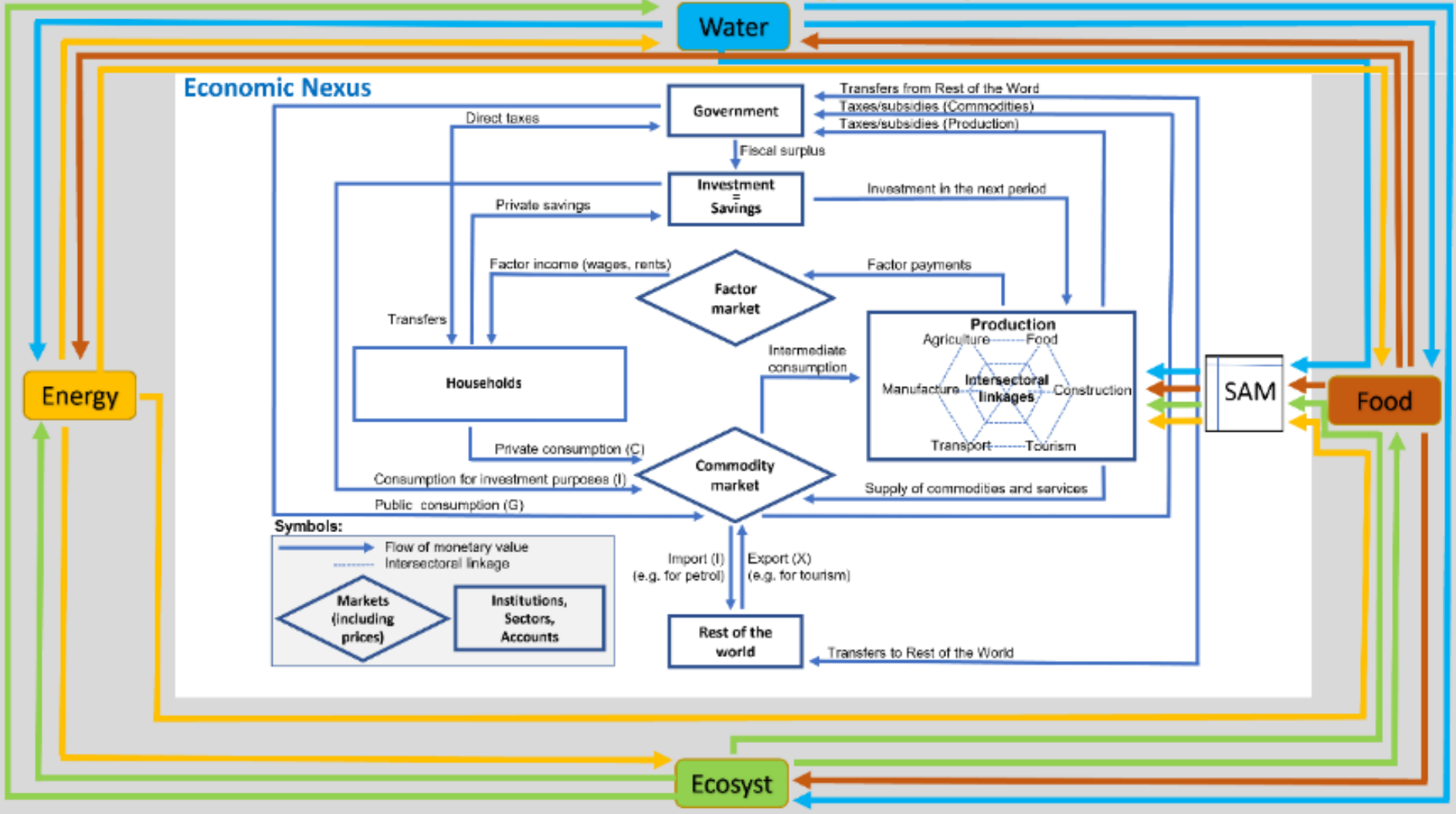
Economic Nexus



- Circular monetary flow of money
- Markets in equilibrium
- Values are transformed, they do not disappear
- Calibrated to macroeconomic data of a SAM (i.e., monetary values)

-2- Methodology: Economic model

WEFE-Ressours Nexus: **Water** **Energy** **Food** **Ecosystems**



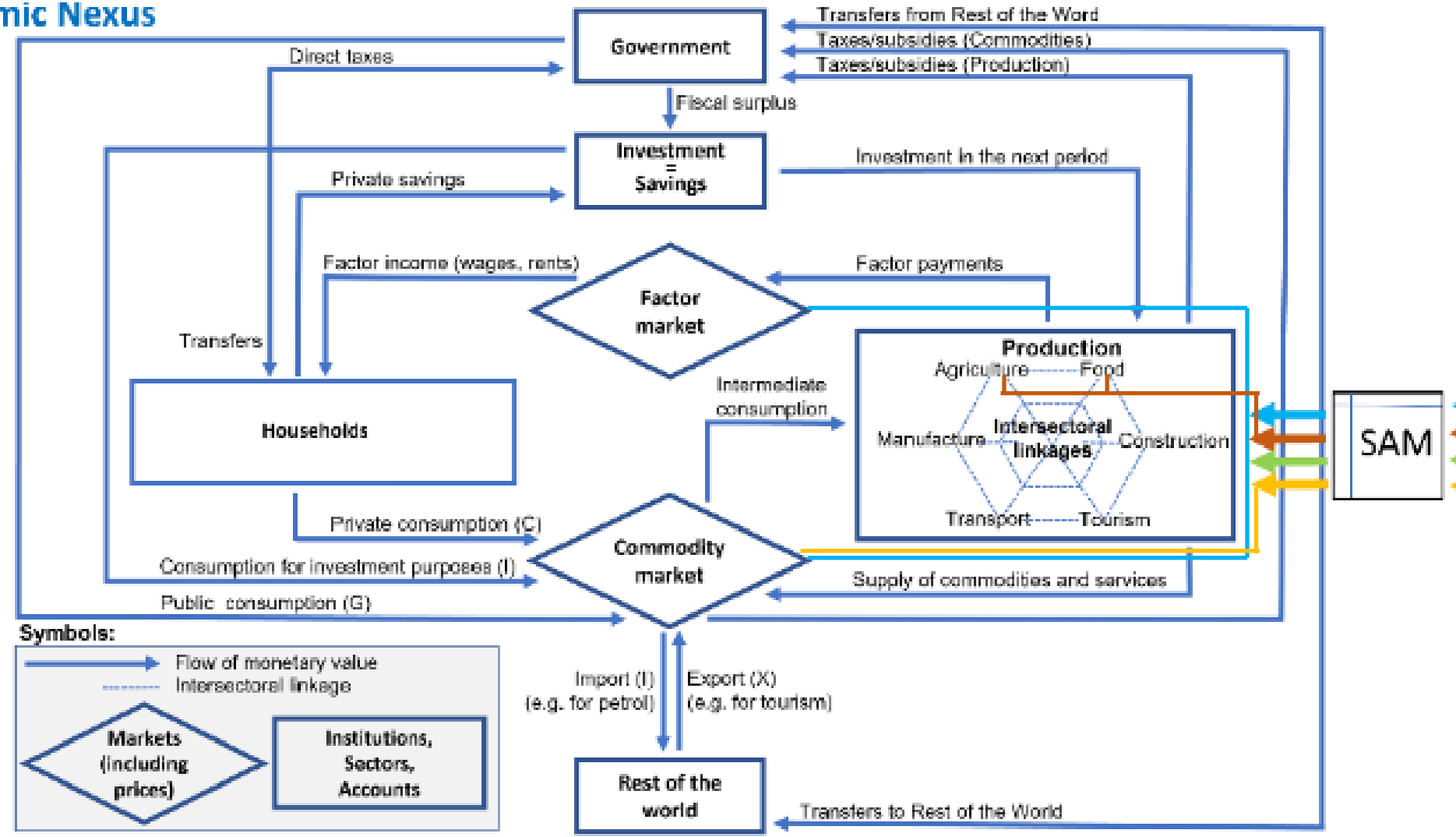
RE union Island

WEFE nexus

CGE model

-2- Methodology: Economic model

Economic Nexus



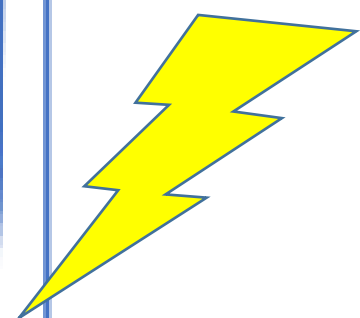
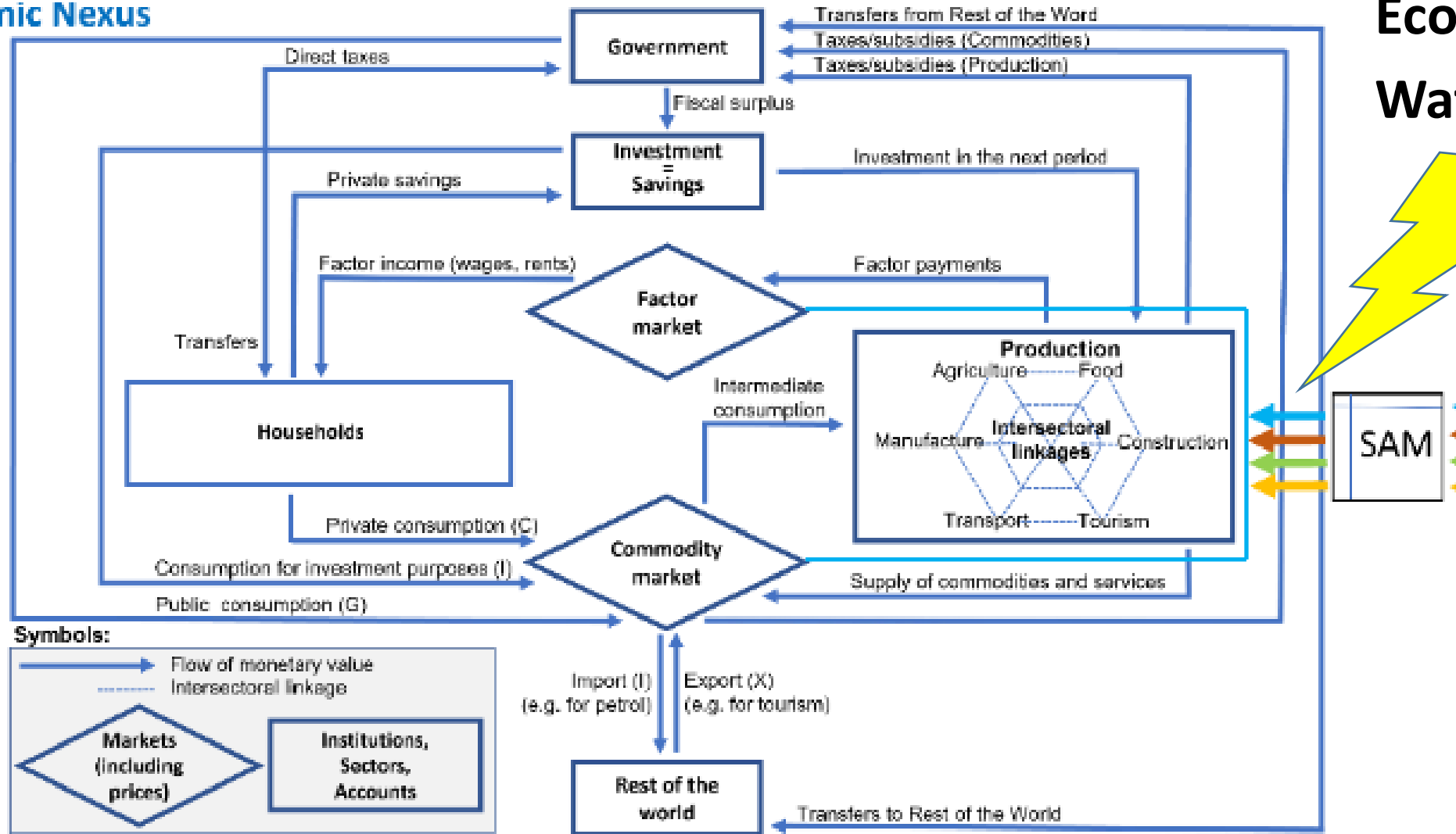
-2- Methodology: Economic model



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**Economic shock:
Water scarcity**

Economic Nexus



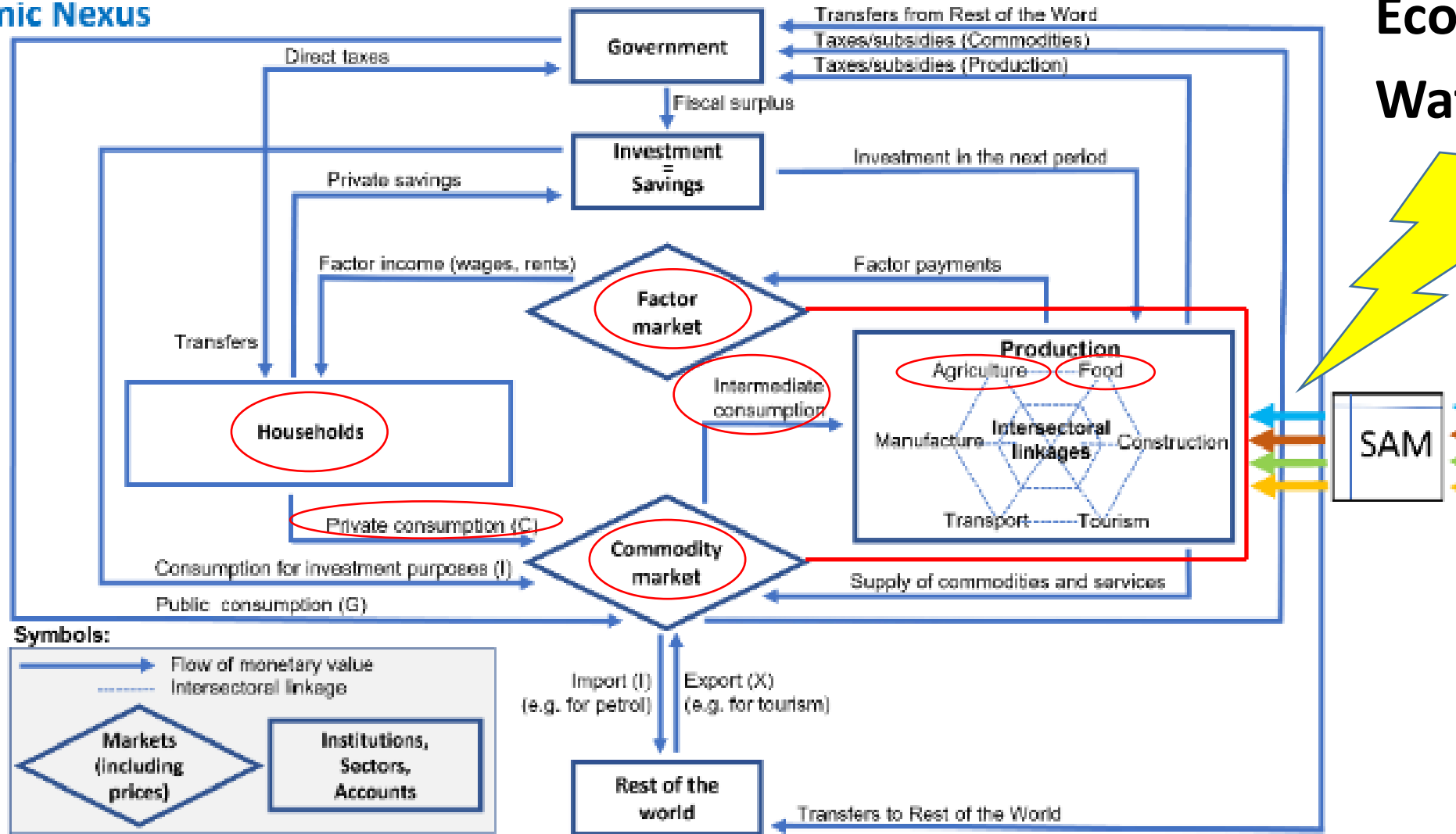
-2- Methodology: Economic model



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**Economic shock:
Water scarcity**

Economic Nexus



-3- Results CGE in InnWater Governance Platform: Overview



CGE Model

A computable general equilibrium (CGE) model is a macroeconomic simulation and analysis tool. The CGE model represents, in mathematical functions, the economic mechanisms of exchanging monetary values between economic activities, factors, agents and markets (including prices). It because of changes in settings compared to the situation if the economic settings stay unchanged. Thus, CGE models are not forecasting instruments; they only analyse how the economy changes if certain events occur. With this, CGE models help researchers analyse the impacts of events and u

Model Information

- Model name: REWEFE-CGE model (the Reunion Island WEFE news CGE model)
- Info about the REWEFE-CGE model: [Link to documentation](#)
- Link to the REWEFE-working paper: [Link to the REWEFE-working paper](#)
- Standard model: PEP single country static standard model (PEP 1-1)
- Info about the PEP-1-1 standard model: [Link to documentation](#)
- Citation: Decaluwé et al. (2013) PEP-1-1: the PEP standard single-country, static CGE model, Version 2.1. Partnership for Economic Policy (PEP). Model documentation.
- Date of model version: 2013-03-12

Select a scenario:

Oil Price Increase

Oil Price Increase

Scenario assumptions

In the scenario Oil Price Increase, the world oil price increases by 5 percent compared to the average annual price in the base. A global energy crisis creates the increase in world oil prices.

Macroeconomic closures

The macroeconomic closure, or "model closure," defines the macroeconomic conditions in which the CGE model operates and which model variables are set externally (exogenously fixed).

- World prices: fixed (small country assumption)
- Household's minimum consumption: fixed
- The current account balance: fixed
- Changes in stocks: fixed
- Governmental spending: fixed
- Tax rates: fixed
- Production factor supply (labour and capital): fixed
- Exchange rate: fixed with the value of 1 (= numeraire)
- Mobility of capital: capital is sector specific

Select one or more indicators:

Macroeconomic ... Activity and Com... Commodity and ... Government and ... WEFE News Micro Simulatio...

1. Macroeconomic indicators

Macroeconomic indicators show how a scenario affects the overall economy. Changes are shown as percentage differences from the base value.

- The Real Gross Domestic Product (GDP_{Real}) measures the total value of all goods and services produced in the economy, adjusted for inflation. A positive change indicates economic growth, while a negative change indicates contraction.
- The Value Added (VAD_{Value}) represents the net output of a sector or the economy, calculated as the value of production minus the cost of intermediate goods. It helps track changes in production efficiency and productivity.
- The Final Consumption (CDF_{Value}) shows the total consumption expenditure by households, indicating if they consume more or less.
- The Government Income (BNC_{Value}) represents the government's revenue, mainly from taxes, which influences its ability to spend on public services and investments.
- The Import and Export Values (IMPO_{Value} & EXPO_{Value}) show trade impacts with external partners.
- The Investment Budget (IDB_{Value}) shows the level of investment in capital goods such as infrastructure, machinery and equipment.

<https://innwater.eurecatprojects.com/cge/>

Technically realised by EURECAT

Model info section

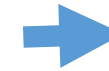
→ model specific information

Scenario section

→ allows the selection of scenarios

Results section

→ Allows the selection of results and displays the results as graphs and tables



CGE Model

A **computable general equilibrium (CGE)** model is a **macroeconomic simulation** and analysis tool. The CGE model represents, in mathematical functions, the economic mechanisms of exchanging monetary values between economic activities, **factors**, **agents** and **markets** (including prices). Thus, the CGE model can simulate a whole economic system at a macroeconomic scale. CGE models are used to analyse economic scenarios, such as economic shocks or policies (e.g., water scarcity or pricing policies). CGE model simulation results are usually expressed in relative changes compared to the **reference** scenario. Thus, the CGE model simulation can inform how the **economic** system changes because of changes in settings compared to the situation if the economic settings stay unchanged. Thus, CGE models are not forecasting instruments; they only analyse how the economy changes if certain events occur. With this, CGE models help researchers analyse the impacts of events and understand the direct and indirect economic mechanisms that can appear during such an event. CGE models are calibrated to the data of a **Social Accounting Matrix (SAM)**, which represents a snapshot of a country or region in a given year. CGE models can represent different temporal (static or dynamic) or regional resolutions (single-country or multi-country).

What is a CGE model: Definition of a CGE model

Model Information

- **Model name:** REWEFE-CGE model (the Reunion Island WEFEX nexus CGE model)
- **Info about the REWEFE-CGE model:** [Link to documentation](#)
- **Link to the REWEFE-working paper:** [Link to the REWEFE-working paper](#)
- **Standard model:** PEP single country static standard model (PEP 1-1)
- **Info about the PEP-1-1 standard model:** [Link to documentation](#)
- **Citation:** Decaluwé et al. (2013) PEP-1-1: the PEP standard single-country, static CGE model. Version 2.1. Partnership for Economic Policy (PEP). Model documentation.
- **Date of model version:** 2023-03-12

Specific information about the REWEFE model

-3- Results

CGE in InnWater Governance Platform: Model info section



Start a conversation ^

CGE

A comput
activities,
water sca
changes i
researche
snapshot

Mode

- Mode
- Info a
- Link t
- Stanc
- Info abo
- Citation: Decaluwé et al. (2013) PEP-1-1: the PEP standard single-country, static CGE model. Version 2.1. Partnership for Economic Policy (PEP). Model documentation.
- Date of model version: 2023-03-12

Selection of info on results data

Select any data you would like to get from:

- Macroeconomic Indicators Activity and Commodity Commodity and Factor Prices Government and Households WEFE Nexus Micro Simulation Model

Your message

Chat box: to insert concrete questions

Clear chat



Hello! I am the InnWater AI Assistant, an artificial intelligence system created to help you navigate the InnWater project's digital tools and governance resources. I provide insights and guidance based solely on public, validated InnWater project documents.

Please remember that I am an AI, not a human expert. My role is to assist your understanding and learning, but final decisions and action plans should be made by you and your group, based on your critical discussions and collective judgment.

Our chat is not saved, and your data is not used for training. If you're okay with that, feel free to start the conversation and I'll guide you from there!

You can verify the sources behind my answers.

Introduction AI Assistant: based on background information

-3- Results

CGE in InnWater Governance Platform: Scenario section



Select a scenario:

Oil Price Increase

Selection of scenarios

Start a conversation ▾

Oil Price Increase

Scenario assumptions

Description of selected scenario to analyse

In the scenario Oil Price Increase, the world oil price increases by 5 percent compared to the average annual price in the base. A global energy crisis creates the increase in world oil prices.

Macroeconomic closures

The macroeconomic closure, or "model closure," defines the macroeconomic conditions in which the CGE model operates and which model variables are set externally (exogenously fixed).

Model closure: the macro framework of exogenously (fixes) assumptions

- World prices: fixed (small country assumption)
- Households minimum consumption: fixed
- The current account balance: fixed
- Changes in stocks: fixed
- Governmental spending: fixed
- Tax rates: fixed
- Production factor supply (labour and capital): fixed
- Exchange rate: fixed with the value of 1 (= numeraire)
- Mobility of capital: capital is sector specific

-3- Results

CGE in InnWater Governance Platform: Scenario section



Select a scenario:

Oil Price Increase

Start a conversation ▾

Oil Price Increase

Water Price Increase

Sewage Disposal

Water Scarcity

In the scenario Oil Price Increase, the world oil price increases by 5 percent compared to the average annual price in the r

Selection of one scenario of interest out of 4 academic scenarios

Academic scenarios = scenarios with simplified assumptions (here, also with relevance for the study region)

Macroeconomic closures

The macroeconomic closure, or "model closure," defines the macroeconomic conditions in which the CGE model operates and which model variables are set externally (exogenously fixed).

- World prices: fixed (small country assumption)
- Households minimum consumption: fixed
- The current account balance: fixed
- Changes in stocks: fixed
- Governmental spending: fixed
- Tax rates: fixed
- Production factor supply (labour and capital): fixed
- Exchange rate: fixed with the value of 1 (= numeraire)
- Mobility of capital: capital is sector specific

-3- Results

CGE in InnWater Governance Platform: Scenario section



Select a scenario:

Water Scarcity

Start a conversation ▾

Oil Price Increase

Water Price Increase

Sewage Disposal

Water Scarcity

Default display is the academic scenario „Oil Price“ for illustration: select the scenario „Water scarcity“

Academic scenarios = scenarios with simplified assumptions (however, still of interest for Reunion Island)

The scenario water scarcity simulates a situation of water scarcity. The availability of ground- and surface water are reduced. The availability of raw water makes the access to raw water more expensive.

Macroeconomic closures

The macroeconomic closure, or "model closure," defines the macroeconomic conditions in which the CGE model operates and which model variables are set externally (exogenously fixed).

- World prices: fixed (small country assumption)
- Households minimum consumption: fixed
- The current account balance: fixed
- Changes in stocks: fixed
- Governmental spending: fixed
- Tax rates: fixed
- Production factor supply (labour and capital): fixed
- Exchange rate: fixed with the value of 1 (= numeraire)
- Mobility of capital: capital is sector specific

-3- Results

CGE in InnWater Governance Platform: Scenario section

Water Scarcity

Start a conversation ▾

Water Scarcity ⇄

Scenario assumptions **Select „Water scarcity“ scenario info of assumptions are display**

The scenario Water Scarcity simulates a situation of water scarcity. The availability of ground- and surface water are reduced by each 5%. Climate change reduces the precipitation on Reunion Island. The reduced availability of raw water makes the access to raw water more expensive.

Macroeconomic closures **Macro economic closures do not change**

The macroeconomic closure, or "model closure," defines the macroeconomic conditions in which the CGE model operates and which model variables are set externally (exogenously fixed).

- World prices: fixed (small country assumption)
- Households minimum consumption: fixed
- The current account balance: fixed
- Changes in stocks: fixed
- Governmental spending: fixed
- Tax rates: fixed
- Production factor supply (labour and capital): fixed
- Exchange rate: fixed with the value of 1 (= numeraire)
- Mobility of capital: capital is sector specific

-3- Results

CGE in InnWater Governance Platform: Results section

Macroeconomic ... × Activity and Com... × Commodity and ... × Government and... × WEFE Nexus ×
Micro Simulatio... ×

Start a conversation ▾

Select results indicators, default: all indicators are selected, view can be reduced

1. Macroeconomic indicators

Macroeconomic indicators show how a scenario affects the overall economy. Changes are shown as percentage differences from the base value.

- The **Real Gross Domestic Product (GDPRvalu)** measures the total value of all goods and services produced in the economy, adjusted for inflation. A positive change indicates economic growth, while a negative change indicates contraction.
- The **Value Added (VAADvalu)** represents the net output of a sector or the economy, calculated as the value of production minus the cost of intermediate goods. It helps track changes in production efficiency and productivity
- The **Final Consumption (CONFvalu)** shows the total consumption expenditure by households, indicating if they consumer more or less.
- The **Government Income (INCGvalu)** represents the government's revenue, mainly from taxes, which influences its ability to spend on public services and investments.
- The **Import and Export Values (IMPOvalu & EXPOvalu)** show trade impacts with external partners.
- The **Investment Budget (INVTvalu)** captures the level of investment in capital goods such as infrastructure, machinery, and equipment.
- In the REWEFE-CGE model the **Unemployment Rate (UNEMppts)** indicates the change in share of the labour force that is unemployed. A high positive change signals that the share of labour not employed and available to be hired has increased.
- The **Consumer Price Index (CPINinde)** represents overall price changes in the economy.

The macroeconomic indicators should be analysed together for a complete picture. More detailed indicators, like those on production and trade, help interpret broader ones like GDP."

0.2

0.15



Usage of the results indicators

1. Macroeconomic indicators
 - What is the impact on the whole economy (at aggregate level)?
2. Activity and Commodities
 - What is the impact on the sectoral production and the consumption of commodities?
3. Commodity and Factor prices
 - How do the markets change in terms of prices for commodities and for production factors?
4. Government and Household income
 - How are households and government impacted in terms of income?
5. WEFE Nexus Indicators
 - How are the four WEFE nexus pillars impacted?
6. Indicators to the Microsimulation Model (MSM)
 - “technical data” selected indicators link CGE and micro-simulation model for macro-micro simulation

-3- Results

CGE in InnWater Governance Platform: Results section

<https://innwater.eurecatprojects.com/cge/>

Overview of the results section

1. Macroeconomic indicators

Macroeconomic indicators show how a scenario affects the overall economy. Changes are shown as percentage differences from the base values.

- The Real Gross Domestic Product (GDPReal) measures the total value of all goods and services produced in the economy, adjusted for inflation. A positive change indicates economic growth, while a negative change indicates contraction.
- The Value Added (VAReal) represents the net output of a sector or the economy, calculated as the value of production minus the cost of intermediate goods. It helps track changes in production efficiency and productivity.
- The Real Consumption (CONReal) shows the total consumption expenditure by households, indicating if they consume more or less.
- The Government Income (GOReal) represents the government's revenues, mainly from taxes, which influences its ability to operate public services and investments.
- The Import and Export Values (IMPReal & EXPReal) show trade impacts with external partners.
- The Investment Budget (INVReal) captures the level of investment in capital goods such as infrastructure, machinery, and equipment.
- In the INNS H-CGE model the Unemployment Rate (UNEMPReal) indicates the change in share of the labor force that is unemployed. A high positive change signals that the share of labor not employed and available to be hired has increased.
- The Consumer Price Index (CPIReal) represents overall price changes in the economy.

The macroeconomic indicators should be analyzed together for a complete picture. More detailed indicators, like those on production and trade, help interpret broader ones like GDP.



Notes: GDPReal = value of real gross domestic product; VAReal = value of production (by sector); VAReal = value added; CONReal = value of real consumption; GOReal = value of government income; IMPReal = value of imports; EXPReal = value of exports; INVReal = value of total investments; UNEMPReal = unemployment rate (change measured by percent)

Indicator	Value
GDPReal	-1.5%
VAReal	-1.0%
CONReal	-0.8%
GOReal	0.0%
IMPReal	0.0%
EXPReal	0.0%
INVReal	0.0%
UNEMPReal	0.0%
CPIReal	0.0%

Notes: GDPReal = value of real gross domestic product; VAReal = value of production (by sector); VAReal = value added; CONReal = value of real consumption; GOReal = value of government income; IMPReal = value of imports; EXPReal = value of exports; INVReal = value of total investments; UNEMPReal = unemployment rate (change measured by percent)

Indicator: description









Results bar chart

Results table

Display options

Download plot/table

Fullscreen

Zoom

-3- Results

CGE in InnWater Governance Platform: Results section



Macroeconomic indicators

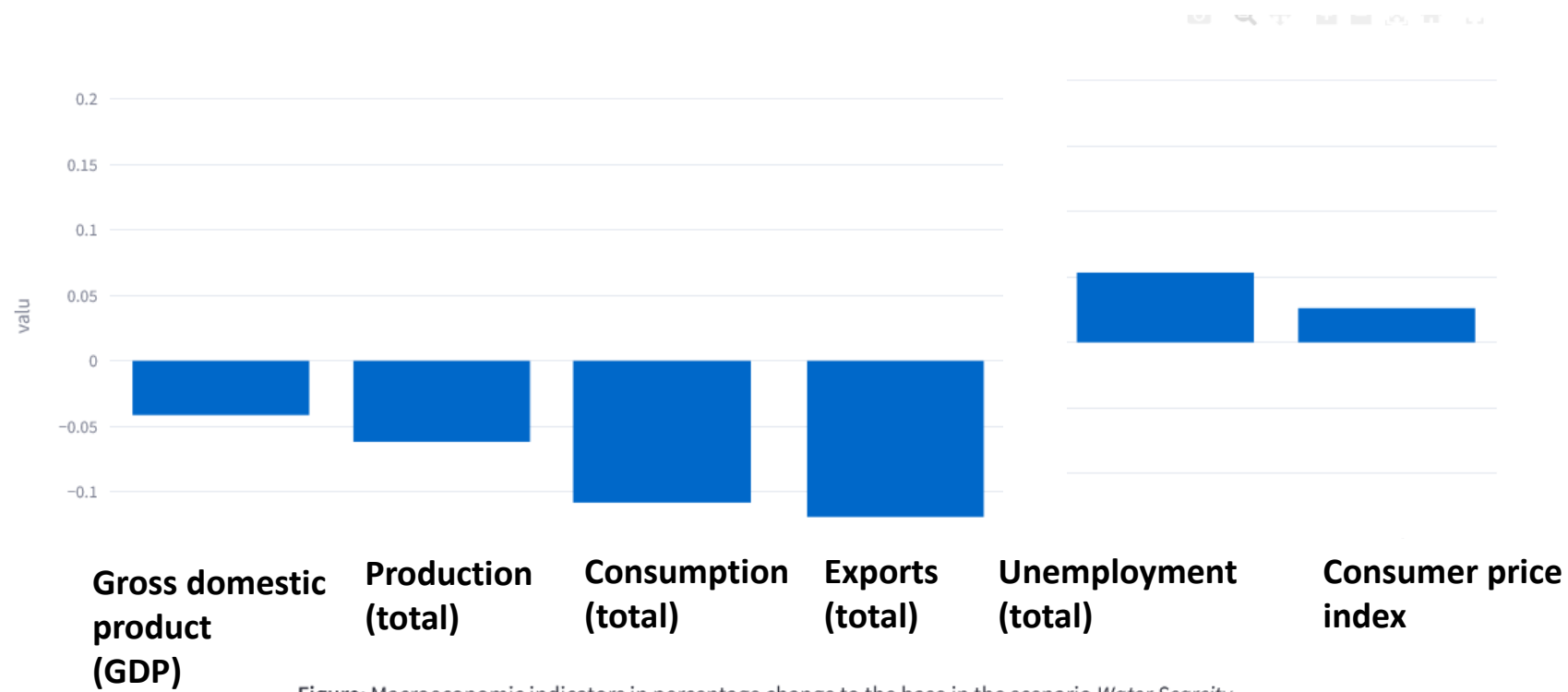


Figure: Macroeconomic indicators in percentage change to the base in the scenario *Water Scarcity*

GDP: aggregated indicator showing positive and negative impacts on the whole economy
Production: how is the production impacted?
Consumption: how is the consumption by the households impacted?
Exports: how is trade impacted, also imports but here negligible change)?
Unemployment: how is the labour market impacted?
Consumer price index (CPI): How are the consumer prices impacted?

-3- Results

CGE in InnWater Governance Platform: Results section



Production of sectors

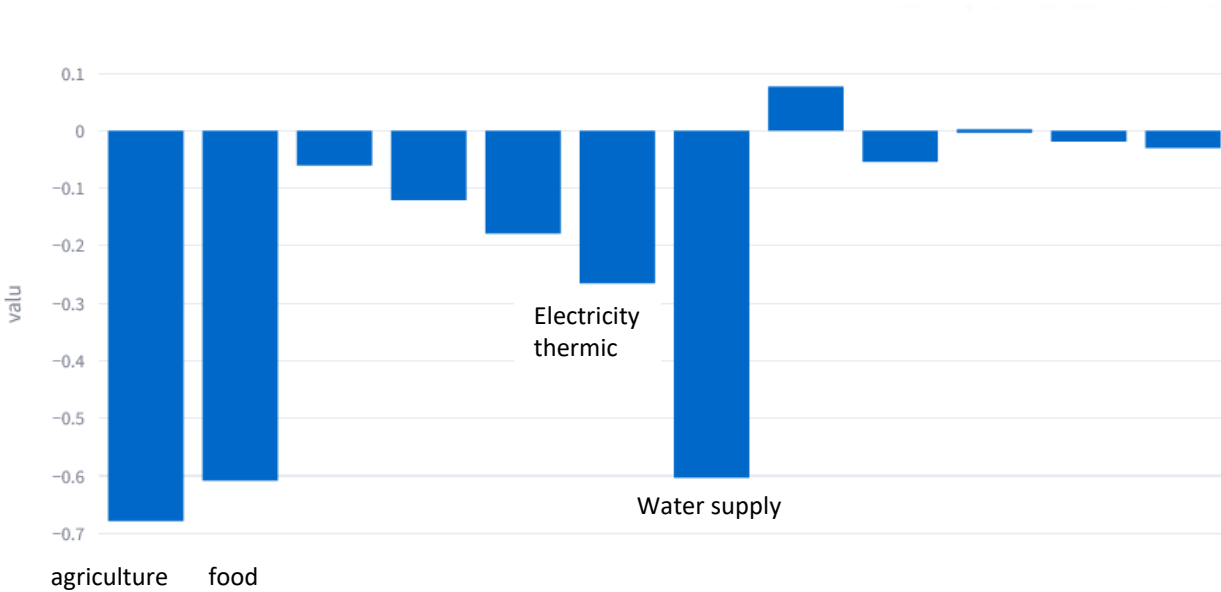


Figure: Production volume in percentage change to the base in the scenario *Water Scarcity*

Consumption of commodities

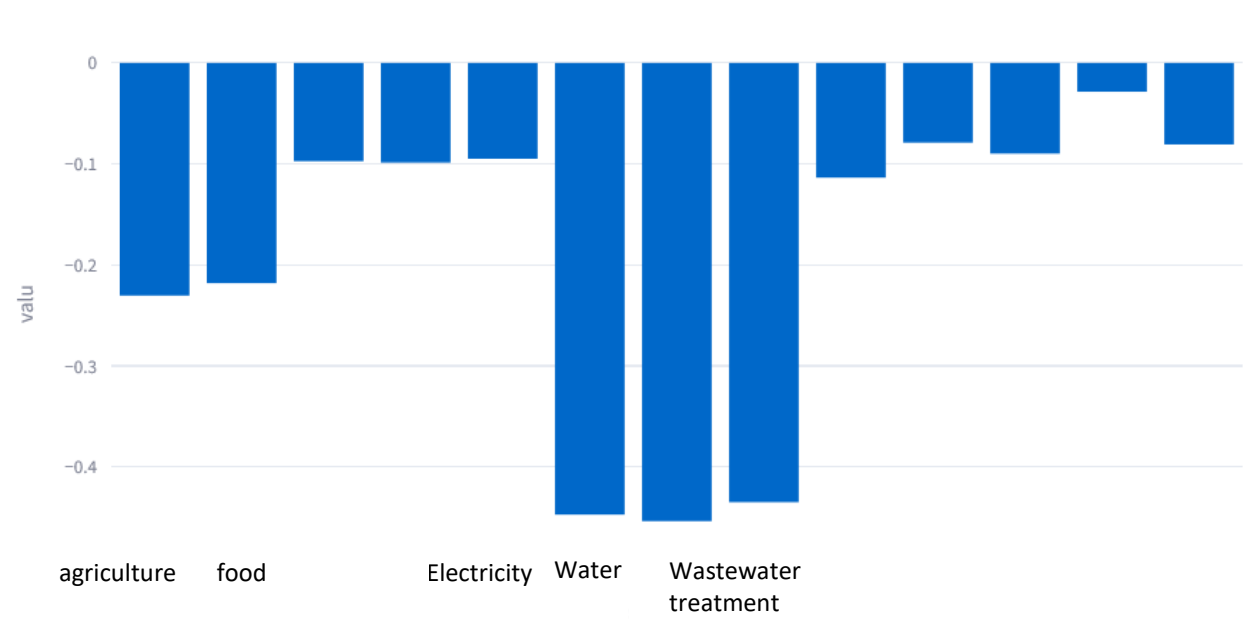


Figure: Final Consumption volume in percentage change to the base in the scenario *Water Scarcity*

Commodity price

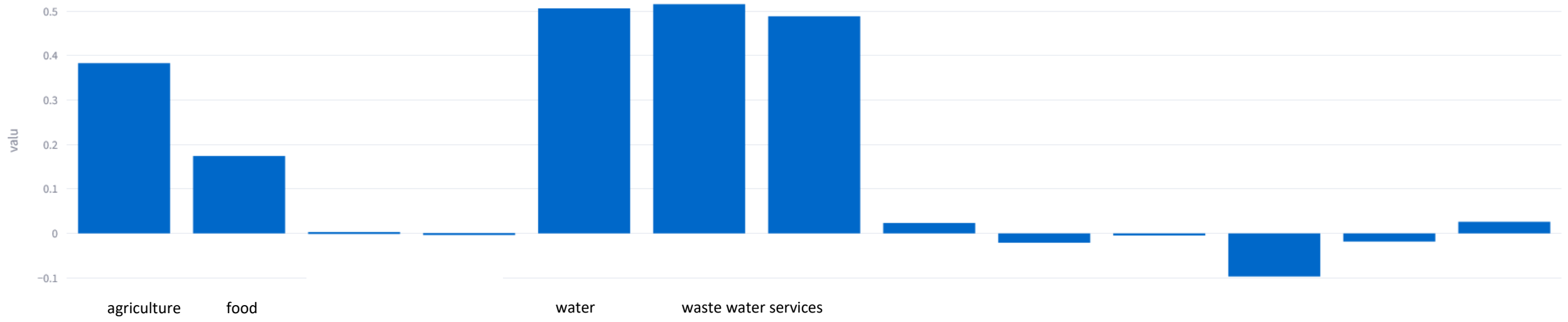


Figure: Commodity prices in percentage change to the base in the scenario *Water Scarcity*

-3- Results

CGE in InnWater Governance Platform: Results section



Factor price for ground and surface water

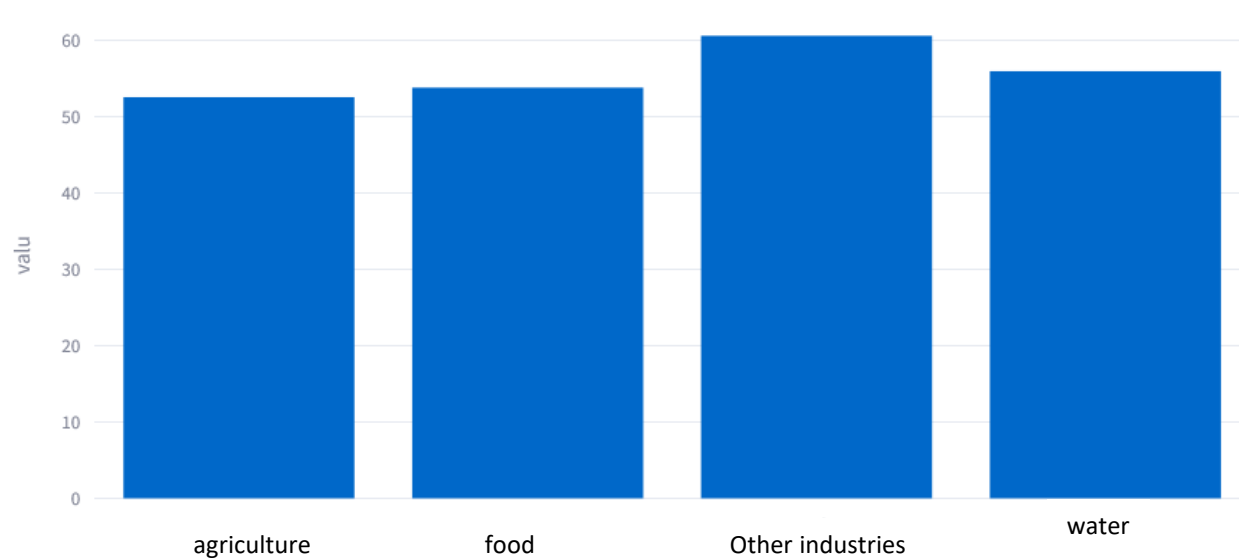


Figure: Ground Water Rental Rate in percentage change to the base in the scenario *Water Scarcity*

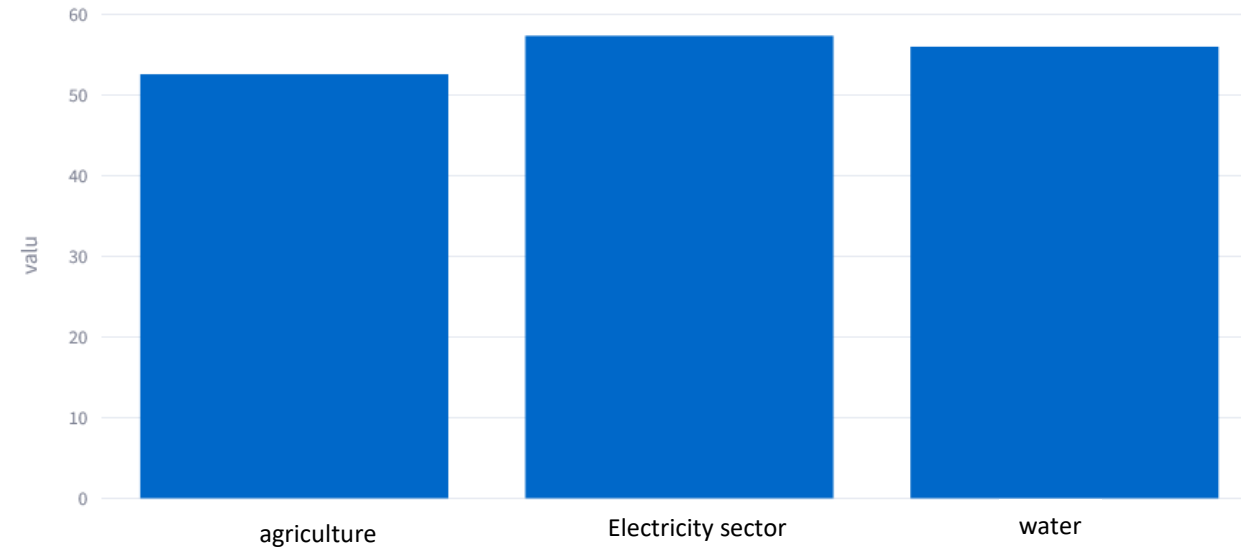


Figure: Surface Water Rental Rate in percentage change to the base in the scenario *Water Scarcity*

-3- Results

CGE in InnWater Governance Platform: Results section



Water

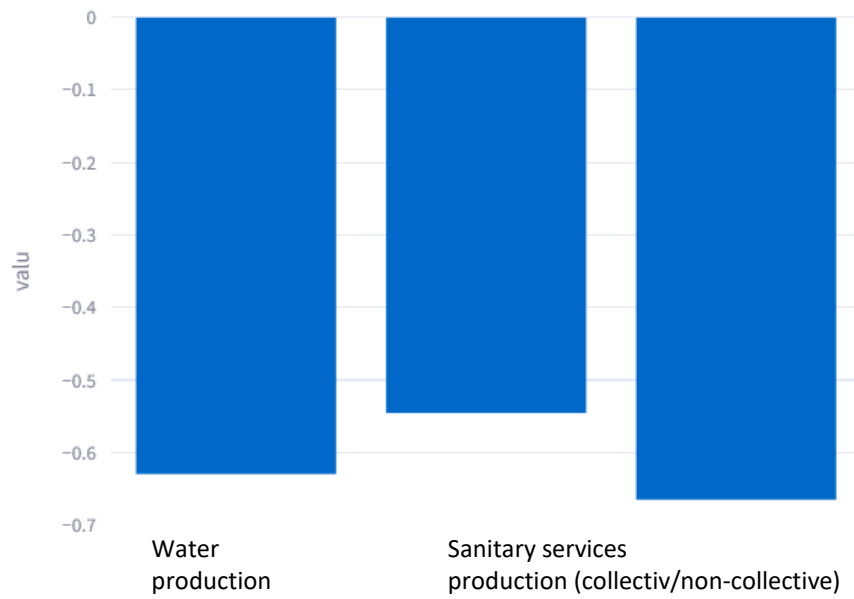


Figure: W(ater) - pillar -- Production of the water and sanitary service activities in percentage change to the base in the scenario *Water Scarcity*

Energy

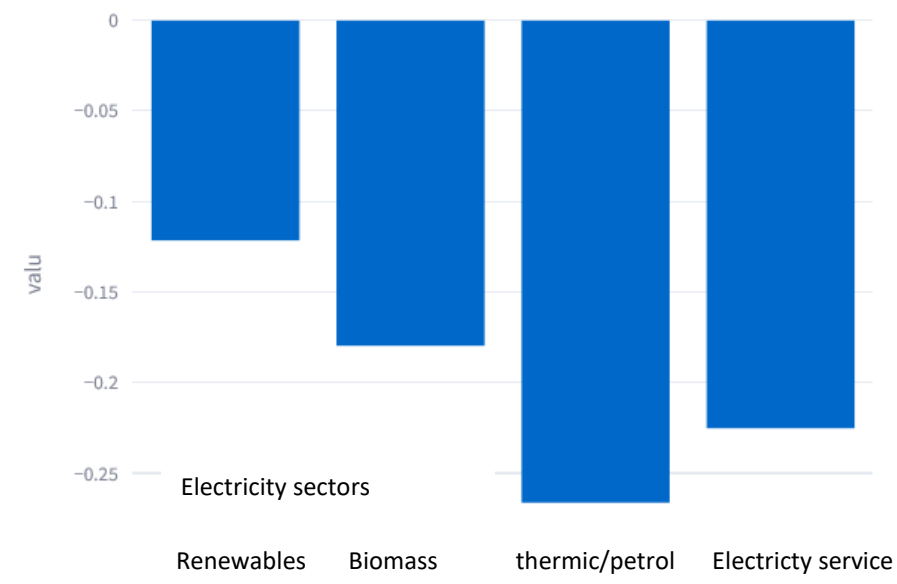


Figure: E(nergy) - pillar -- Production of the electricity producing activities in percentage change to the base in the scenario *Water Scarcity*

-3- Results

CGE in InnWater Governance Platform: Results section



Food

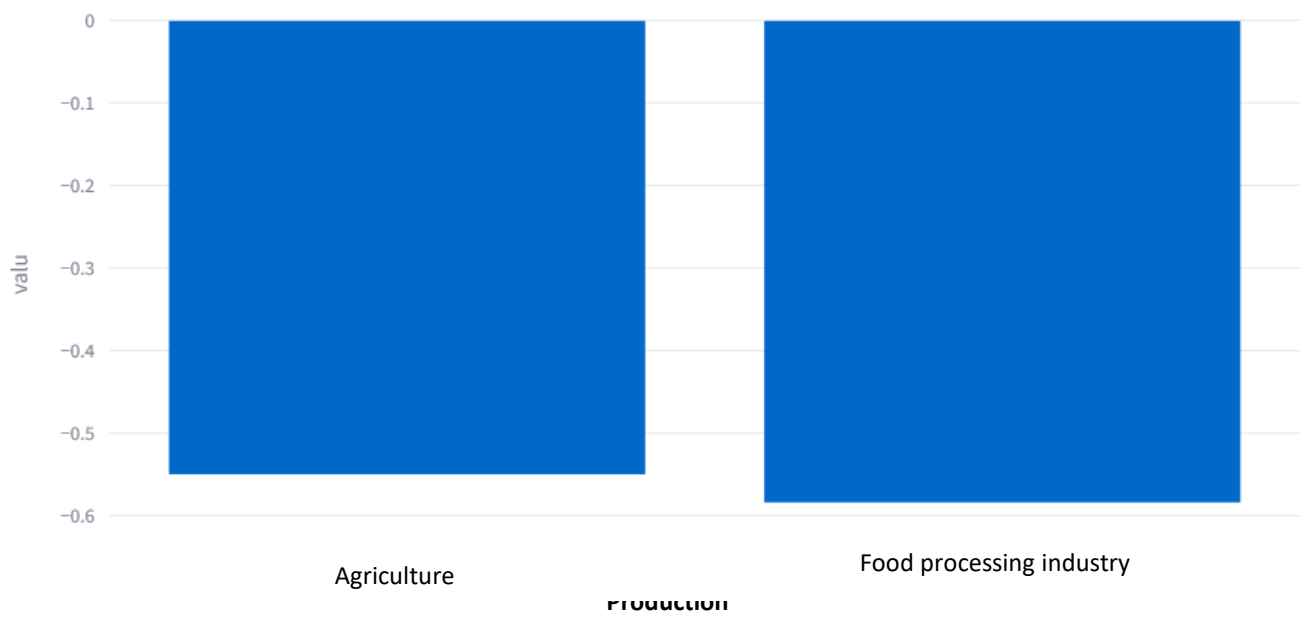


Figure: F(ood) - pillar -- Production of the agriculture and food producing activities in percentage change to the base in the scenario *Water Scarcity*

Ecosystems

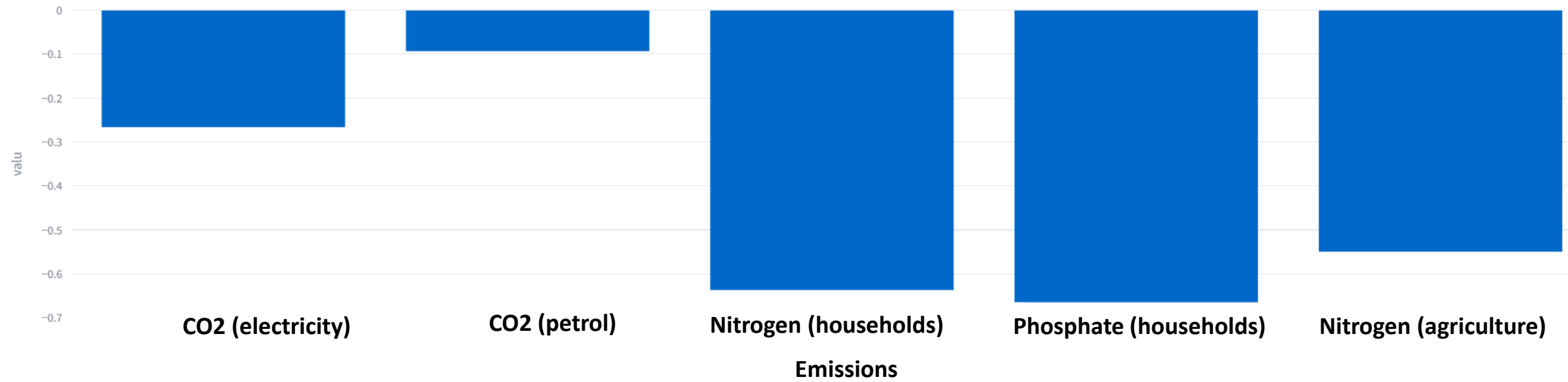


Figure: E(cosystems) - pillar -- Emissions of CO2 and water pollutants in percentage change to the base in the scenario *Water Scarcity*

-3- Results

CGE in InnWater Governance Platform: Results section



Indicators provided to the Microsimulation model for macro-micro-simulation

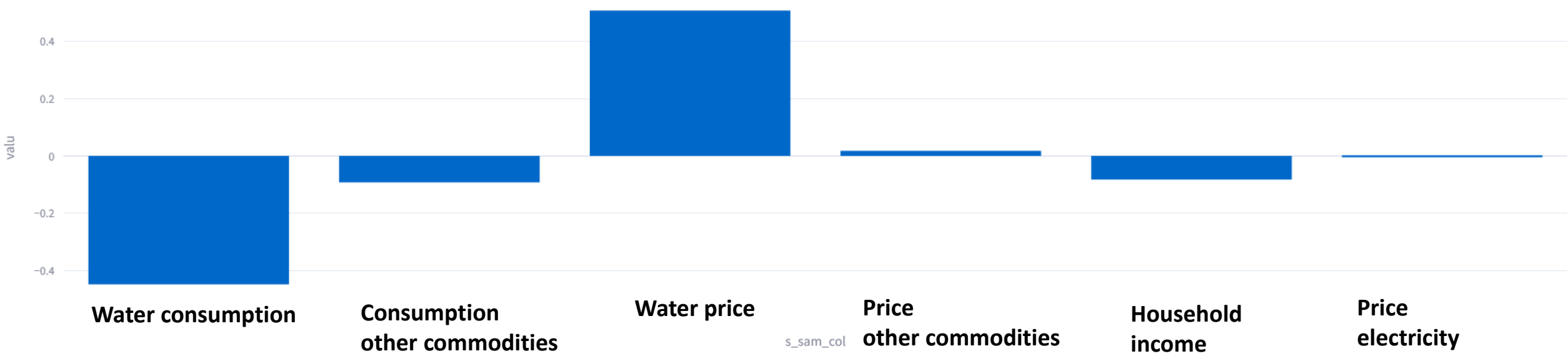


Figure: Indicators to the Microsimulation Model (MSM) in *Water Scarcity*

-4- Conclusions Summary & Take-Home-Messages: Fact sheet

CGE Model

A Computable General Equilibrium (CGE) model is a quantitative economic model that represents the entire economy in terms of economic agents, sectors, production factors, and markets. It simulates the interactions among producers, consumers, governments, and trade, under the assumption that supply and demand are balanced. A WEEFE nexus CGE model considers the four WEEFE nexus pillars: W(ater), E(nergy), F(ood) and E(cosystems)

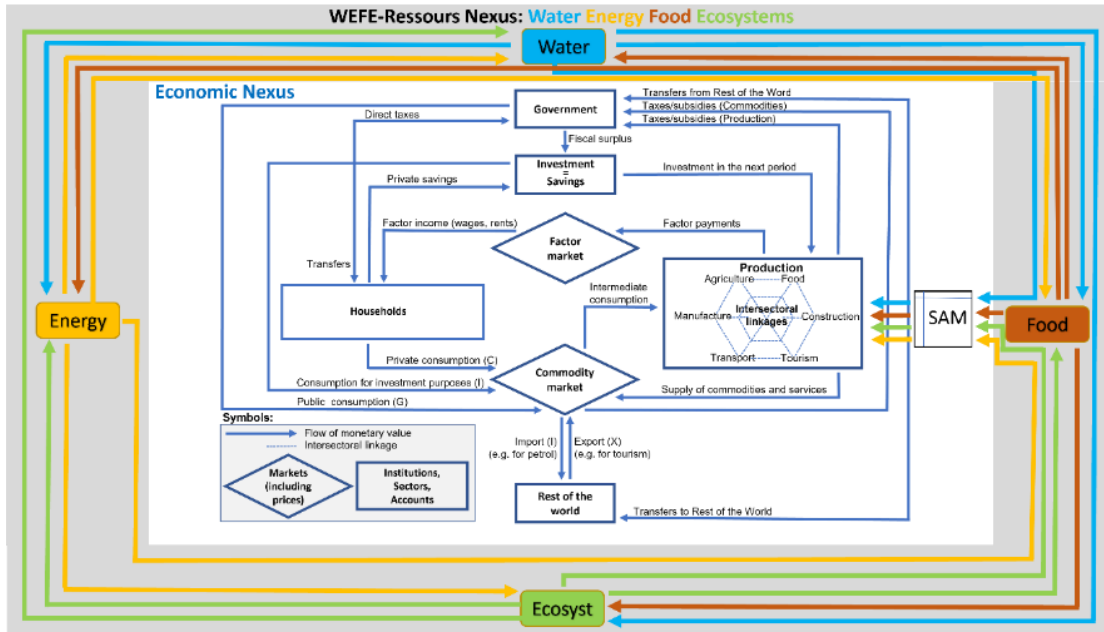


Figure 1: Schematic overview of a WEEFE nexus CGE model. Source: Adapted from Henseler et al. (2022)

Key Features of a CGE Model

- Microeconomic foundation: households maximise utility, producers maximise profits.
- Calibrated to macroeconomic data through a Social Accounting Matrix (SAM).
- Represents the economy in a base year

Definition: Social Accounting Matrix (SAM)

A SAM represents the structure of the economy in a base year using monetary values for activities, commodities, factors, and agents. Columns represent payments, while rows represent receipts. It is the calibration basis of CGE models.

Spatial resolution

CGE models can represent national, regional, or multi-country economies. The SAM determines the spatial scale.

Temporal resolution

- Static simulations: show changes between two states without considering time path.
- Dynamic simulations: explicitly model changes over time.

Limits of CGE Models

- Aggregate representation of sectors and households.
- Most behavioural parameters are calibrated, not empirically observed.
- Simplified economic behaviour, may not fully reflect reality.

Forecasting vs CGE Models

Forecasting tools predict future trends (e.g., 'in 2050 output will grow by 4%'). CGE models (as Policy simulation tool), instead, evaluate potential impacts of changes in the economy (e.g., 'if subsidies decrease, output decreases by 4%').

Interpreting CGE Model Results

Results should be interpreted in relation to all variables, focusing on direction and magnitude of changes rather than exact numbers.

Challenges in Building WEEFE Nexus CGE Models

Integrating water, energy, food, and ecosystems requires detailed data. Main challenge: ensuring economic data availability for SAM construction.

Literature

- Recommended readings introductions, text books CGE models
- WEEFE CGE models
- Documentation of the REWEEFE model



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