



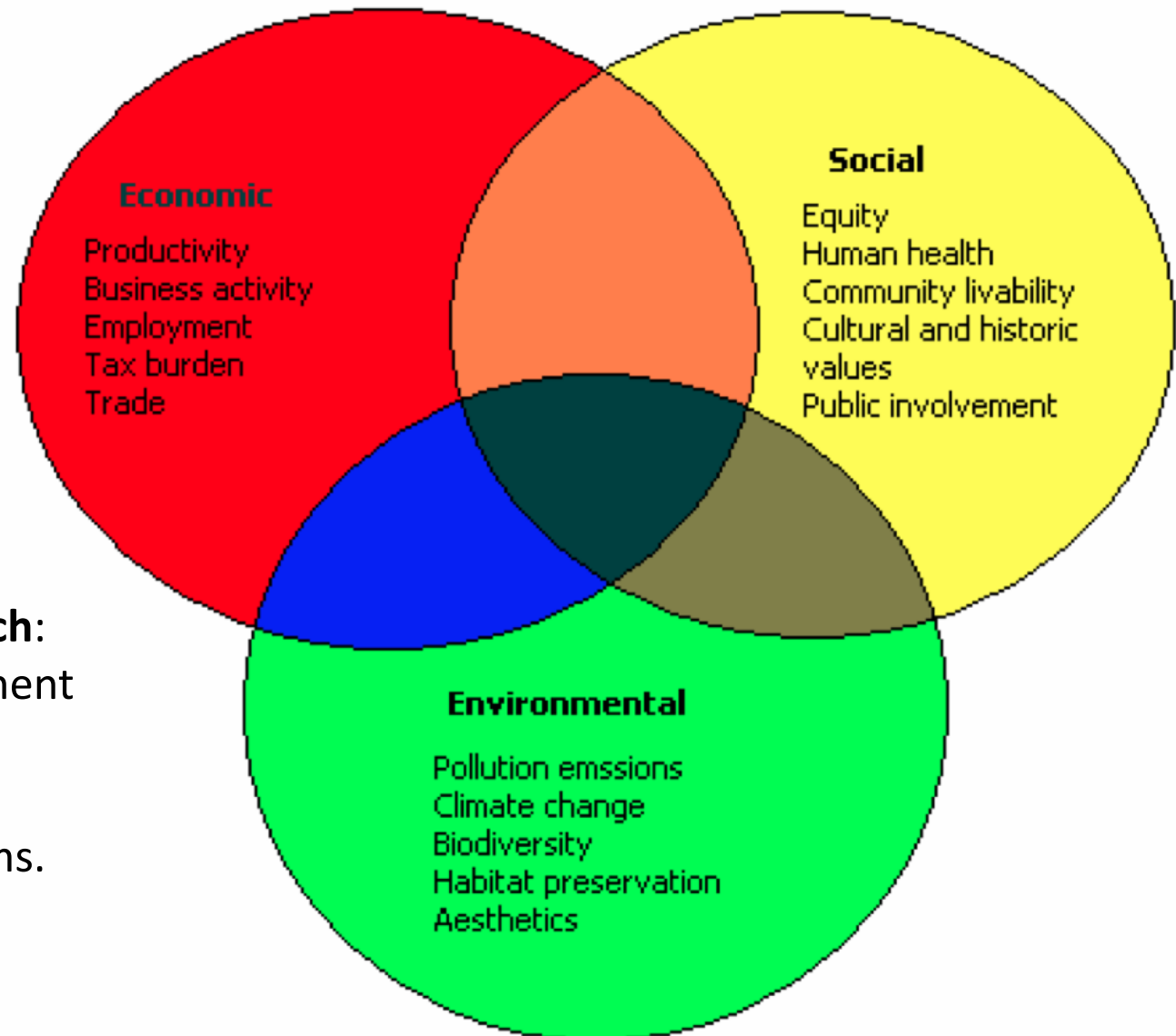
Spatial-economic-ecological model for the assessment of sustainability policies of Russian Federation (SUST-RUS)

Natalia Tourdyeva (CEFIR)



Overview of the project

- Project's goal
 - Comprehensive assessment of policies related to sustainable development agenda (as it is understood by Russian and international policy makers)



‘Three pillar’ approach:
sustainable development
refers to progress in
economic, social and
environmental systems.



Overview of the project

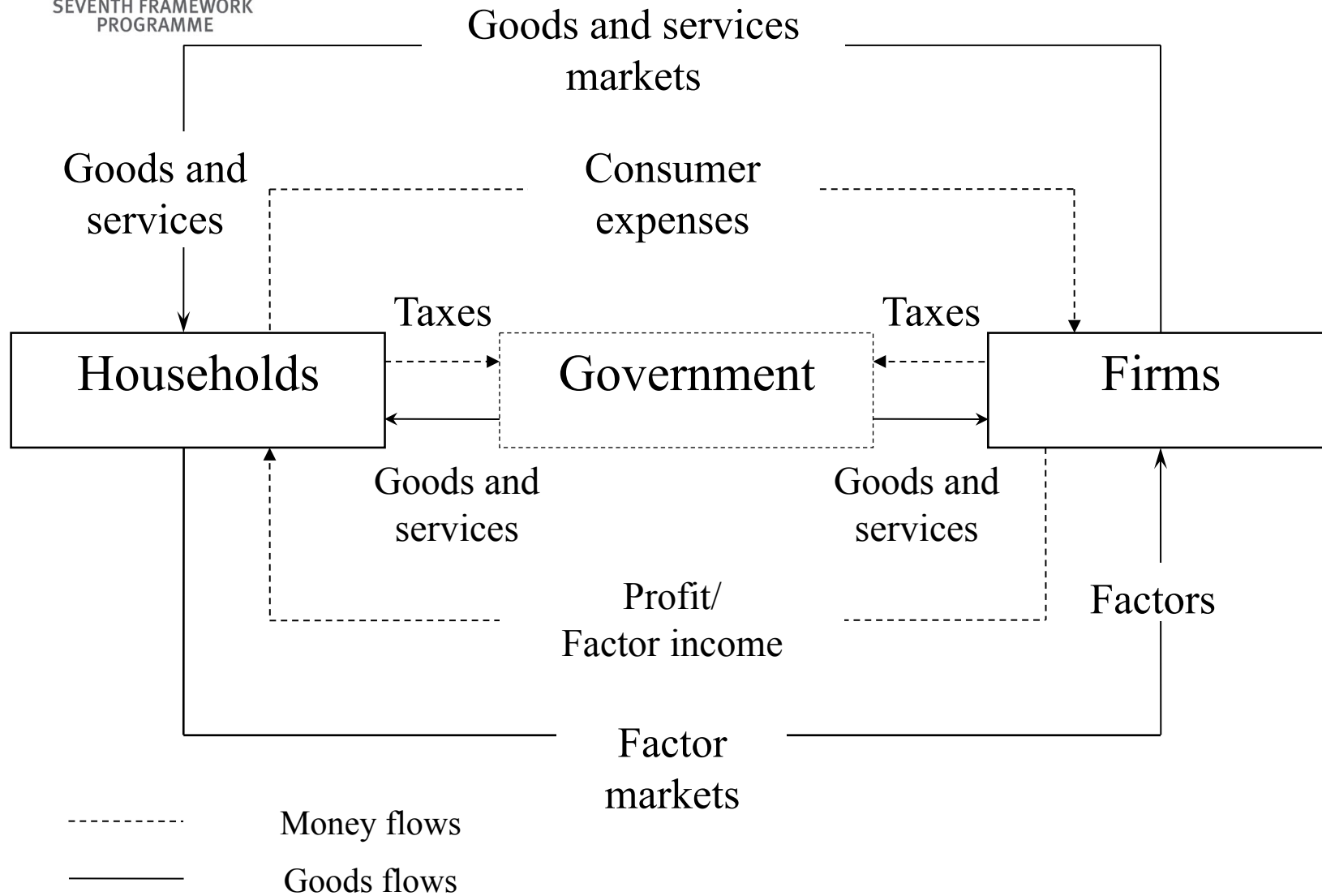
SUST-RUS aims at:

- developing a modelling approach, which represents the state-of-the-art in impact assessment modelling and corresponds the complexity of the sustainability issue
- building consistent database necessary for the implementation of the developed approach for Russia
- constructing the spatial-economic-ecological model for Russia
- developing a set of sustainability indicators associated with the model, which allows for quantification of social, economic and environmental effects of sustainability policies
- using the model to assess the effects of a set of important sustainability policy measures in order to demonstrate the operation ability and reliability of the developed modelling approach



Overview of the project

- Assessment
- Different policies (3 dimensions) – unified framework
 - Core model: CGE
 - A country model – Russia
 - Regions – 7 federal districts
 - Producers
 - Consumers
 - Regional Government
 - trade links between regions in the model (federal districts)
 - regional trade links with the rest of the world
 - federal government
 - saving-investment block
 - macro closure(s)
 - time





Estimation of the Russian SIOT for 2003

Create **mapping** between IO2003, IO95; find minimum one-to-one mapping between IO95 and NACE

Disaggregate 2003 symmetric input-output matrix with 22 OKONH industries to 24 OKONH industries, using the use matrix in consumer prices and the make matrix for 2003 with commodity technology assumption.

Run a **cross-entropy minimization procedure**; disaggregate the source IO2003, with **1995 priors** on coefficients.

Aggregate to **NACE with 32 industries**; obtain a NACE-based Russian IO for 2003 with 32 “single-product” industries.

Estimation of the Russian SIOT for 2006

Estimate 2006 **use matrix in producer** prices. Assumption: structure of mark-ups is the same as in 2003.

Estimate 2006 symmetric input-output matrix in basic prices with commodity technology assumption.

Run a **cross-entropy minimization procedure**; disaggregate the estimated symmetric input-output matrix for 2006, with **2003 priors** on coefficients.



Interpretation of the modeling result

- Comprehensive
 - A language of policy makers: Sustainability indicators
 - Balance between the interpretation and measurement of the complex phenomena of sustainable development while keeping indicators as simple as possible and their number in low levels.

Indicators

Scientific	Functional	Pragmatic
<p>Measurable and quantifiable: they should adequately reflect the phenomenon intended to be measured</p>	<p>Relevant: for all stakeholders involved</p>	<p>Understandable: should be easily understood by stakeholders</p>
<p>Meaningful: appropriate to the needs of the user</p>	<p>Leading: so that they can provide information to act on</p>	<p>Feasible: measurable at reasonable effort and cost</p>
<p>Clear in value: distinct indication which direction is good and which is bad</p>	<p>Possible to influence: Indicators must measure parameters that may be modified</p>	<p>Coverage of the different aspects of sustainability: indicators address economic, environmental and social dimensions</p>
<p>Clear in content: measure in understandable units that make sense</p>	<p>Comprehensive: the indicator set should sufficiently describe all essential aspects under study</p>	

Indicators in SCGE models



- Quite 'narrow' set of indicators
- No coverage of 'descriptive' indicators, need for link with variables of model
- Almost full coverage of **long term macro-economic indicators**: GDP, Consumption, Income, Savings, Investment, Price changes,...
- **Social and environmental indicators** need **link with other databases** (not within SAM data)
- Social indicators: introduce multiple households, unemployment, skill levels, income distribution, employment in informal sector, etc..
- Environmental indicators: introduce database of emissions, energy inputs, land use, waste, abatement costs, etc.
- Consistency of SAM and additional data → hard task!



Economic indicators



Build in all 'standard' economic indicators

- GDP: 'benchmark' indicator and important as a composite to other indicators
- Price index: change in 'real price' level, for example due to taxation
- Investments
- Household consumption

Government:

- Public budget
- Tax revenues

Foreign sector

- Trade openness
- FDI

Economic indicators

Theme	Indicator	Level	Unit
Economic production	GDP	National Regional Industry/Services/ Government	Monetary
Trade balance	Current account deficit/surplus	National	Monetary
Trade openness	(Export + Import) / GDP	National Regional	Unitless
Public budget	Public deficit/surplus by GDP	National	Percentage
Investments	Investment share in GDP (FDI)	National Regional	Monetary
Price level	Change in relative price compared to baseline	National average Regional average Goods (by type)	Percentage
Consumption	Household consumption	National Regional	Monetary Percentage
Government income	Tax revenues	National Regional	Monetary

- Coal/oil and gas in SAM
 - Input of energy (fuels) to GDP
- Database on emissions: GHG and non-GHG gasses
 - Emissions (damages) / GDP
- Database on waste:
 - Waste (damage) / GDP
- Introduce land use via production function: integrate land types and land productivity
 - Productive land / industrial production
 - Land type conversion
- Imports and exports
 - Share of resources in total exports/imports (primary goods)

Environmental indicators



Theme	Indicator	Level	Unit
Climate change	Greenhouse emissions gas	National Regional Industry	Monetary (damages) Tonnes
Energy	Energy intensity by GDP	National Regional	Monetary Tonnes
Air pollution	Air pollution (damages) of well know substances	National Regional Industry	Monetary Tonnes
Waste	Generated waste by industries	National Regional Industry	Monetary(damages) Tonnes

Social indicators

- Income distribution: household type
 - Poverty (Incidence, Intensity, Inequality)
 - Income inequality (Atkinson index or Gini coefficient)
- Expenditures by household type
 - Welfare by household type (Equivalent variation)
- Skill types and relative endowment by household
 - Unemployment and wage by skill type / household
- Informal sector
 - Share of labour in informal sector
- Household savings
- Change in labour supply
- Link environment and social system: effect on health and labour supply of emissions and pollution (GEM-E-3)
 - Medical expenditures due to environmental damage
 - Labour supply losses due to environmental damage

Social indicators

Theme	Indicator	Level	Unit
Poverty	Mean income of 'poor' household compared to poverty line	National Regional	Value between 0 and 1
Inequality in income distribution	Atkinson index	National Regional	Value between 0 and 1
Tax system	Kakwani index	National Regional	Unitless
Income	Household disposable income	National Regional	Monetary value
Unemployment	Unemployment rate	National Regional Household type	Percentage
Welfare	Utility based index : equivalent variation	National Regional	Unitless
Concentration of production	Herfindahl index for concentration	Regional	Unitless

Policies?

- Investment in regional infrastructure and development
- Reducing restrictions on migration (international and interregional)
- Increasing restrictions on foreign direct investments
- Abatement of polluted lands
- Improving technology of now polluting industries
- Putting emission restrictions and standards on polluting industries
- Decreasing energy intensity of economy
- Preserving valuable nature areas



Indicator systems



- **EU Sustainable Development Strategy (SDS):**
Ten themes, reflecting the seven key challenges, prosperity and governance. Hierarchically divided in 'lead indicators' (1), 'priority indicators' (2), 'explanatory indicators' (3)
- **Pressure-state-response model:** OECD framework to map **human** pressure on development, state of the environment and response of policy makers.
- **Barometer of sustainability:** Indicator framework to map human development and state of environment on 2-D set. Indicators are scored according to performance in linear set (0-100). Total score is aggregated to A) human B) environmental development



Thank you.