PARP
Grupa PFR

Regional Economic Modelling for ex-ante Impact Assessments

Andrea Conte, PhD

Cracow, December 10th, 2019

Republic
of Poland

The project is co-financed from the European Regional Development Fund and the Cohesion Fund.

Supporting policy with scientific evidence

AI Watch

Monitor the development, uptake and impact of Artificial Intelligence for Europe

Knowledge Centre for Bioeconomy

We enhance the knowledge base for policymaking on the bioeconomy through better knowledge management.

Competence Centre on Composite Indicators and Scoreboards

Our expertise on statistical methodologies and in developing sound composite indicators provides policy-makers with the 'big picture' for informed policy decisions and progress monitoring.

Disaster Risk Management Knowledge Centre

We provide a networked approach to the science-policy interface in Disaster Risk Management (DRM), across the EU Commission, Member States and the DRM community worldwide.

Knowledge Centre for Food Fraud and Quality

We produce and make sense of scientific information to protect the authenticity and quality of food supplied in the EU.

Competence Centre on Foresight – Megatrends Hub

Megatrends are long-term driving forces that are observable now and will most likely have significant influence on the future. This Hub is a dynamic collaborative repository of information and resources on the main megatrends shaping our world.

Knowledge Centre for Global Food and Nutrition Security

We support the EU global commitment to end hunger, achieve food security and improve nutrition through a dedicated, reinforced science-policy interface and a fostered inter-policy dialogue.

Competence Centre on Microeconomic Evaluation

We advise EU policy making through ex-post causal evaluation and data-driven microeconomic analysis.

Knowledge Centre on Migration and Demography

We provide independent scientific evidence for EU policymaking in migration and demography related fields.

Competence Centre on Modelling

We promote a responsible, coherent and transparent use of modelling to support the evidence base for EU policies.

Competence Centre on Technology Transfer

The CC TT provides technology transfer policy related expertise and services to the European Commission and other institutions of the Union and operational support services to a broader range of stakeholders.

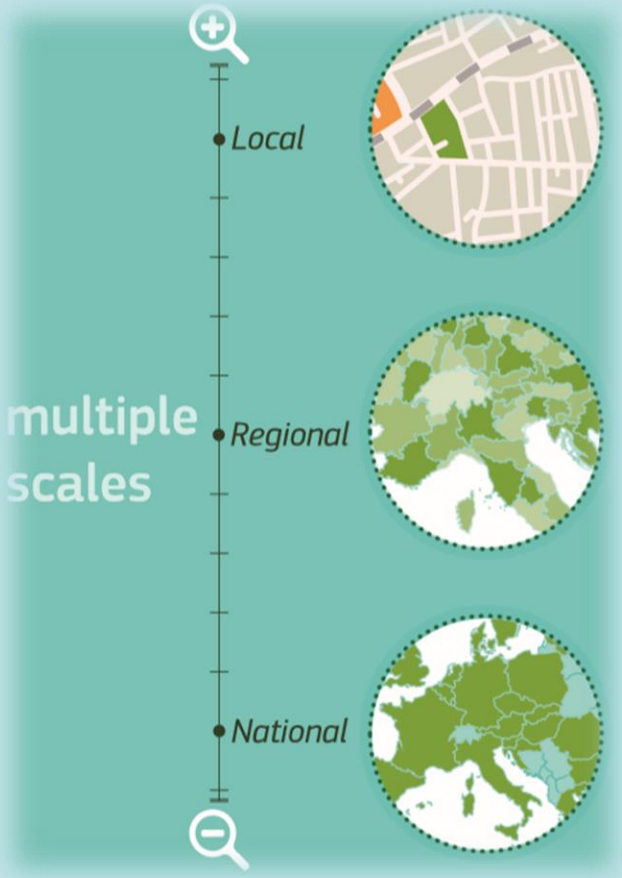
Knowledge Centre for Territorial Policies

We support EU policymaking through better knowledge management on territorial (urban and regional) related issues.

Competence Centre on Text Mining and Analysis

We use text mining and analysis tools to extract information from online data, including traditional or social media, or from large public or proprietary document sets.

Territorial Dashboard



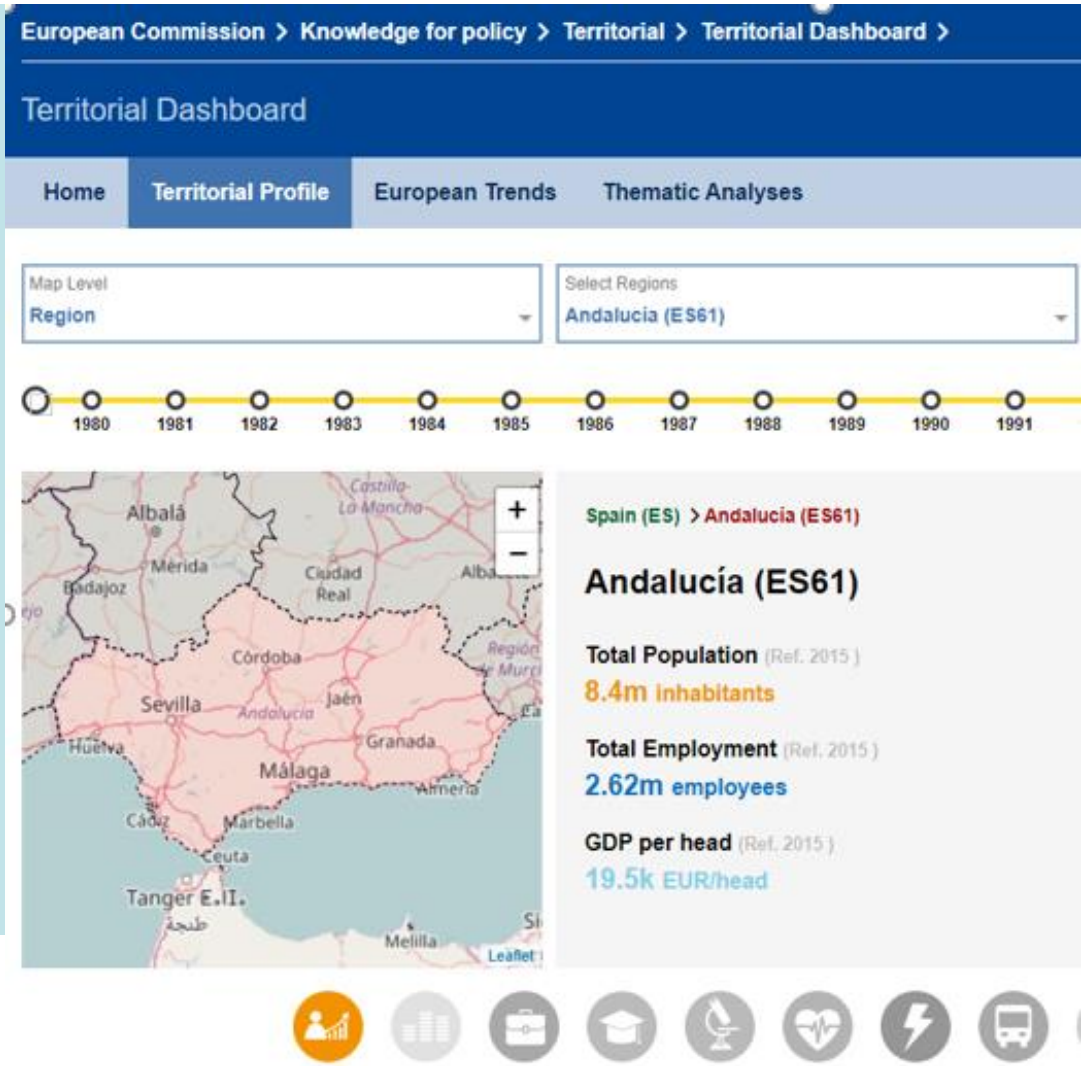
T-Board

Country (NUTS0)
Regions (NUTS2)
Sub-Regions (NUTS3)

UDP

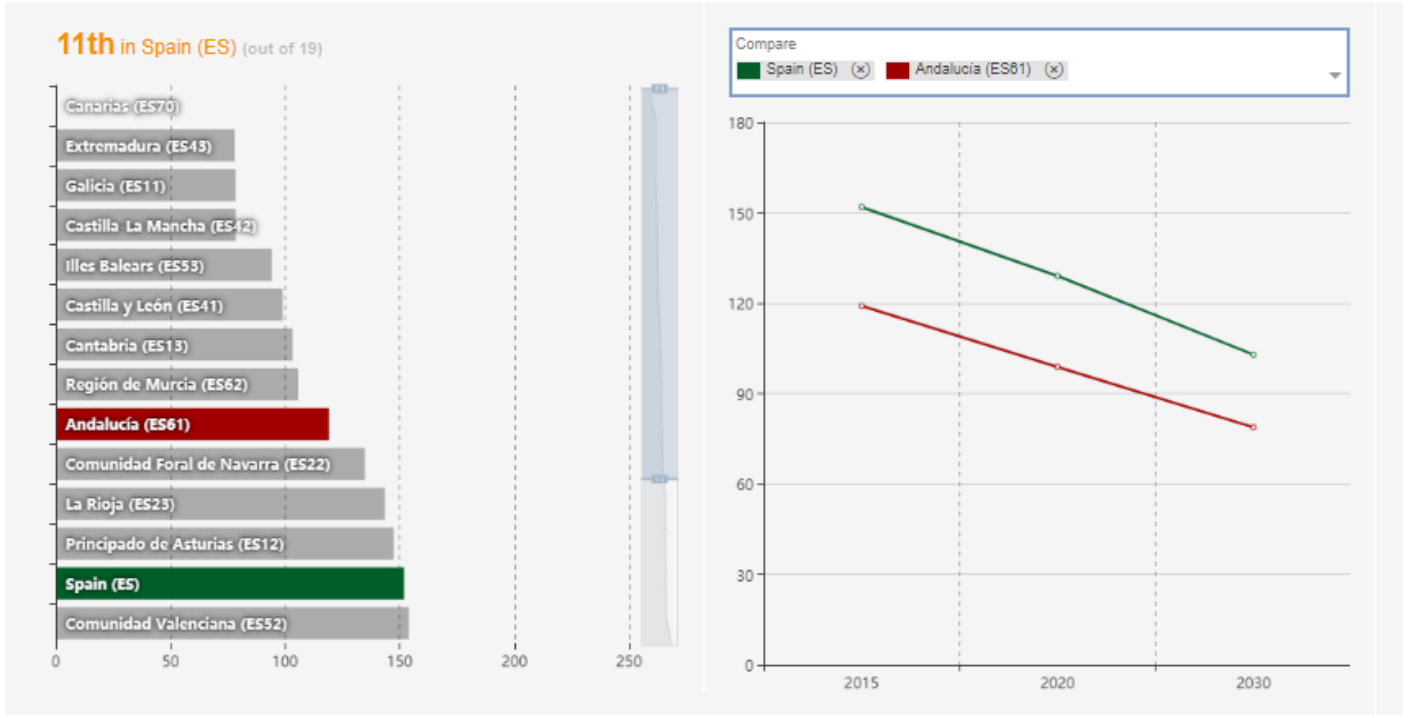
Metro Areas
Functional Urban Areas
Cities

Territorial Profile



Population Density (weighted)

Population weighted density refers to the average of the density of all parcels of land that make up a city, with each parcel weighted by its population.



Better Regulation Toolbox

Better regulation toolbox

PAGE CONTENTS

I. General principles of better regulation

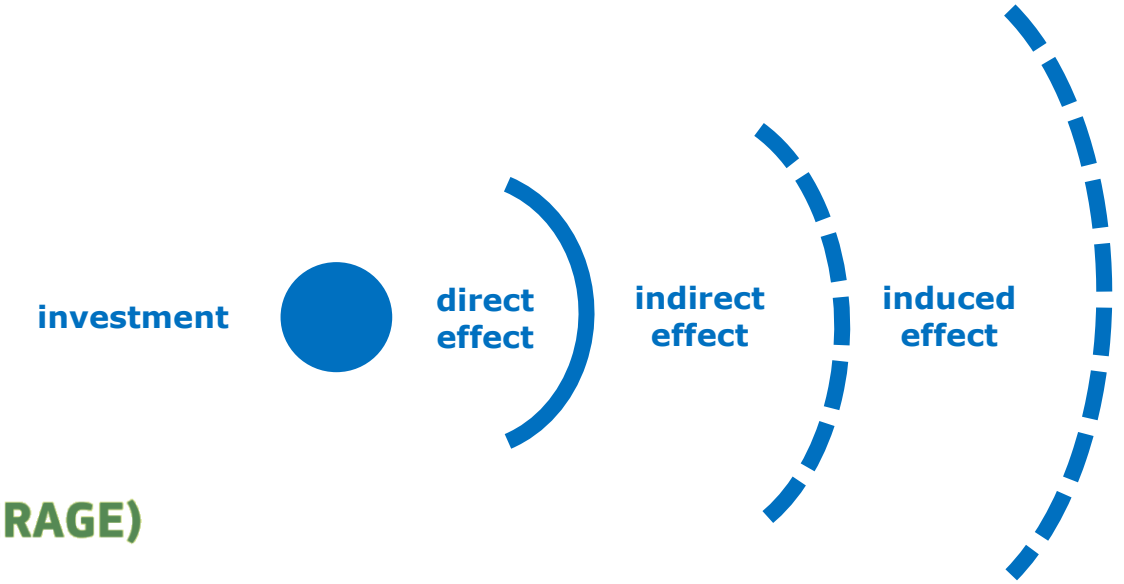
- TOOL #1. Principles, procedures & exceptions
- TOOL #2. The Regulatory Fitness Programme and the REFIT Platform
- TOOL #3. Role of the Regulatory Scrutiny Board
- TOOL #4. Evidence-based better regulation
- TOOL #5. Legal basis, subsidiarity and proportionality
- TOOL #6. Planning and validation of initiatives
- TOOL #7. Drafting roadmaps, evaluation roadmaps and inception Impact assessments

II. How to carry out an impact assessment

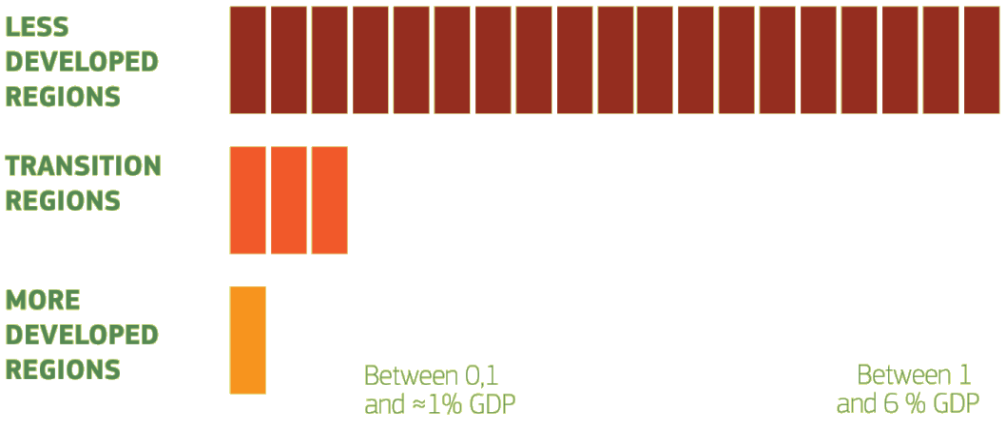
- Introduction
- TOOL #8. What steps should I follow for an impact assessment?
- TOOL #9. When is an impact assessment necessary?
- TOOL #10. Financial programmes and instruments
- TOOL #11. Social partner initiatives
- TOOL #12. Format of the impact assessment report
- TOOL #13. How to undertake a proportionate impact assessment
- TOOL #14. How to analyse problems
- TOOL #15. Risk assessment and management
- TOOL #16. How to set objectives
- TOOL #17. How to identify policy options
- TOOL #18. The choice of policy instruments

RHOMOLO: Dynamic Spatial General Equilibrium Model for EU Regions and Sectors

RHOMOLO simulates the impact of policies on each specific region's economic performance



SIMULATED IMPACT ON GDP GROWTH (AVERAGE)



Growth calculated is higher for the less developed regions.
In the long run this could bring all EU regions to a similar level of wealth.

RHOMOLO Modelling Framework

- RHOMOLO is the **multi-sectoral economic model** developed by DG JRC for the impact assessments of EU Policies;
- It shows how **policy shocks** may affect economic and social outcomes at the regional, country and sectoral level (deviation from baseline).

- It captures key determinants of the spatial distribution of economic activities:
  - ✓ Sector-composition: through **regional I/O tables** and Social Accounting Matrices;
  - ✓ Spatial configuration: through **asymmetric sector- and region-pair-specific** trade costs and spatial technological spillovers.

RHOMOLO Modelling Framework

- The domestic economy (which corresponds to the whole EU) consists of R-1 endogenous regions included into M countries. The Rest of the World is introduced in the model as an exogenous external institutional sector.

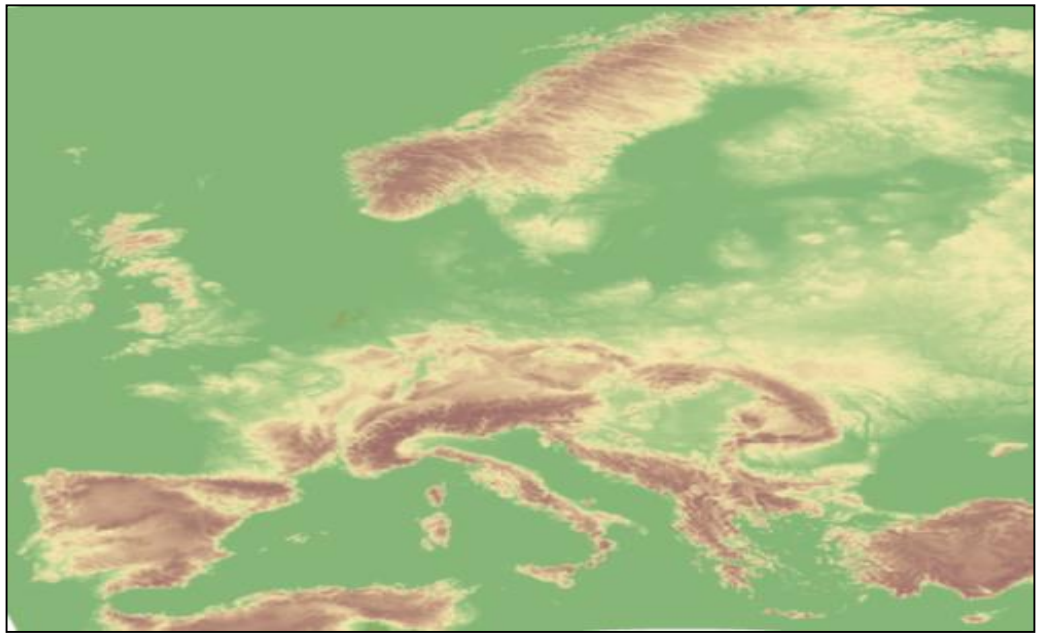
- Sector disaggregation: **10 tradable NACE rev.2 sectors** (A, B-E, C, F, G-I, J, K-L, M-N, O-Q, R-U);

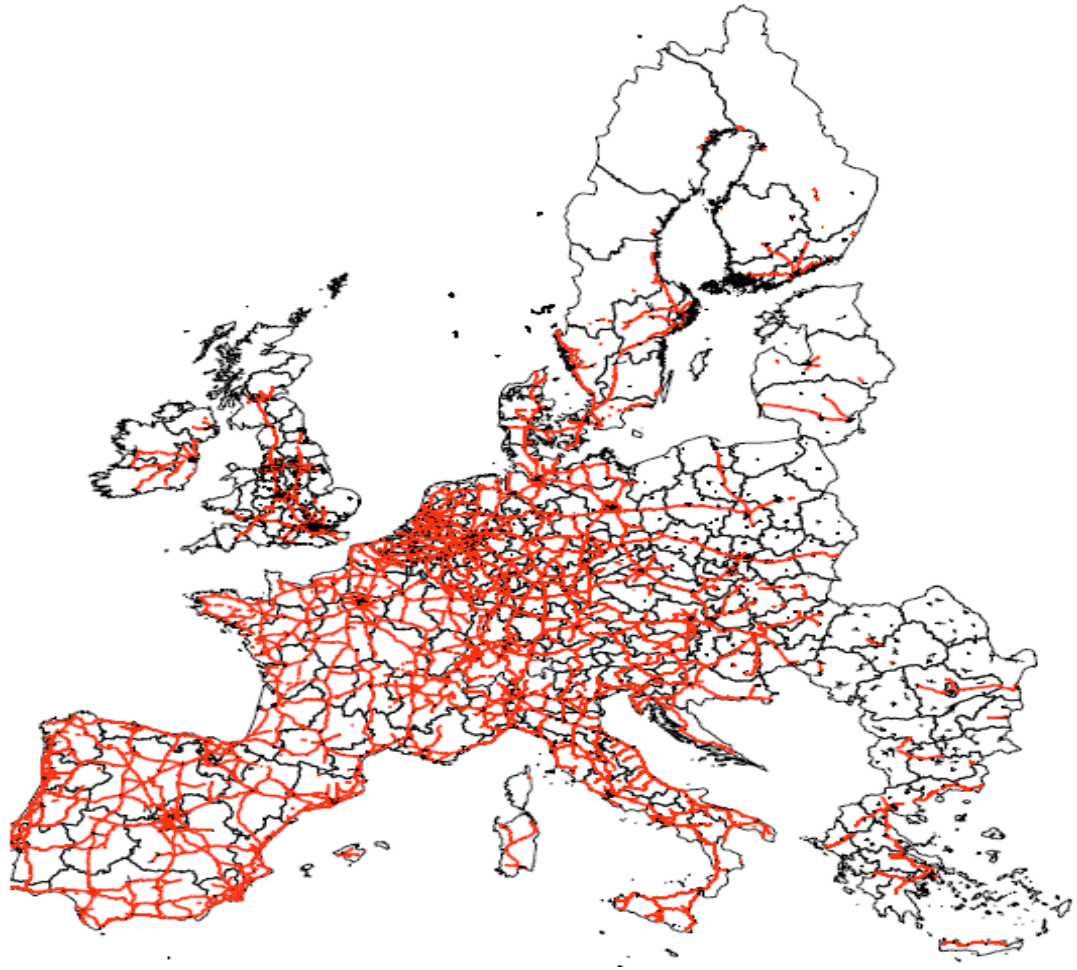
- Geographical coverage: 28 EU Member States + ROW ; **267 NUTS2 regions** (French overseas territories are excluded).

- Final goods are consumed by **Households**, **Governments** and **Investors** whilst firms consume intermediate inputs.

Unique Sectoral and Geographical Granularity

1. **Regional IO Tables**
2. **Territorial Accessibility via existing Infrastructure** (sector- and region-pair-specific asymmetric trade costs + spillovers)

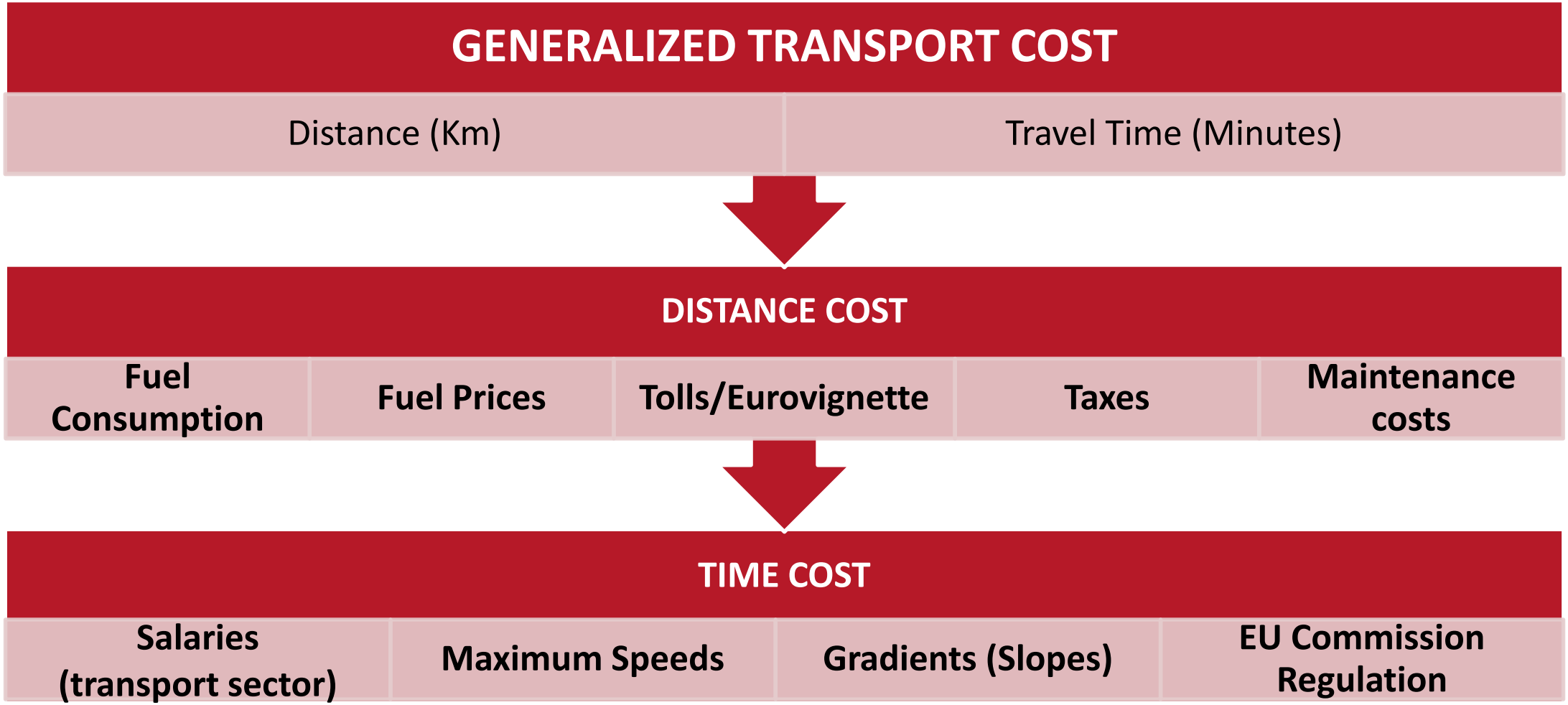




Source: OpenStreetMap

And a detailed population distribution

The Generalized Transport Cost (GTC)



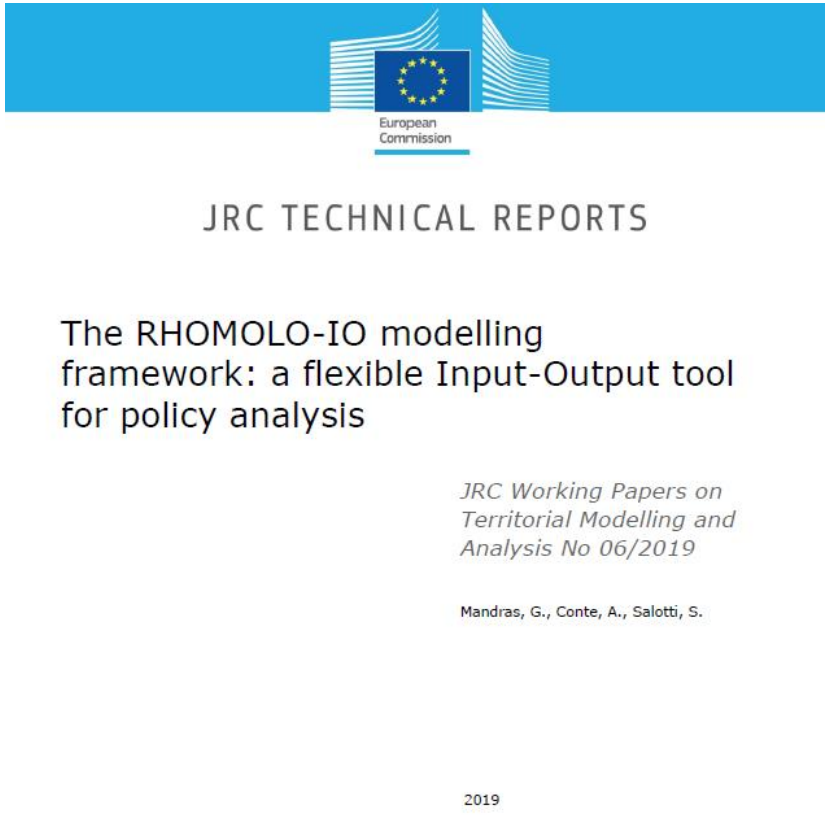
RHOMOLO IO

A stylised interregional Social Accounting Matrix : *2 sectors, 1 and 2, producing 2 types of products*

IRIOT		region 1: Use		region 2: Use		region 1: Supply		region 2: Supply		region 1: Use	region 2: Use	
		sector 1	sector 2	sector 1	sector 2	product 1	product 2	product 1	product 2	hhd - Inv	hhd - inv	total
region1	sector 1					3	7					10
	sector 2					2	6					8
region 2	sector 1							5	2			7
	sector 2							3	6			9
region 1	product 1	1	1	1						1	1	5
	product 2	2	3		2					5	1	13
region 2	product 1	1		2	1						4	8
	product 2		1							1	6	8
region 1	value added	6	3							transfer	transfer	9
region 2	value added			4	6					transfer	transfer	10
	total	10	8	7	9	5	13	8	8	7	12	

- The use of this products by different sectors in different regions is presented in the first 4 columns.
- The production of these products is presented on the top 4 rows.
- Total production in these sectors is provided in the last column on the right.
- In the bottom two rows total value added which is an aggregation of both labour and capital income.
- International trade (product level) and is divided over different types of use.
- The use of the final demand categories are presented in the last 2 columns.
- The use of the different producing sectors are presented in the first 2 columns.
- Region 1 exports 3 units of product 2 to Region 2 where 2 units are used by sector 2 and 1 unit by final demand

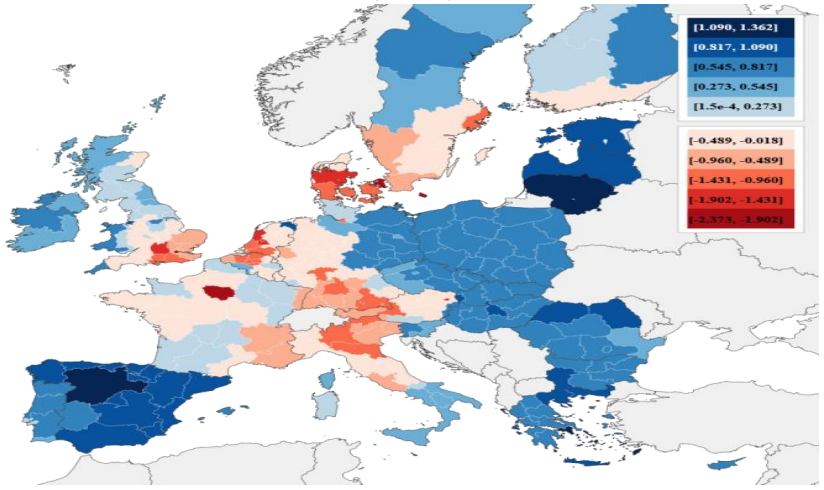
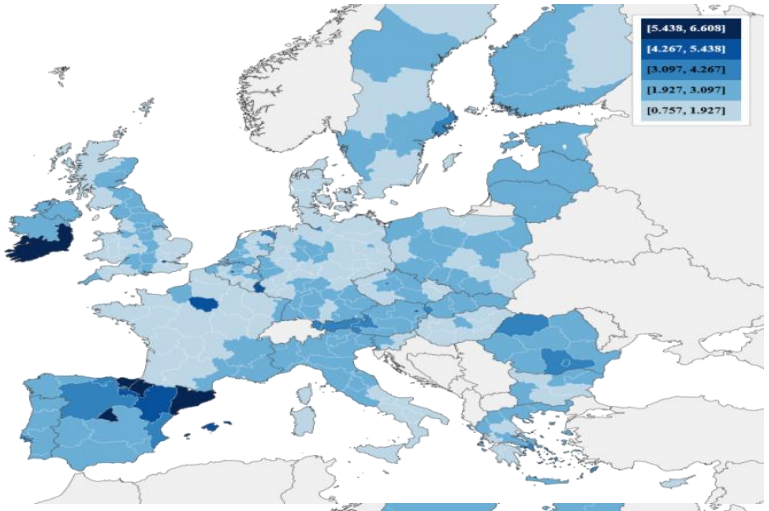
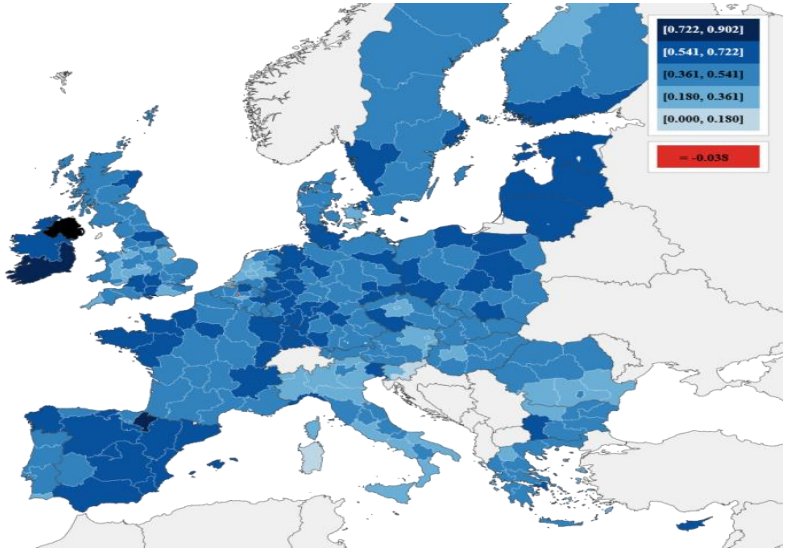
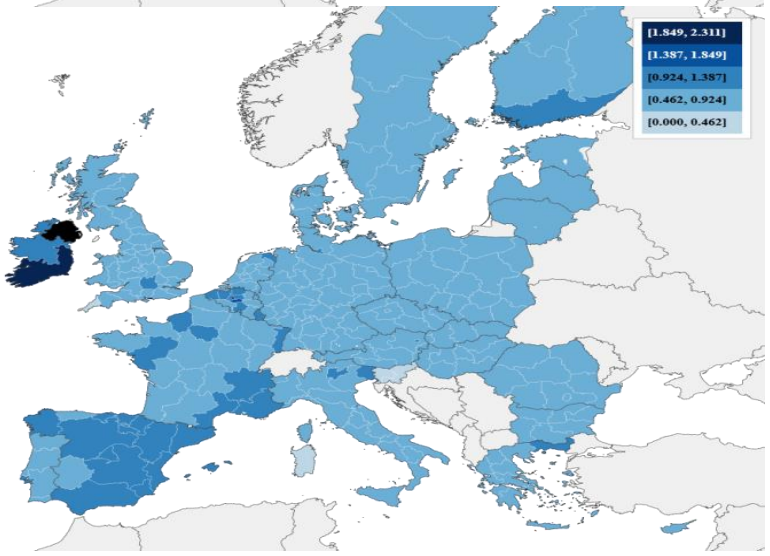
RHOMOLO IO Framework



Applications

- The evaluation of TEN-T projects
- Employment Analyses
- European Globalisation Adjustment Fund (EGF)
- Coal Regions in Transition
- Consumption Redistribution Analysis
- Trade (& Value Added) Analysis

Cumulative multipliers

	2020	2030
Shocking regions simultaneously		
Shocking regions Individually		

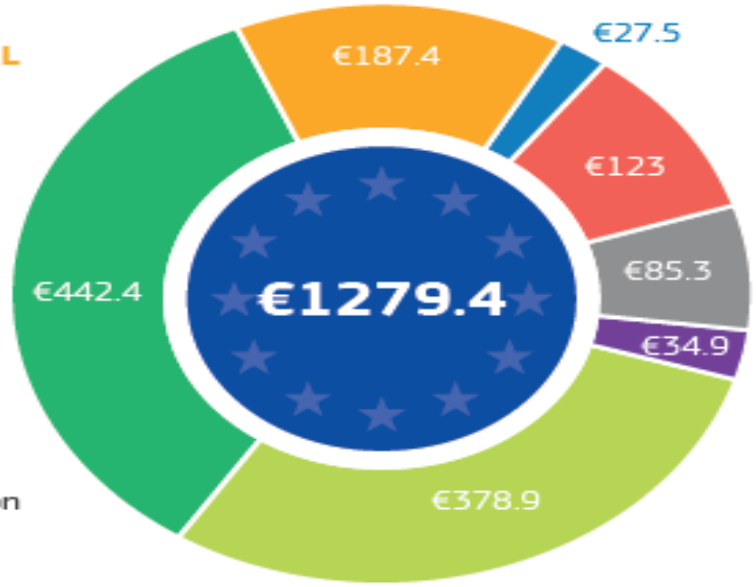
Introduction of Cohesion Policy shocks in RHOMOLO

Type of Shock	Temporary effect /EU budget money flow	Permanent policy effect
Infrastructure - Transport	Increase in government consumption	Decrease in transportation costs
Infrastructure - Other	Increase in public investment Increase in government consumption	
Human Capital	Decrease in labour supply (all workers) + Increase in government consumption Decrease in labour supply (highly skilled workers) + Increase in government consumption	Increase in labour productivity (all types of labour) Increase in high-skill labour productivity (highly skilled workers)
R&D	Increase in government consumption Investment subsidy to reduce risk premium	Increase in TFP
Aid to Private Sector	Production subsidy Investment subsidy to reduce risk premium Increase in government consumption	
Technical Assistance	Increase in government consumption of "other services" in recipient regions (financed by the others)	–

MFF Proposal 2021-2027

THE NEW MULTIANNUAL FINANCIAL FRAMEWORK 2021 – 2027
A BUDGET FOR A UNION THAT PROTECTS, EMPOWERS AND DEFENDS

In billion euro, current prices



I. SINGLE MARKET, INNOVATION AND DIGITAL
€187.4

1 Research and Innovation
2 European Strategic Investments
3 Single Market
4 Space

II. COHESION AND VALUES
€442.4

5 Regional Development and Cohesion
6 Economic and Monetary Union
7 Investing in People, Social Cohesion and Values

III. NATURAL RESOURCES AND ENVIRONMENT
€378.9

8 Agriculture and Maritime Policy
9 Environment and Climate Action

IV. MIGRATION AND BORDER MANAGEMENT
€34.9

10 Migration
11 Border Management

V. SECURITY AND DEFENCE
€27.5

12 Security
13 Defence
14 Crisis Response

VI. NEIGHBOURHOOD AND THE WORLD
€123

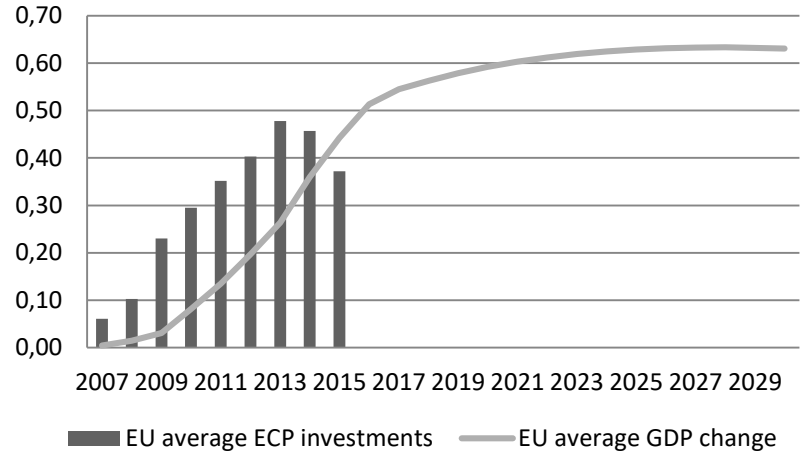
15 External Action
16 Pre-Accession Assistance

VII. EUROPEAN PUBLIC ADMINISTRATION
€85.3

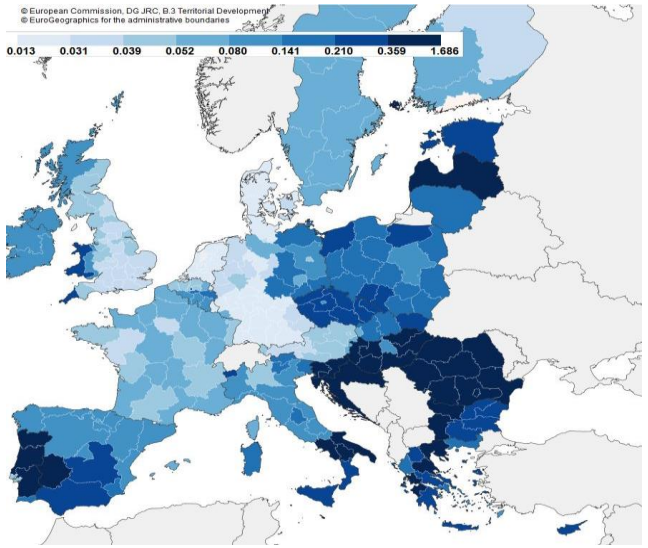
17 European Public Administration

Horizontal Support to COM Impact Assessments

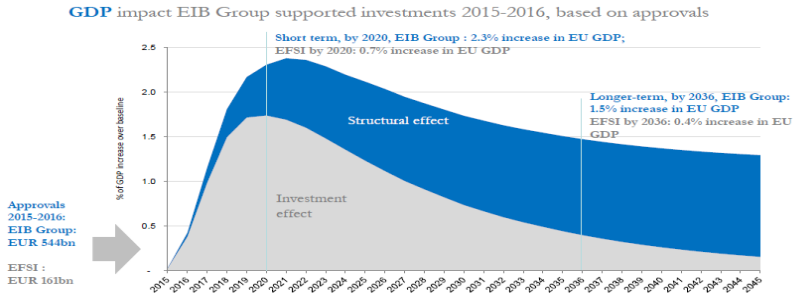
European Structural and Investment Funds (SWD (2018) 282 final)



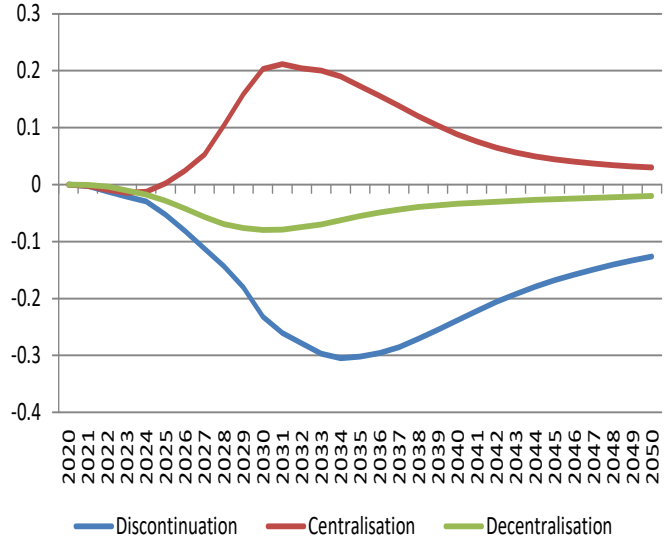
European Social Fund (SWD (2018) 289 final)



European Fund for Strategic Investments (EIB / JRC Annual Report)



Horizon 2020 (SWD (2018) 307 final)



Impact assessments with RHOMOLO REGIO

- **SWD(2018)282 final - May 29th, 2018**

Figure 2: impact of 2020-2027 RTD funds on EU-27 GDP, 2020-2035

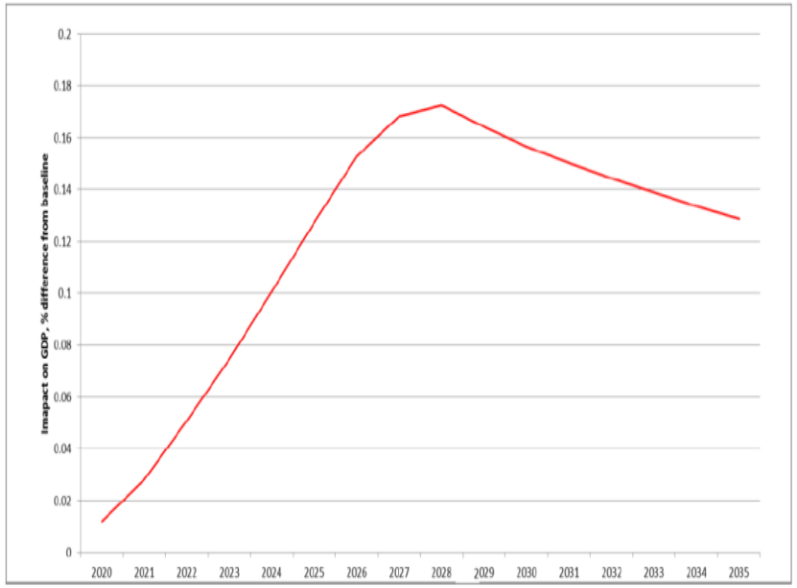
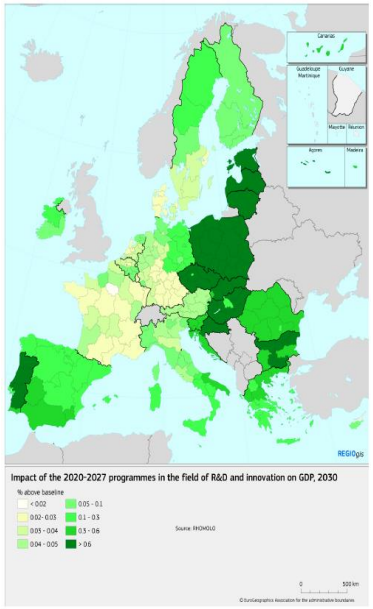


Figure 3: RTD in 2020-2027 ERDF. Impact on Regional GDP, 2030



European Commission

JRC TECHNICAL REPORTS

The impact of Cohesion Policy 2007-2015 in EU regions: Simulations with the RHOMOLO Interregional Dynamic General Equilibrium Model

JRC Working Papers on Territorial Modelling and Analysis No 03/2018

Di Comite, F., Lecca, P., Monfort, P., Persyn, D., Piculescu V.

Impact assessments with RHOMOLO EMPL

- **SWD(2018)289 final - May 30th, 2018**

Figure 1: GDP effect of ESF investments at regional level, Rhomolo simulations

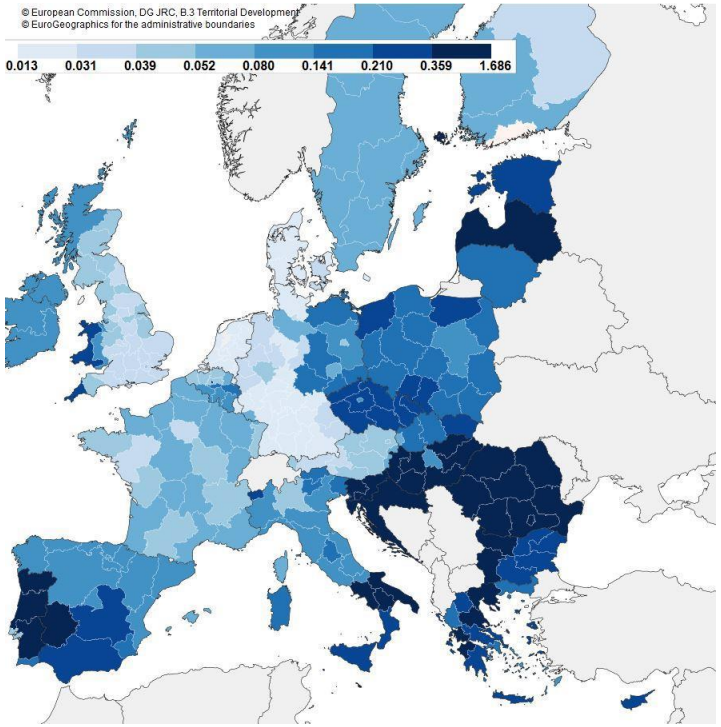
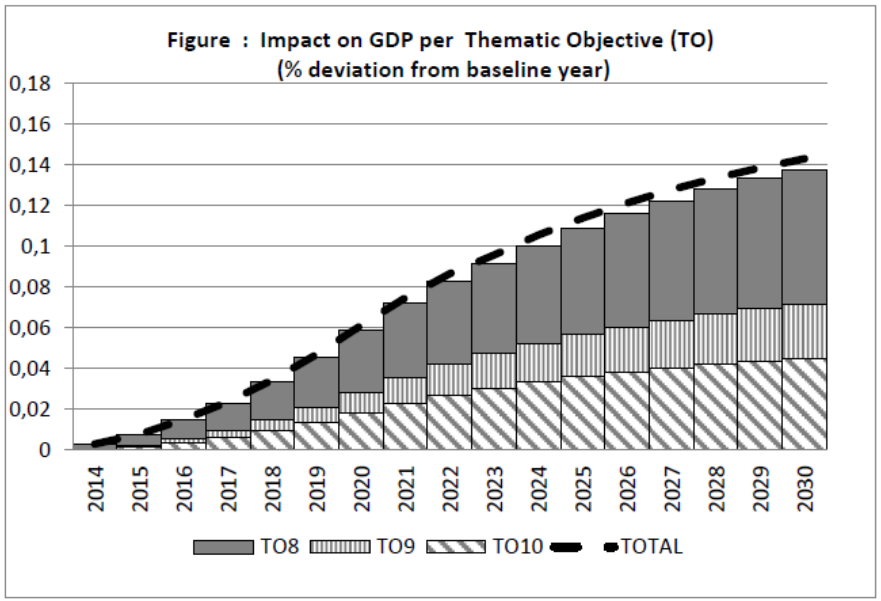


Figure 2: Impact on GDP of ESF investments per TO, Rhomolo simulations

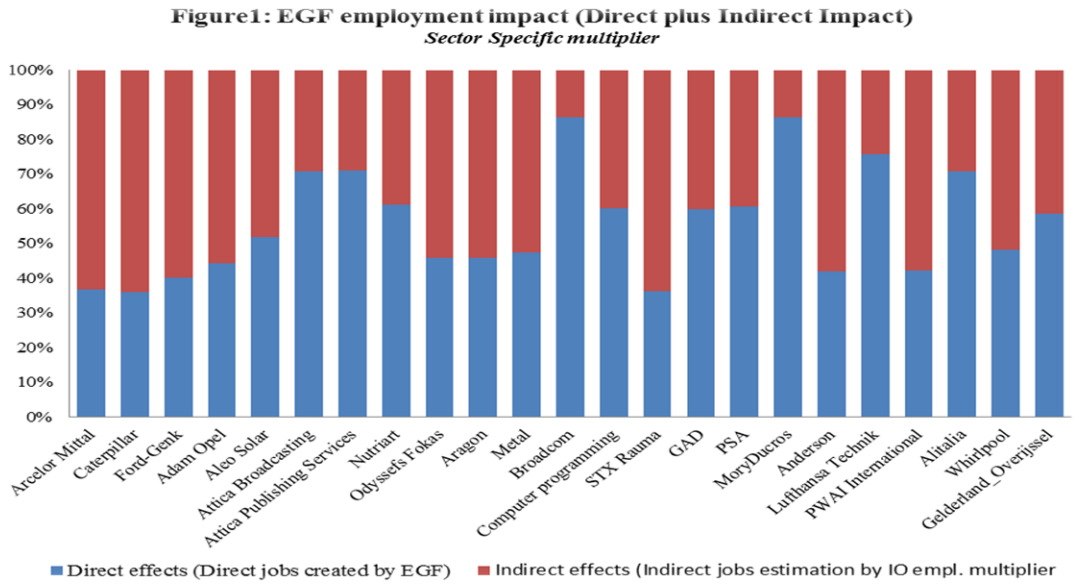


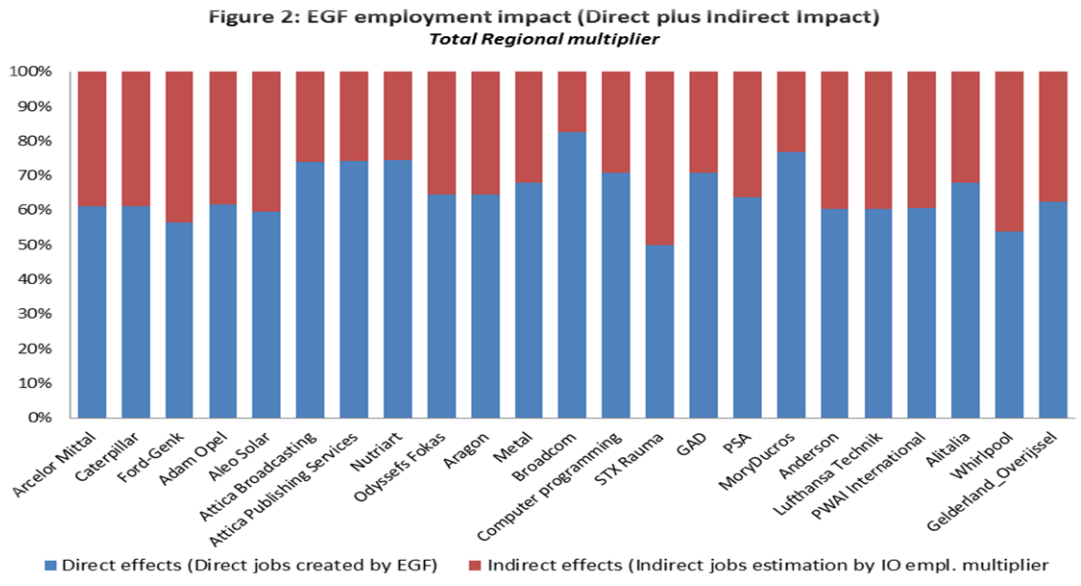
Impact assessments with RHOMOLO-IO

➢ SWD(2018)289 final - May 30th, 2018

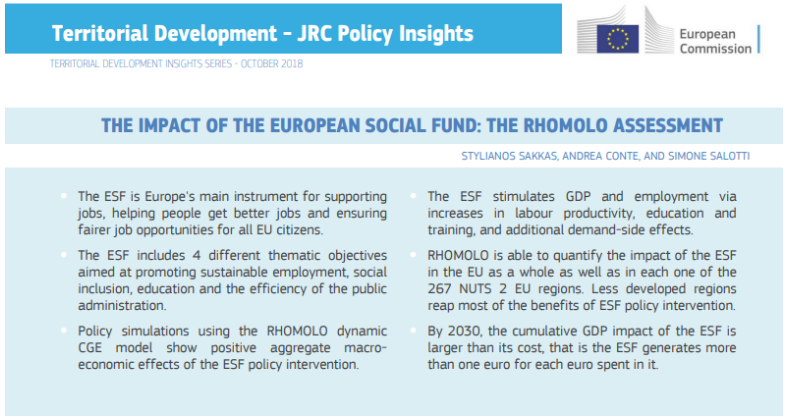
2.1.1.3 EGF (European Globalisation Adjustment Fund)

In addition to the current average re-employment rate of 65% there is empirical evidence of positive indirect effects of the EGF, as each additional job created influences positively other sectors. The dimension of these indirect impacts varies across case studies, ranging from a minimum of 20% up to 50% of the total jobs generated



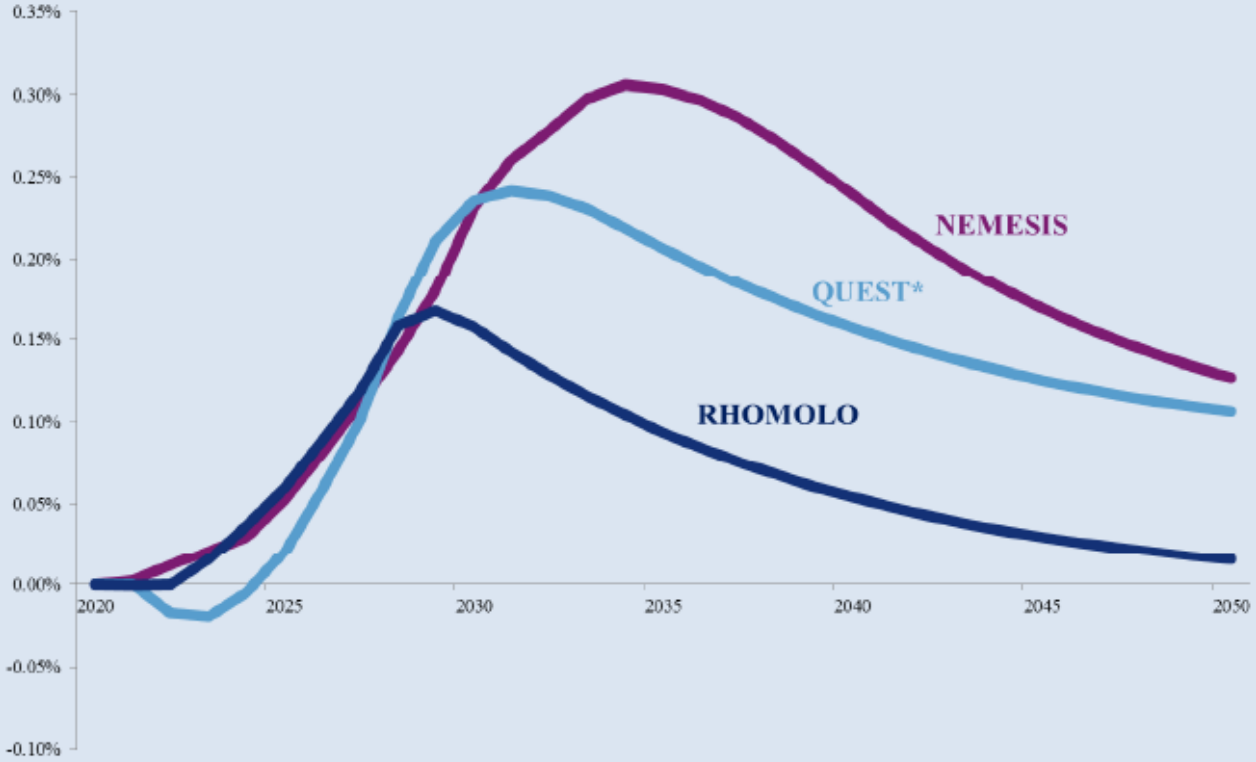


Impact assessments with RHOMOLO EMPL



Impact assessments with RHOMOLO RTD

Figure 1: GDP gains from the continuation of Horizon 2020 (percentage change compared to a situation without Framework Programme)



*Note: Figures calculated for EU-27; different sets of results from QUEST are presented in Annex 5 based on different funding assumptions. This graph presents the scenario with higher benefits

SWD(2018)307 final, June 7th, 2018

Assessing the regional socio-economic impact of the European R&I programme

JRC Working Papers on Territorial Modelling and Analysis No 05/2018

Christensen, M.

2018

Impact assessments with RHOMOLO CAB (Katainen)

The European Fund for Strategic Investments (EFSI)

Making smarter use of financial resources

Support: how you can benefit from the Plan

Visibility for projects, technical assistance and how to apply

Improving the business environment in the EU

Removing obstacles to investment

- **Four pillars:** Capital Market Union, Energy Union, Digital Single Market, Single Market Strategy (relevant DGs involved)

COM(2018) 771 final

November 22nd, 2018

EUROPEAN COMMISSION

Brussels, 22.11.2018

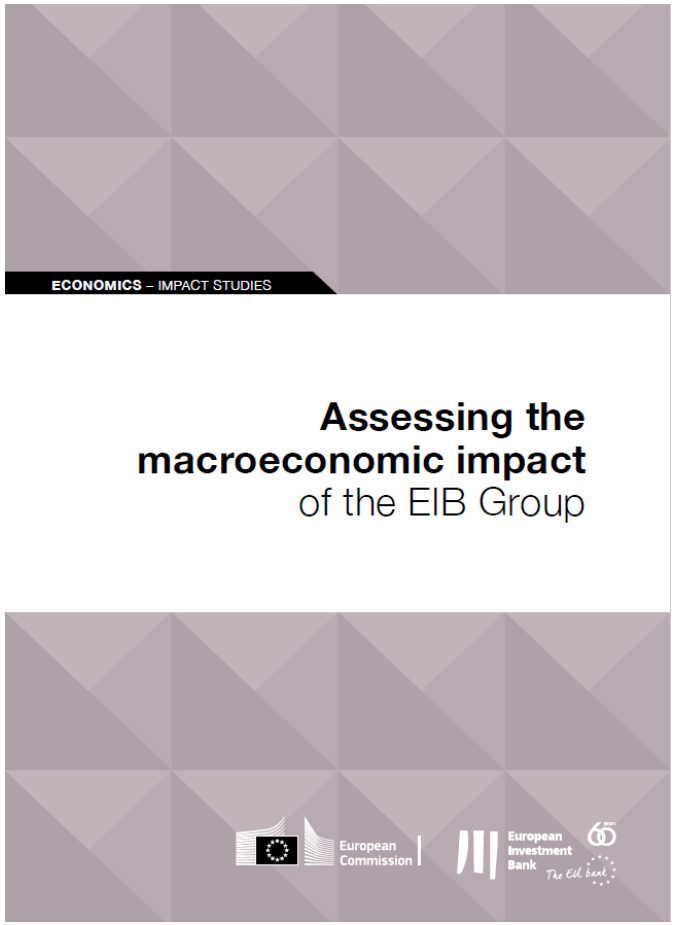
COM(2018) 771 final

COMMUNICATION FROM THE COMMISSION

Investment Plan for Europe: stock-taking and next steps

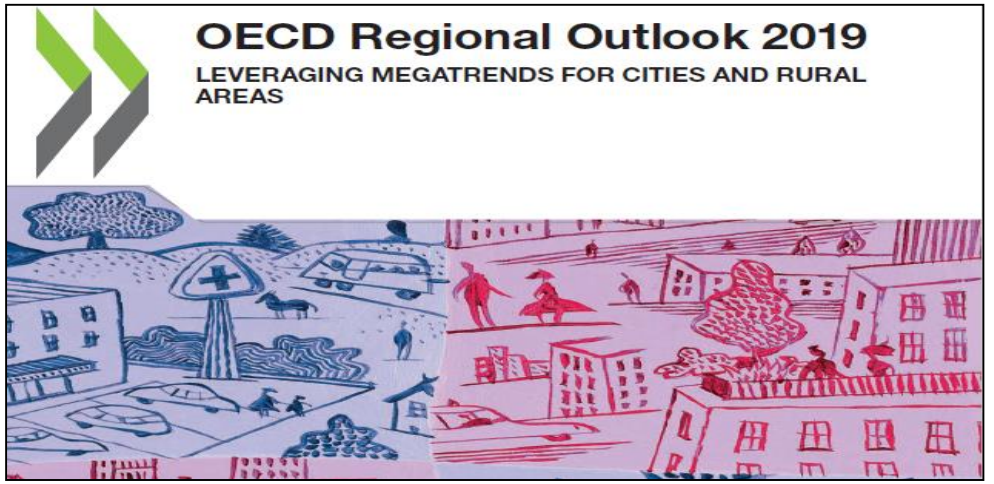
Impact assessments with RHOMOLO EIB

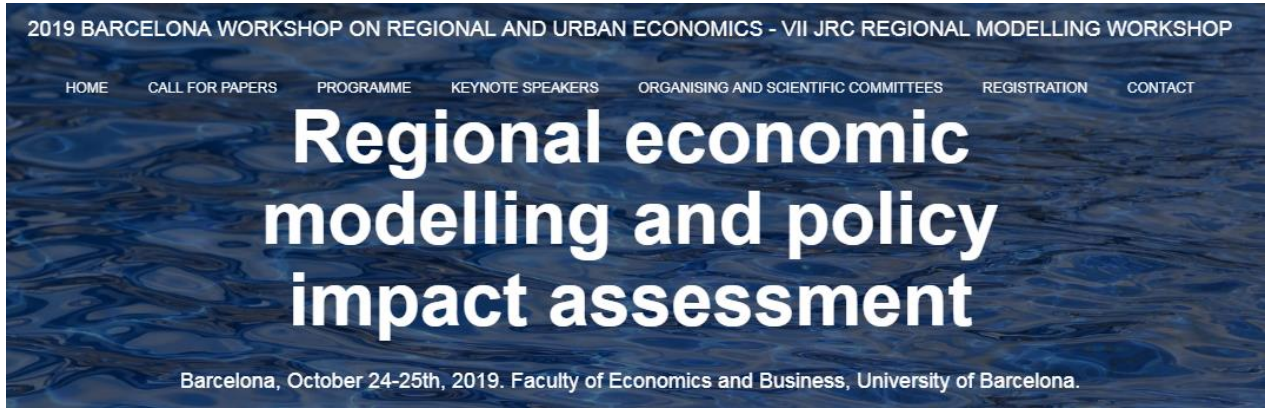
- **EIB / JRC Annual Reporting**
- **Last Press Release October 22nd, 2019**



Ongoing / Recent Initiatives

- Support to EC Country Analysis
- JRC – OECD Job Automation
- JRC Exploratory projects (HETFIGE, GEGRAM)
- Africa (EIB, DEVCO, NEAR)
- JRC Resilience flagship reports
- Events (EWRC, AECR..)





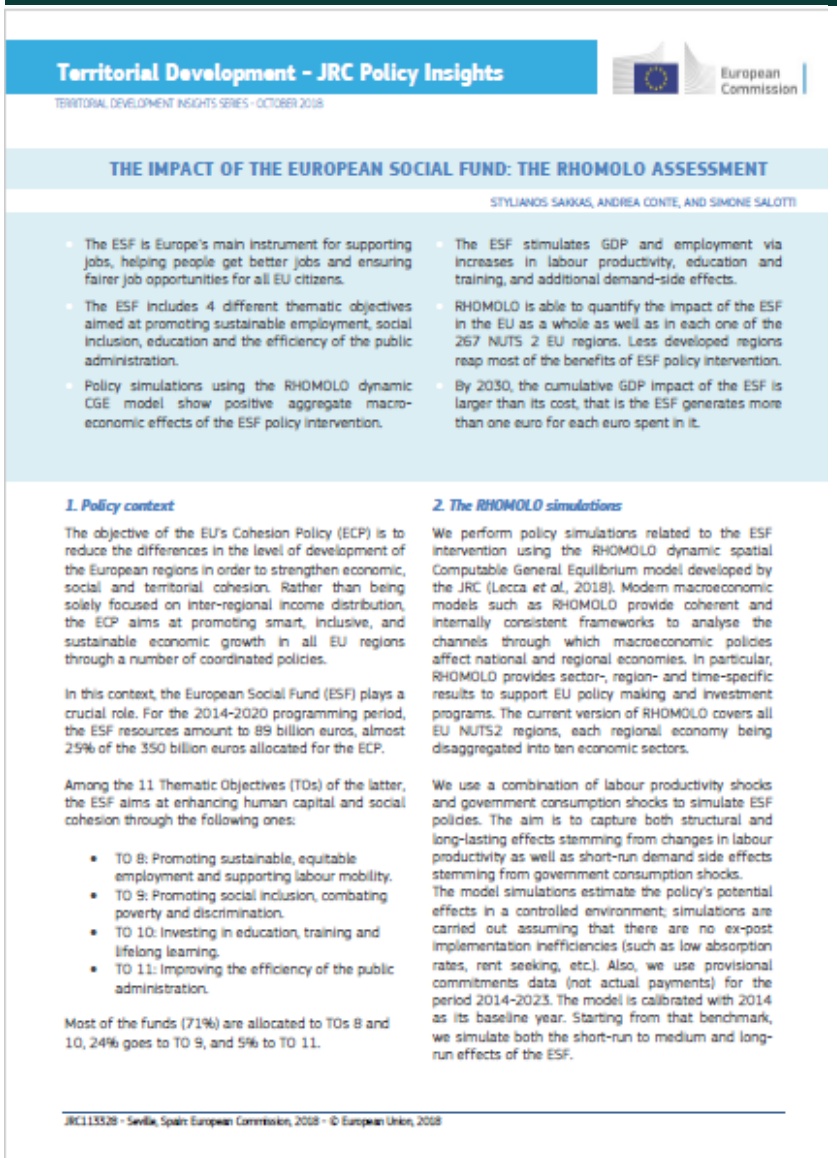
New Economic & Statistical Perspectives on Urban & Territorial Themes (NESPUTT 2019)

NOV 21 2019

Milan (IT)

The European Commission's Joint Research Centre (JRC) and the University of Milan-Bicocca organise NESPUTT, an international workshop which will take place in Milan on the 21st and 22nd of November 2019.

Background Material



Territorial Development – JRC Policy Insights

TERRITORIAL DEVELOPMENT INSIGHTS SERIES - OCTOBER 2018

European Commission

THE IMPACT OF THE EUROPEAN SOCIAL FUND: THE RHOMOLO ASSESSMENT

STYLIANOS SAKKAS, ANDREA CONTE, AND SIMONE SALOTTI

- The ESF is Europe's main instrument for supporting jobs, helping people get better jobs and ensuring fairer job opportunities for all EU citizens.
- The ESF includes 4 different thematic objectives aimed at promoting sustainable employment, social inclusion, education and the efficiency of the public administration.
- Policy simulations using the RHOMOLO dynamic CGE model show positive aggregate macro-economic effects of the ESF policy intervention.
- The ESF stimulates GDP and employment via increases in labour productivity, education and training, and additional demand-side effects.
- RHOMOLO is able to quantify the impact of the ESF in the EU as a whole as well as in each one of the 267 NUTS 2 EU regions. Less developed regions reap most of the benefits of ESF policy intervention.
- By 2030, the cumulative GDP impact of the ESF is larger than its cost, that is the ESF generates more than one euro for each euro spent in it.

1. Policy context

The objective of the EU's Cohesion Policy (ECP) is to reduce the differences in the level of development of the European regions in order to strengthen economic, social and territorial cohesion. Rather than being solely focused on inter-regional income distribution, the ECP aims at promoting smart, inclusive, and sustainable economic growth in all EU regions through a number of coordinated policies.

In this context, the European Social Fund (ESF) plays a crucial role. For the 2014-2020 programming period, the ESF resources amount to 89 billion euros, almost 25% of the 350 billion euros allocated for the ECP.

Among the 11 Thematic Objectives (TOs) of the latter, the ESF aims at enhancing human capital and social cohesion through the following ones:

- TO 8: Promoting sustainable, equitable employment and supporting labour mobility.
- TO 9: Promoting social inclusion, combating poverty and discrimination.
- TO 10: Investing in education, training and lifelong learning.
- TO 11: Improving the efficiency of the public administration.

Most of the funds (71%) are allocated to TOs 8 and 10, 24% goes to TO 9, and 5% to TO 11.

2. The RHOMOLO simulations

We perform policy simulations related to the ESF intervention using the RHOMOLO dynamic spatial Computable General Equilibrium model developed by the JRC (Lecca *et al.*, 2018). Modern macroeconomic models such as RHOMOLO provide coherent and internally consistent frameworks to analyse the channels through which macroeconomic policies affect national and regional economies. In particular, RHOMOLO provides sector-, region- and time-specific results to support EU policy making and investment programs. The current version of RHOMOLO covers all EU NUTS2 regions, each regional economy being disaggregated into ten economic sectors.

We use a combination of labour productivity shocks and government consumption shocks to simulate ESF policies. The aim is to capture both structural and long-lasting effects stemming from changes in labour productivity as well as short-run demand side effects stemming from government consumption shocks.
The model simulations estimate the policy's potential effects in a controlled environment; simulations are carried out assuming that there are no ex-post implementation inefficiencies (such as low absorption rates, rent seeking, etc.). Also, we use provisional commitments data (not actual payments) for the period 2014-2023. The model is calibrated with 2014 as its baseline year. Starting from that benchmark, we simulate both the short-run to medium and long-run effects of the ESF.

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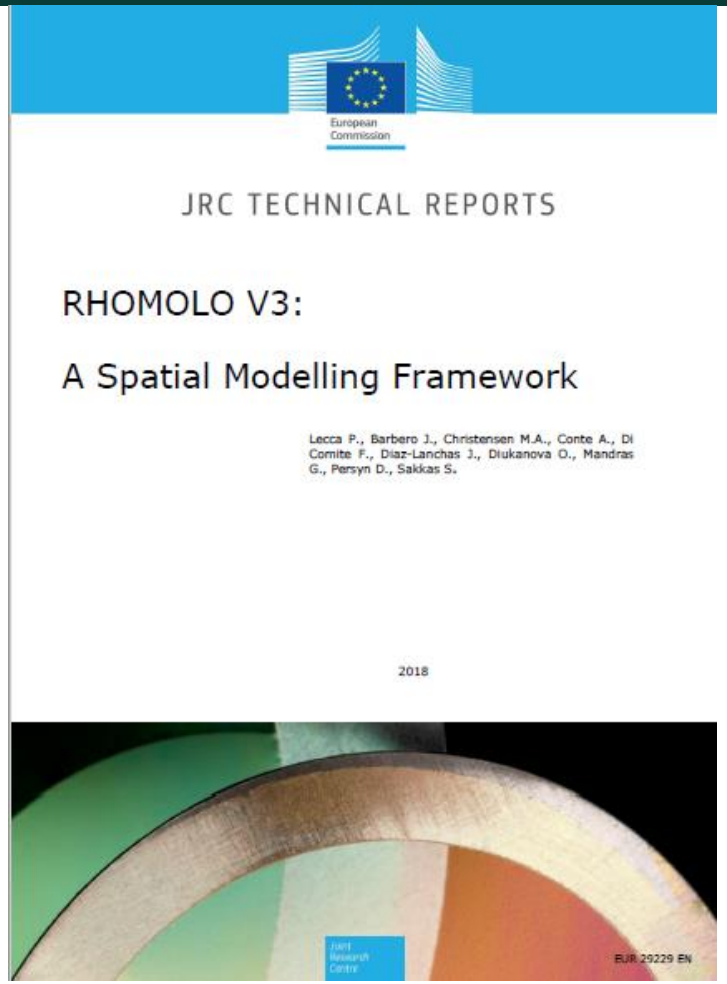

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JRC TECHNICAL REPORTS

RHOMOLO V3:

A Spatial Modelling Framework

Lecca P., Barbero J., Christensen M.A., Conte A., Di Comite F., Diaz-Lanchas J., Diukanova O., Mandras G., Persyn D., Sakkas S.

2018

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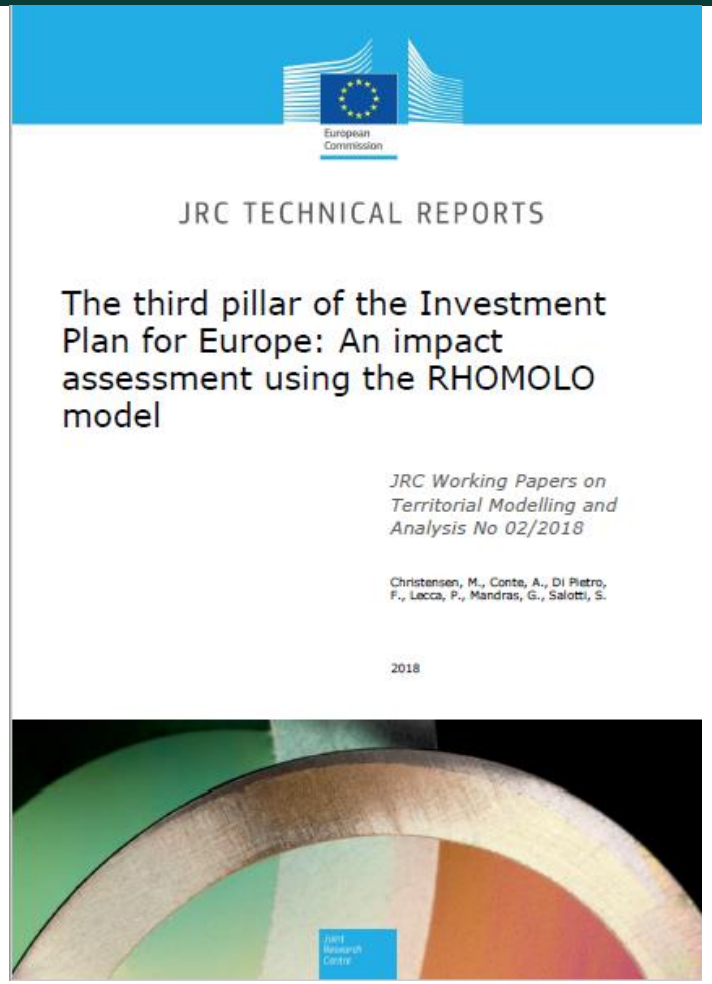

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JRC TECHNICAL REPORTS

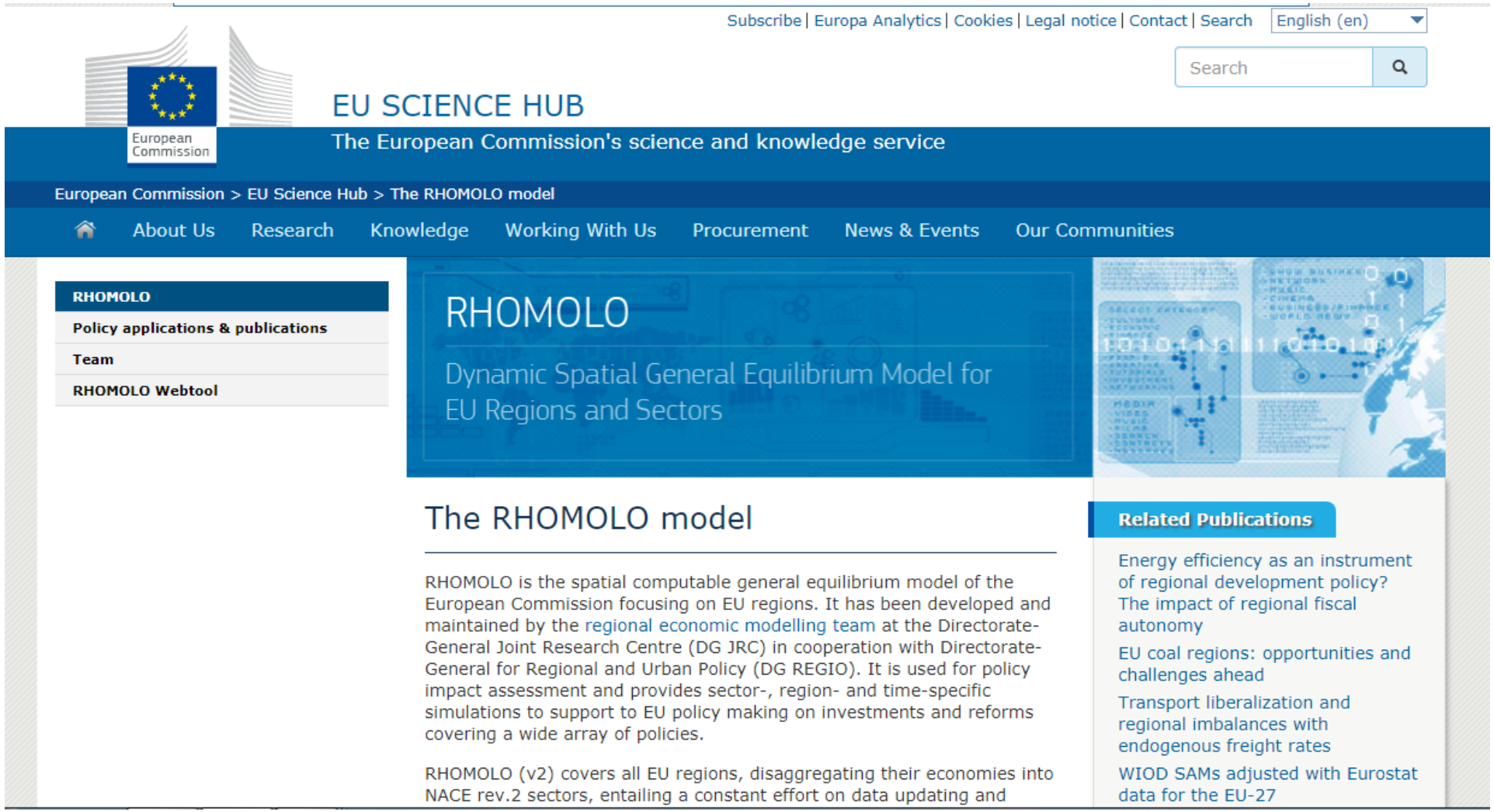
The third pillar of the Investment Plan for Europe: An impact assessment using the RHOMOLO model

JRC Working Papers on Territorial Modelling and Analysis No 02/2018

Christensen, M., Conte, A., Di Pietro, F., Lecca, P., Mandras, G., Salotti, S.

2018

With its own website, newsletters, online (reduced) model, events, etc.



Thanks

Questions and inputs/feedback?

You can find me at **andrea.conte@ec.europa.eu**

More information on RHOMOLO:
https://ec.europa.eu/jrc/rhomolo

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