EFOP-3.6.2-16-2017-00017
Sustainable, intelligent and inclusive regional and city models

ECONOMIC IMPACT MODELING IN THE PRIORITIZATION PROCESS OF SMART SPECIALIZATION

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OUTLINE

- Introduction
- Economic impact assessment in prioritization
- The challenges in modeling the likely economic impacts of a new activity
- A regional case study: ex-ante impact modeling of a selected new activity in the city of Pécs
- Summary

INTRODUCTION

- Prioritization is key in S3 – but implementation is a problem
- In the prioritization process the government selects from alternative domains (activities) for policy support
  - *Which activity* to support?
  - What are the *policy instruments* to be applied to support the activity?
  - *How much* public money to spend for the support of each the activity's introduction?
- Dimensions of prioritization (Foray 2015):
  1. the activity's individual features (degree of novelty, the extent to which it targets new regional opportunities, availability of regional supply factors)
  2. its regional spillover capacity to generate firm concentration
  3. economic significance of the new activity
- **Economic significance of the new activity: this presentation argues for the necessity to involve economic impact models in the prioritization process**
- A concrete economic impact assessment exercise is carried out for a selected new activity in the city of Pécs

RESEARCH QUESTIONS

- How can we contribute to the prioritization process? How can we survey pontential ideas?
- What ‚entrepreneurial discoveries' contribute the most to regional growth?
- How can we select among many alternative ideas?
- What are the cost and the benefits of investing in different ideas?

ECONOMIC IMPACT ASSESSMENT IN PRIORITIZATION

- The suggested approach for economic impact assessment in the smart specialization literature:

  'estimation of **direct and indirect resource inputs** from both the private and public sector suppliers' (Foray et al. 2011, p. 13)

- However the suggested approach covers impacts only partially since a new activity
  - might require **investments** in the region inducing further investments in other sectors in the region and in other regions
  - results in changes in regional **employment** in the new sector and other sectors in the region and in other regions
  - investment and production requires **intermediate production** inputs from the region and other regions
  - increased capital and labor income involves income **multiplier effects** in the region and in other regions
  - goods and factor **prices** might change that might result in **substitutions** of regional products with imports from other regions or countries,
  - **migration** impacts, etc.

- Therefore the introduction of a new activity will result in various, mutually interconnected changes in the economy of the region as well as the economies of other regions

WHAT FEATURES ARE NECESSARY IN AN IMPACT MODEL ?

- **Economic impact models** could potentially be useful in the estimation of the various economic impacts of a new activity
- Suitable economic impact models should incorporate
  - the regional dimension (S3 interventions address regional development)
  - interregional interactions (trade, migration, technology spillovers)
  - the industrial dimension of the regional economy (S3 interventions address selected industrial sectors)
- With the application of multi-regional (20), multi-sectoral (37) models the economic impacts of different new activities may become comparable

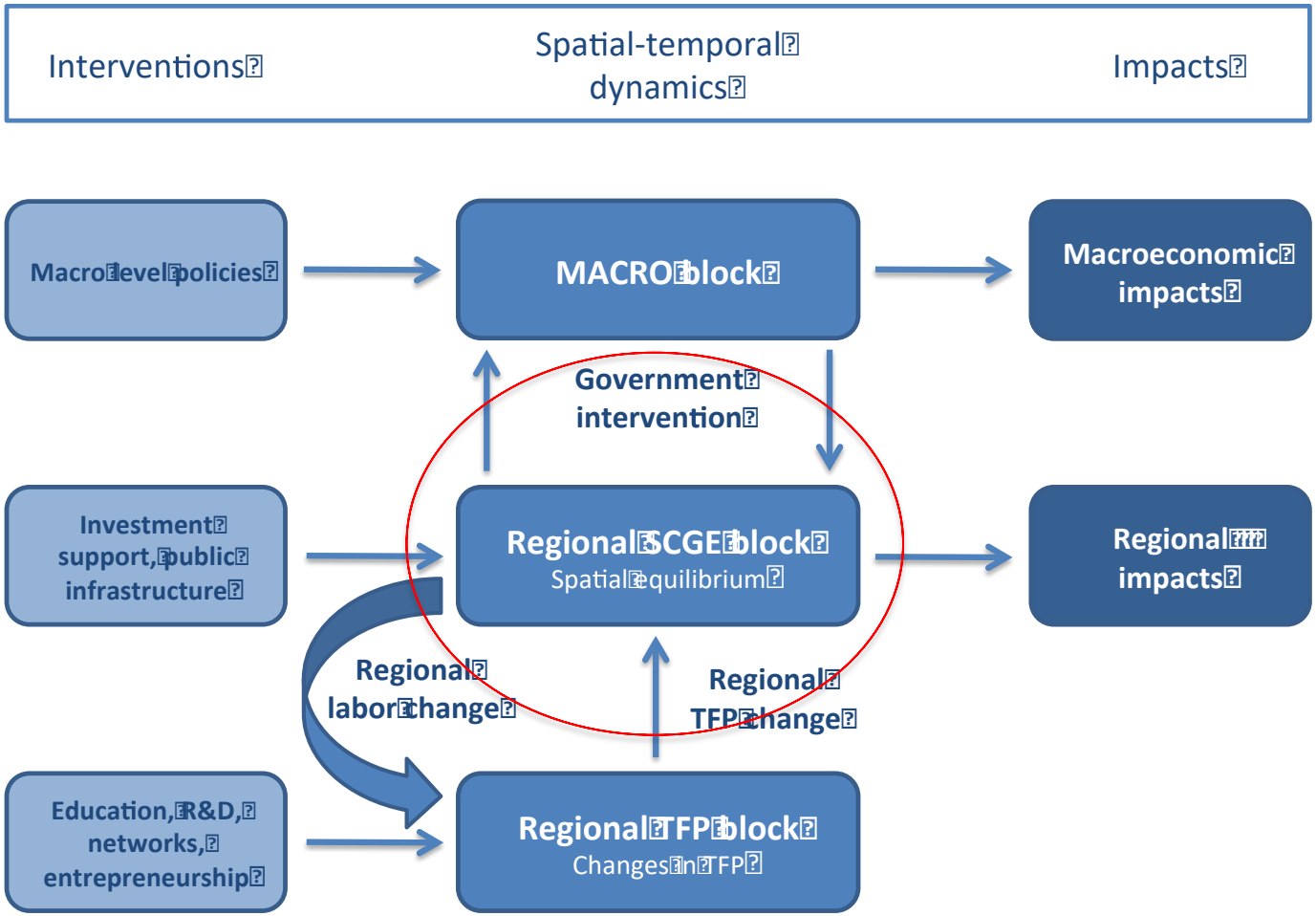
THE MODEL APPLIED IN ASSESSMENT: THE GMR-HUNGARY MODEL

- **GMR**: Geographic Macro and Regional model

- GMR-models: EcoRET model (Varga, Schalk 2004), GMR-Hungary (Varga 2007, Varga, Járosi, Sebestyén 2013), GMR-Europe (Varga 2017, Varga, Sebestyén, Szabó, Szerb 2018), GMR-Turkey (Varga, Baypinar 2016)

- Selected applications:
  - Cohesion Policy impact assessment for the Hungarian government (since 2004 continuously)
  - Cohesion Policy impact assessment for the European Commission (DG Regio, 2011)
  - FP6 impact assessment (2010)
  - Policy impact assessments for Turkish regions (2014)

THE MODEL APPLIED IN ASSESSMENT: THE GMR-HUNGARY MODEL



HOW CAN WE ENUMERATE THE EXPECTED IMPACTS OF A ‚NEW SECTOR'?

- The solution we followed:
  - We added a new sector which produces this output in an existing model (since the new activity results in new output)
  - The impact is the direct effects of starting a new activity + **the reaction of other actors** to the presence of the new activity

- How to get the data to model the new sector?
  - The initial model is based on Hungarian Statistical Office data
  - **In the case of the new sector** the necessary information is collected via interviews

A REGIONAL CASE STUDY

THE EX-ANTE IMPACT MODELING OF THE INTRODUCTION OF A SELECTED NEW ACTIVITY IN THE CITY OF PÉCS

SCREENING FOR POTENTIAL DOMANINS 1: SOME OF THE INNOVATIVE FIRMS IN THE REGION

- **Soft Flow – biotechnology, R&D**
  - Flow cytometry, antibodies, toxi-watch mycotoxin
  - Nish market, highly specialized, global buyers, global suppliers, University's necessity is limited
- **Games for Business – software, B2B**
  - Recruitment, HR development software using gamification methods
  - Regional (Budapest), global buyers, human resource (most important) is available via freelancer channels
- **Rati – car interior product development**
  - Supplier of car interior for global players (Renault, Audi, VW)
  - Supply of semi finished products from China, local human resource for assembly, industrial design capacity from Budapest (despite of the fact that the University has such potential)

SCREENING FOR POTENTIAL DOMAINS 2: SOME OF THE RESEARCH AREAS INSPECTED AT THE UNIVERSITY OF PÉCS

- **New grape cultivars with durable disease resistance** – *Institute of Viticulture and Oenology*
  - New grape cultivars with durable disease resistance that allows significant reduction of insecticides, suitable for organic wine growing
  - Obstacles: long process (still 3-4 years to get all licenses); regional spillover and transformation effects are not evident
- **3D printing, rehabilitation robotics development, medical equipments** – *3D Print Project Center Medical working group*
  - Design and development of experimental medical equipment, prototypes, e.g. rehabilitation robotics development, design and manufacturing of medical simulation equipment
  - Obstacles: the projects are in initial phase, lack of focus
- **Biotechnology and biopharmacology** – *School of Pharmacy, School of Medicine, SZRC, 3D PPC*
  - Many promising research avenues ranging from anti-inflamatory drugs to cancer treatment
  - Obstacles: regional spillover and transformation effects are not evident owing to high level of internationalization

THE ACTIVITY SELECTED FOR ASSESSMENT:
3D BIOPRINTING OF CARTILAGE FOR SPORT INJURIES

- Special area of 3D printing
- Fat cells of the patients are used to grow the personally customized cartilage
- High value added compared to traditional treatments by full costumization and relatively short period of recovery to loadability that is of utmost importance in sport
- Expertise in research and surgery are present at the University of Pécs
- Potential spillovers into other sectors (tourism, insurance, transportation services etc.)

BUSINESS MODEL CANVAS – SPORT MEDICAL, 3D CARTILAGE PRINTING AND IMPLANT

Key Partners

University,
Medical equipment producers,
Medical accessories producers,
Patient management service providers – transfer shuttle, taxi, hotel,
Entertainment activity providers – restaurants, touristic attraction sites, etc.

Key Activities

Business administration,
Patient management,
Medical activities,
Cartilage production.

Key Resources

Human capacity – doctors, biologist, assistants, business support staff.
Physical facility – for treatment and for the 3D printing.
Equipment – assessment, diagnostic, operation, 3D printing.
Financial resource – investment, working capital funding.

Value Propositions

Durable, resistant, natural cartilage customized using 3D printing technology.

Cost of the cartilage, treatment and other support services are at a low price.

Scientific credibility due to University supported R&D activity.

Customer Relationships

Newsletters, publications, tutorial videos, thematic events and scientific conferences, trainings and educational programs.

Key account relationship with professional organizations and associations.

Community building activities.

Channels

Direct communication to professional sport clubs and associations, via thematic events.
Word of mouth in the professional segment.
Through actors of the health care system with diagnostic capacity.
In cooperation with medical aids producers and distributors.

Customer Segments

Professional athletes with knee injuries resulting in cartridge trauma.

35-40 years old, mid-upper, upper class non-professional individuals with intensive, daily sport activity.

Hungarian and EU professional soccer, handball, basketball, athletic, swimming and water polo clubs and associations.

Cost Structure

Patient management, diagnostics, treatment, 3D printing, aftercare, insurance, cost of accessories, amortization, hazardous waste.

Revenue Streams

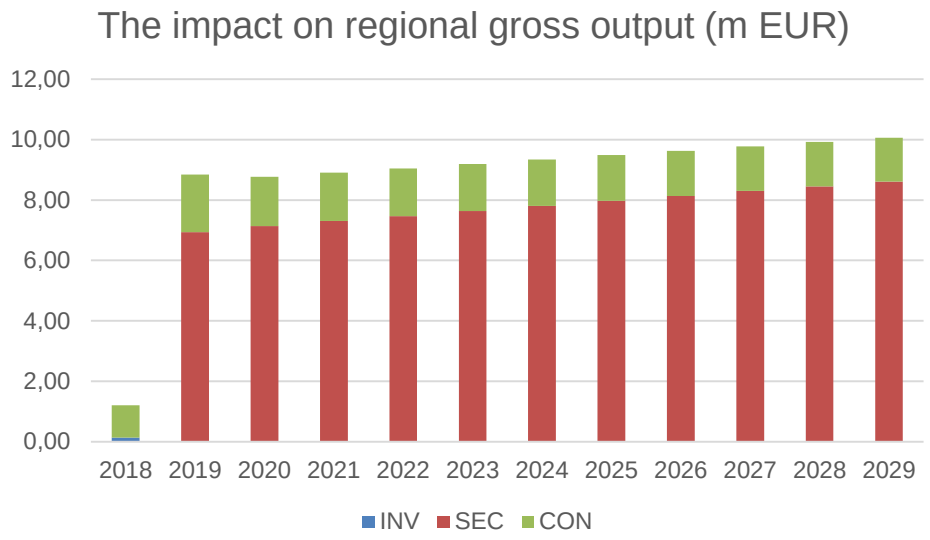
Treatment – medical assessment, diagnosis, cartilage printing, implantation.
Support services – logistics, medical hotel, food, rehabilitation.
Aftercare services – monitoring, consulting

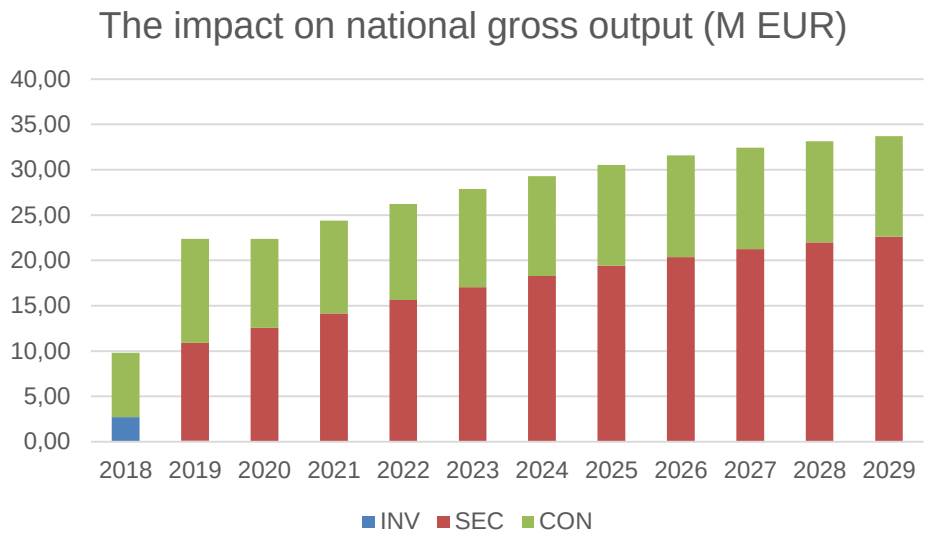
SHOCKS ASSOCIATED WITH THE NEW SECTOR

- The impact is the difference between the baseline and the scenario simulation

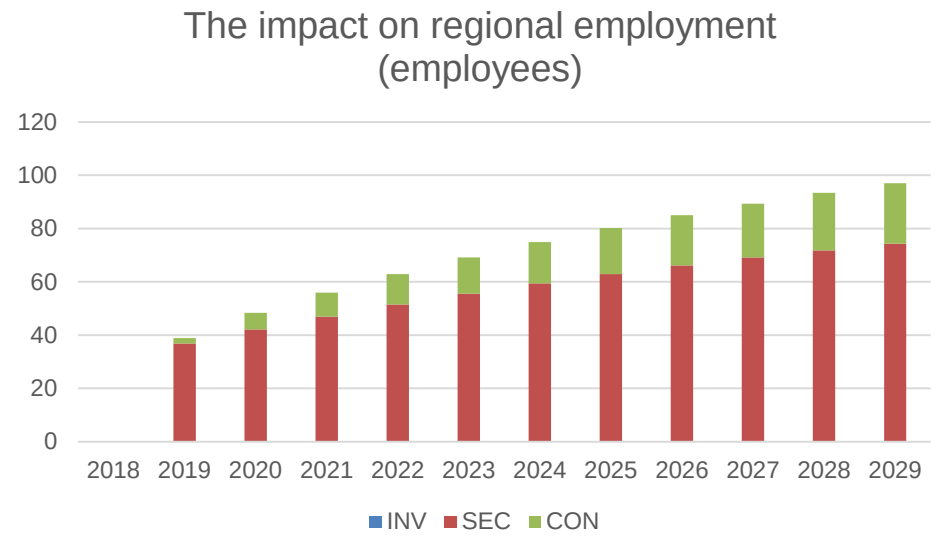
- Scenario: 1000 patients per year (full capacity utilization)
- Labor shock
  - 15 new employees (252 thousand EUR annually)
- Investment in the new sector in 2018 (equipment, construction): 2.6 million EUR
  - Source: foreign grant (e.g. EU funds)
- Investment in a new hotel and a restaurant in 2018: 4.4 million EUR
  - Source: foreign grant (e.g. EU funds)
- Consumption shock (of the new sector) between 2019-2029: 4.9 million EUR (annually)
  - Source: foreign patients (1000 patients per a year)
- Tourism shock between 2019-2029: 1.7 million EUR (annually)
  - Source: foreign patients (1000 people – staying for 4-13 days per visit)

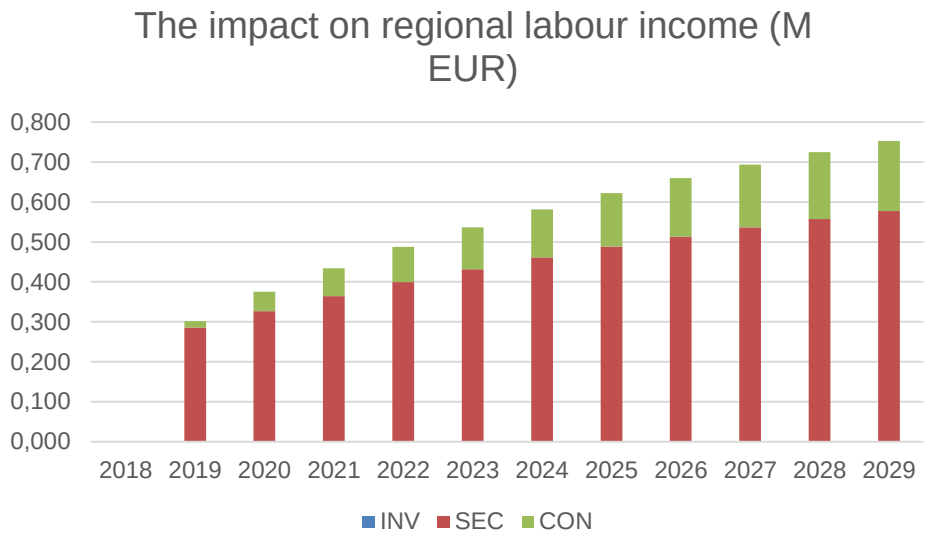
IMPACTS ON OUTPUT





IMPACTS ON EMPLOYMENT AND WAGES





PLANS FOR FURTHER DEVELOPMENTS IN THE METHODOLOGY

In the example simulation the shock is relatively moderate (compared to the new activity's potential): 2-3 patients per day

Additional investigations:

- The impacts of increasing demand for 3D bioprinting
  - Including the impacts when capacities (production, local services, etc.) implied by increasing demand are adjusted

- Economic impact assessment of the policy interventions to improve regional conditions for increasing the new activity's spillover capacity (generating new firm formation)
  - Entrepreneurship development
  - Human capital development
  - Improving physical accessibility
  - Increasing R&D activity
  - Improving the access to interregional knowledge networks

- Impact analyses for additional new activities and cross-activity comparisons of the costs of interventions with regional and national economic impacts

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