



Assessing Europe's Entrepreneurial Ecosystems and Simulating Policy Interventions

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Basic aims of FIRES



- To analyze the **broader contexts of smart, inclusive and sustainable growth** in Europe to support implementation of the Commission's 'Europe 2020' growth strategy and to restore Europe's **ability to innovate, grow and create jobs** over the coming decades
- to examine the role of entrepreneurship in creating an inclusive and sustainable growth.
- WP 4: to develop the tools to assess the quality of the entrepreneurial ecosystems in the EU



Entrepreneurship ecosystem and „traditional” entrepreneurship approaches



Entrepreneurship Ecosystem (EE) approach

- Multi-contextual perspective –system elements are closely connect to each other
 - Changing one element has an effect on other elements
- Unit of analysis: smaller regions, cities
- Focus on high impact entrepreneurial activities
- Tailor-made policy suggestions

Traditional approaches

- Contextual perspective – focusing on the environmental components individually
 - Examining the effect of the element independently - one by one
- Unit of analysis: mostly countries
- Focus on startups in general
- Policy suggestions are mostly uniform (one size fits to all)



Entrepreneurship ecosystem measure The Regional Entrepreneurship and Development Index (REDI)



- According to Acs et al. (2014), *'A System of Entrepreneurship (SE) is the dynamic, institutionally embedded interaction between entrepreneurial attitudes, abilities, and aspirations, by individuals, which drives the allocation of resources through the creation and operation of new ventures'* (p. 119).
- **REDI as EE measurement**
 - The REDI index incorporates three sub-indices, 14 different pillars, 28 variables – half institutional and half individual – 44 indicators and 60 sub-indicators.
 - Sub-indicator selection was based on
 - (1) the theoretical and empirical literature search to be able to connect the sub-indicator to an entrepreneurial phenomenon,
 - (2) their potential to assign clear benchmarks and evaluate performance in relation to this benchmark
 - (3) their capabilities to connect to economic development and
 - (4) the availability of data over the examined time period, 2007-2014.
 - Some important aspects – university, mentoring, support, and leadership are missing



Sub-indexes	Pillars	Variables (ind./inst.)	Entrep. Ecosystem component
ATTITUDES SUB-INDEX	OPPORTUNITY PERCEPTION	OPPORTUNITY RECOGNITION	MARKET/REGULATION
		MARKET AGGLOMERATION	
	STARTUP SKILLS	SKILL PERCEPTION	HUMAN CAPITAL/EDUCATION
		QUALITY OF EDUCATION	
	RISK ACCEPTANCE	RISK PERCEPTION	CULTURAL FACTORS/REGULATION
		BUSINESS RISK	
NETWORKING	KNOW ENTREPRENEUR	NETWORKS	
	SOCIAL CAPITAL		
CULTURAL SUPPORT	CARRIER STATUS	CULTURAL FACTORS	
	OPEN SOCIETY		
ABILITIES SUB-INDEX	OPPORTUNITY STARTUP	OPPORTUNITY MOTIVATION	REGULATION
		BUSINESS ENVIRONMENT	
	TECHNOLOGY ADOPTION	TECHNOLOGY LEVEL	KNOWLEDGE CREATION/DISSEMINATION
		ABSORPTIVE CAPACITY	
	HUMAN CAPITAL	EDUCATIONAL LEVEL	HUMAN CAPITAL/EDUCATION
		EDUCATION AND TRAINING	
COMPETITION	COMPETITORS	INFRASTRUCTURE	
	BUSINESS STRATEGY		
ASPIRATION SUB-INDEX	PRODUCT INNOVATION	NEW PRODUCT	KNOWLEDGE CREATION/DISSEMINATION
		TECHNOLOGY TRANSFER	
	PROCESS INNOVATION	NEW TECHNOLOGY	KNOWLEDGE CREATION/DISSEMINATION
		TECHNOLOGY DEVELOPMENT	
	HIGH GROWTH	GAZELLE	INFRASTRUCTURE FINANCE
		CLUSTERING	
GLOBALIZATION	EXPORT	MARKET	
	CONNECTIVITY		
FINANCING	INFORMAL INVESTMENT	FINANCE	

REDI – the system perspective – the connection of the components



- Indicators within one variables are substitutes reflecting to the same phenomenon – we calculate the average values
- Variables within one pillar have a (multiplicative) effect together - we calculate pillars as multiplying the individual and the institutional variables
- System performance is ‘co-produced’ by its constituent elements: The 14 pillars are inter-related and all support the functioning of the EE together.



Entrepreneurship ecosystem: The Regional Entrepreneurship and Development Index (REDI)



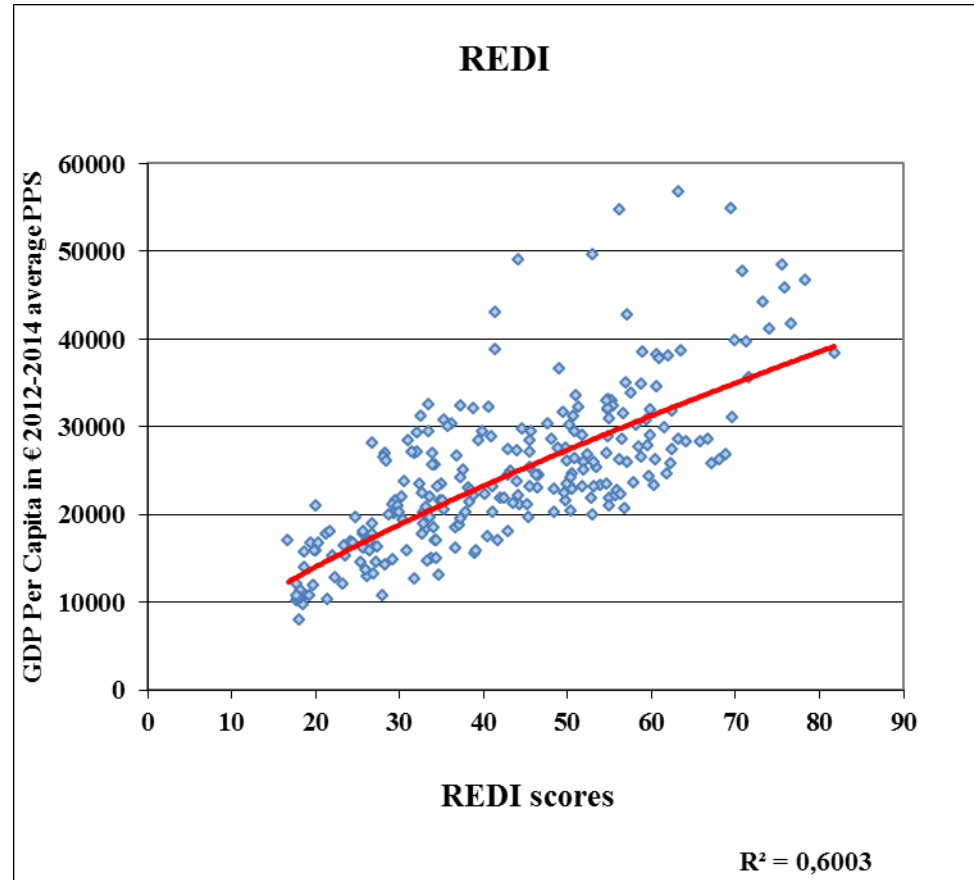
- In EE, it is the combination of the pillar components that ultimately determines the functioning of the system.
 - The value of each pillar in a region is penalized by linking it to the score of the “bottleneck” pillar that has the weakest performance in that region.
 - The penalty is higher if differences are higher. It also implies that the pillar components are only partially substitutable with one another.
- Entrepreneurship policy should be tailor-made by identifying local bottlenecks and narrow or eliminate gaps that prevent a given region from fully exploiting its entrepreneurial potential.
 - REDI complements to other case-preferred EE approaches by taking a wider, bird-eye and not a microscopic view about the EE and its components.
 - This entrepreneurship policy to alleviate system failures reflects well to the traditional economic policy to relax market failures and to the innovation system approach to improve the weak part of the innovation systems components



REDI ranking

Rank	REGION	REDI	GDP	Rank	REGION	REDI	GDP	Rank	REGION	REDI	GDP
1	Stockholm	78,3	46725	43	North West (UK)	50,4	24150	85	Illes Balears	34,3	25675
2	Hovedstaden	76,6	41675	44	Région wallonne	50,3	23300	86	Región Północno-Zachodni	34,2	17050
3	London	75,5	48450	45	Niedersachsen	50,3	30125	87	Region Północny	33,7	15025
4	Southern and Eastern	71,3	39675	46	Zahodna Slovenija	50,0	26125	88	Centro (IT)	33,5	29400
5	Île de France	70,8	47650	47	Schleswig-Holstein	49,8	27500	89	Nord-Ovest	33,5	32450
6	Helsinki-Uusimaa	70,0	39875	48	Westösterreich	49,0	36575	90	Andalucía	33,2	18375
7	South East (UK)	69,6	31050	49	Länsi-Suomi	48,9	27475	91	Lithuania	32,8	18925
8	Hamburg	69,5	54900	50	Sjælland	48,4	22900	92	Cantabria	32,7	22425
9	Sydsverige	65,8	28275	51	Lisboa	48,1	28600	93	Centro (PT)	32,7	17800
10	West-Nederland	63,5	38675	52	Südösterreich	47,6	30350	94	Nord-Est	32,6	31150
11	Région de Bruxelles-Capitale	63,2	56775	53	Ouest (FR)	46,6	24475	95	Aragón	31,9	26975
12	Berlin	62,4	31825	54	Nord - Pas-de-Calais	46,4	23075	96	Region Wschodni	31,8	12650
13	South West (UK)	62,3	25750	55	Smaland med öarna	45,6	28375	97	Közép-Magyarország	31,1	28400
14	Baden-Württemberg	62,0	38050	56	Est (FR)	45,5	23225	98	Principado de Asturias	30,3	21925
15	Syddanmark	61,6	29875	57	Norra Mellansverige	45,5	27125	99	Macroregiunea trei	29,9	20975
16	Bayern	60,6	38250	58	Méditerranée	45,4	25300	100	Galicia	29,5	21625
17	Scotland	60,5	26300	59	Estonia	45,3	19625	101	Región de Murcia	29,3	20100
18	Border, Midland and Western	60,4	23350	60	Rheinland-Pfalz	44,6	29725	102	Canarias (ES)	29,2	21100
19	Östra Mellansverige	59,9	29025	61	North East (UK)	44,3	21100	103	Attiki	28,3	26950
20	Vastsverige	59,8	31925	62	Bratislavský kraj	44,2	49050	104	La Rioja	28,2	26550
21	Hessen	58,9	38500	63	Bassin Parisien	44,1	23700	105	Západné Slovensko	26,7	18950
22	East of England	58,7	26475	64	Pohjois- ja Itä-Suomi	43,2	24900	106	Isola	26,7	17825
23	Centre-Est (FR)	58,5	27700	65	Vzhodna Slovenija	43,0	18025	107	Stredné Slovensko	26,5	15800
24	Midtjylland	58,2	30150	66	Region Centralny	43,0	24475	108	Extremadura	26,1	16975
25	East Midlands (UK)	57,9	23600	67	Thüringen	41,1	23175	109	Macroregiunea unu	26,1	12900
26	Zuid-Nederland	57,6	33850	68	Cataluna	40,9	28875	110	Vychodné Slovensko	26,0	13725
27	Bremen	57,1	42700	69	Region Poludniowy	40,5	17400	111	Sud	25,7	17700
28	Ostösterreich	56,9	35000	70	Mecklenburg-Vorpommern	40,2	22325	112	Kontinentalna Hrvatska (Conti	25,6	16150
29	Saarland	56,7	31550	71	Mellersta Norrland	39,9	29425	113	Castilla-la Mancha	24,7	19600
30	Nordjylland	56,5	28625	72	Pais Vasco	38,8	32075	114	Jadranska Hrvatska (Adriatic C	23,5	15225
31	Noord-Nederland	55,3	33000	73	Czech Republic	38,8	22175	115	Macroregiunea patru	22,3	12825
32	Northern Ireland (UK)	55,0	21825	74	Sachsen-Anhalt	38,2	22975	116	Voreia Ellada	22,0	15250
33	Nordrhein-Westfalen	54,8	33050	75	Sud-Ouest (FR)	37,6	25000	117	Nyugat-Dunántúl	21,6	18000
34	Övre Norrland	54,8	31875	76	Alentejo	37,1	18750	118	Macroregiunea doi	21,4	10350
35	West Midlands (UK)	54,0	23250	77	Latvia	36,7	16200	119	Nisia Aigaiou, Kriti	21,3	17800
36	Etelä-Suomi	52,4	26775	78	Region Poludniowo-Zachodni	36,7	18500	120	Kentriki Ellada	20,0	15825
37	Oost-Nederland	51,8	29075	79	Comunidad Foral de Navarra	36,2	30375	121	Dél-Dunántúl	19,8	11900
38	Yorkshire and The Humber	51,8	23100	80	Algarve	35,4	20550	122	Észak-Magyarország	18,9	10725
39	Vlaams Gewest	51,3	32175	81	Brandenburg	35,1	23400	123	Közép-Dunántúl	18,8	15750
40	Comunidad de Madrid	51,1	33575	82	Comunidad Valenciana	34,9	21500	124	Észak-Alföld	18,2	11300
41	Sachsen	50,5	24575	83	Castilla y León	34,6	23150	125	Dél-Alföld	17,7	12100
42	Wales	50,4	20400	84	Norte	34,3	17075				

The connection between REDI and economic development



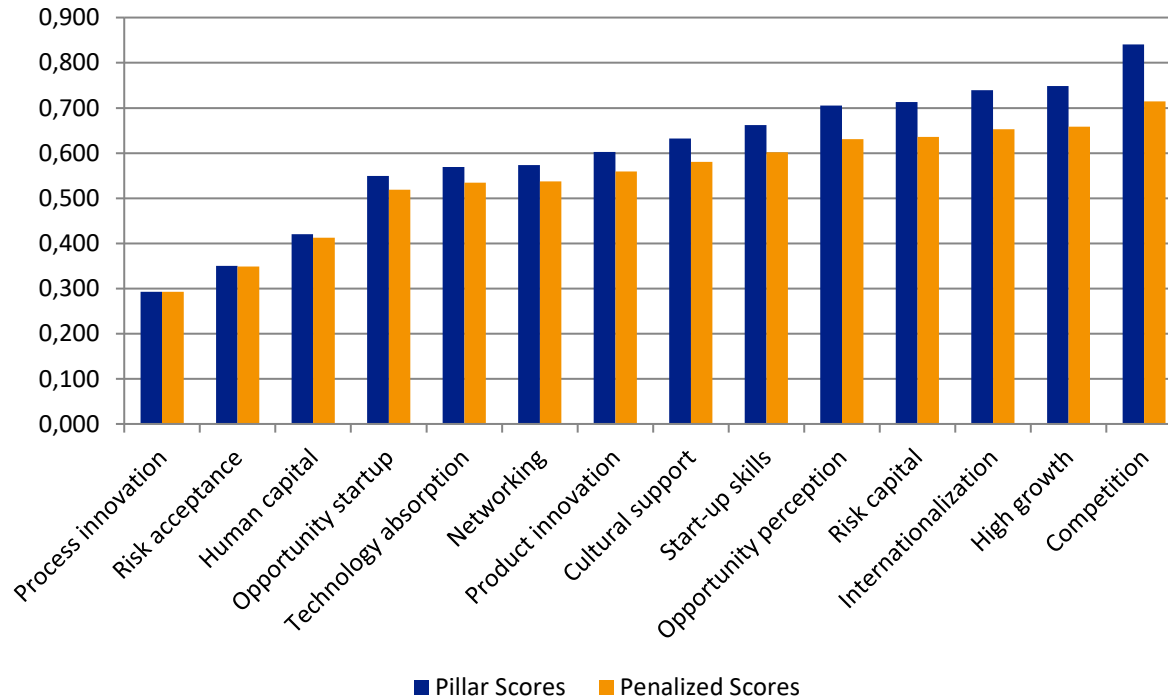
REDI penalty - Nordrhein-Westfalen



Pillar Name	Pillar Scores	Penalized Scores	Penalty Scores	Penalty %
Opportunity perception	0,705	0,631	0,074	10,56%
Start-up skills	0,662	0,602	0,061	9,15%
Risk acceptance	0,351	0,349	0,002	0,47%
Networking	0,574	0,538	0,036	6,27%
Cultural support	0,632	0,581	0,052	8,16%
Opportunity startup	0,549	0,519	0,030	5,51%
Technology absorption	0,569	0,534	0,035	6,15%
Human capital	0,420	0,412	0,008	1,85%
Competition	0,841	0,715	0,126	15,00%
Product innovation	0,603	0,559	0,043	7,21%
Process innovation	0,293	0,293	0,000	0,00%
High growth	0,749	0,659	0,090	11,99%
Internationalization	0,740	0,653	0,086	11,69%
Risk capital	0,713	0,636	0,077	10,82%
Average	0,600	0,549	0,073	7,49%



REDI penalty - Nordrhein-Westfalen



REDI 10% increase- Nordrhein-Westfalen



Pillar Name	Pillar Scores	Penalized Scores	Improvement	New Pillar score	New penalized Pillar score
Opportunity perception	0,705	0,631	0,000	0,705	0,704
Start-up skills	0,662	0,602	0,000	0,662	0,662
Risk acceptance	0,351	0,349	0,109	0,460	0,438
Networking	0,574	0,538	0,000	0,574	0,569
Cultural support	0,632	0,581	0,000	0,632	0,632
Opportunity startup	0,549	0,519	0,000	0,549	0,543
Technology absorption	0,569	0,534	0,000	0,569	0,565
Human capital	0,420	0,412	0,040	0,460	0,438
Competition	0,841	0,715	0,000	0,841	0,826
Product innovation	0,603	0,559	0,000	0,603	0,601
Process innovation	0,293	0,293	0,167	0,460	0,438
High growth	0,749	0,659	0,000	0,749	0,745
Internationalization	0,740	0,653	0,000	0,740	0,737
Risk capital	0,713	0,636	0,000	0,713	0,712
Average	0,600	0,549	0,023	0,623	0,615





The economic effects of entrepreneurship policy



Economic models in policy impact assessment



- Economic impact assessment of policies:
 - ex-ante (policy design phase)
 - likely economic effects (e.g., on employment, GDP) of interventions
 - comparative analysis of the effects of different interventions requiring the same policy budget
 - ex-post (monitoring, evaluation)
- Evaluation is beyond the immediate project-level: consideration of input-output linkages, income multipliers, technological spillovers



Economic models in policy impact assessment



- Impact assessment with economic models:
 - Baseline (no intervention)
 - Policy scenario (intervention)
 - Comparison of the baseline and the scenario (in relative terms)



Economic models for entrepreneurship policy impact assessment



- A suitable economic impact model should incorporate:
 - a variable representing entrepreneurship policy: it is the REDI index in our case
 - the regional dimension (entrepreneurship policy interventions are regionally targeted)
 - interregional interactions (trade, migration, technology spillovers)
 - the aggregate national and supra national (EU) levels (it is important to know how much a country or the European Union gains from policies supporting entrepreneurship)
- With multi-regional models the economic impacts of different development scenarios become comparable at regional and supra-regional levels both ex ante and ex post



GMR economic impact models



- **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, Szabó 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)



Policy instruments in the GMR-Europe policy impact assessment model



- Traditional policy instruments in GMR-EU:
 - private investment subsidies
 - R&D and human capital support

- novel instruments in GMR-EU:
 - entrepreneurship development
 - global knowledge networks development



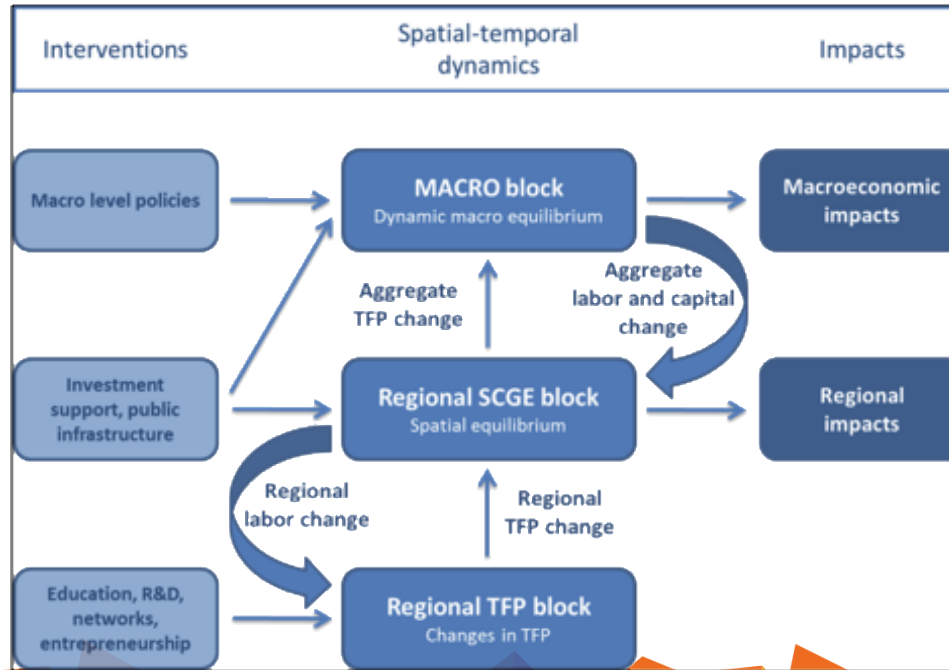
The structure of GMR models



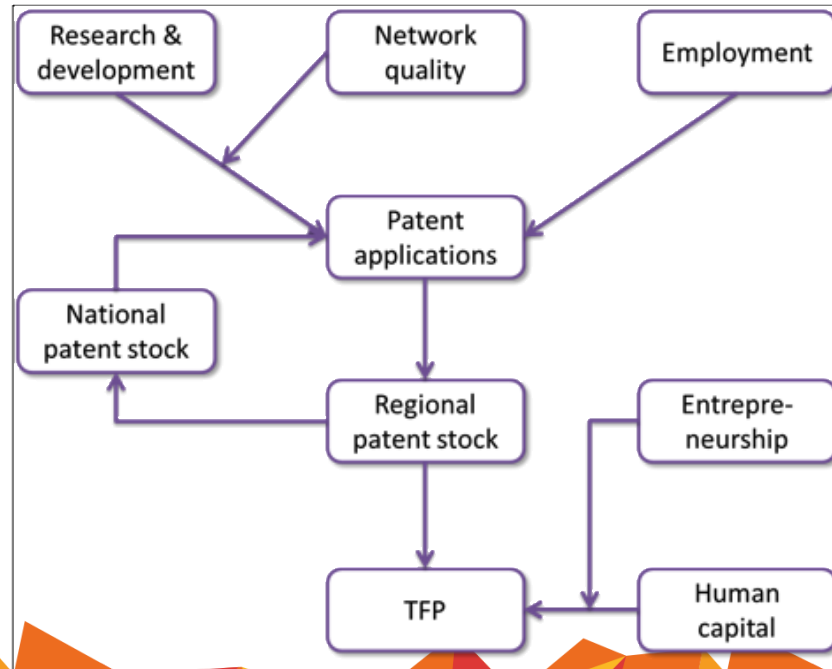
- the regional Total Factor Productivity (TFP) block – policy impact on productivity
- the regional Spatial Computable General Equilibrium (SCGE) block – policy impact on regional economic variables (GDP, employment, etc.)
- the macroeconomic (MACRO) block – policy impacts at the macro level



Regional and macroeconomic impact mechanisms in the GMR-Europe model



The schematic structure of the TFP block



Modeling the impact of the entrepreneurial ecosystem on TFP



- Entrepreneurship is measured by the REDI index
- Our formulation follows the knowledge spillover theory of entrepreneurship (Acs et al. 2009):
 - entrepreneurs transfer knowledge to economic applications therefore a better entrepreneurial climate intensifies firm formation and TFP growth





Growth or convergence? Simulations of the effects of alternative regional entrepreneurship policies



The target of the simulations



- We explore the growth and convergence effects of entrepreneurship development policies
- Three countries in focus:
 - Germany (Western Europe)
 - Italy (Southern Europe)
 - Hungary (Central Europe)



Growth or convergence? Simulations of the effects of alternative regional entrepreneurship policies



1. The uniform solution: REDI increases uniformly (10%) in each region of each country
2. Country optimization: resources of the “uniform” solution reallocated average REDI at the country level
3. Poorest regions scenario: resources of the “uniform” solution reallocated to the least entrepreneurial regions in each country



Growth or convergence? Simulations of the effects of alternative regional entrepreneurship policies



Economic impacts depend on:

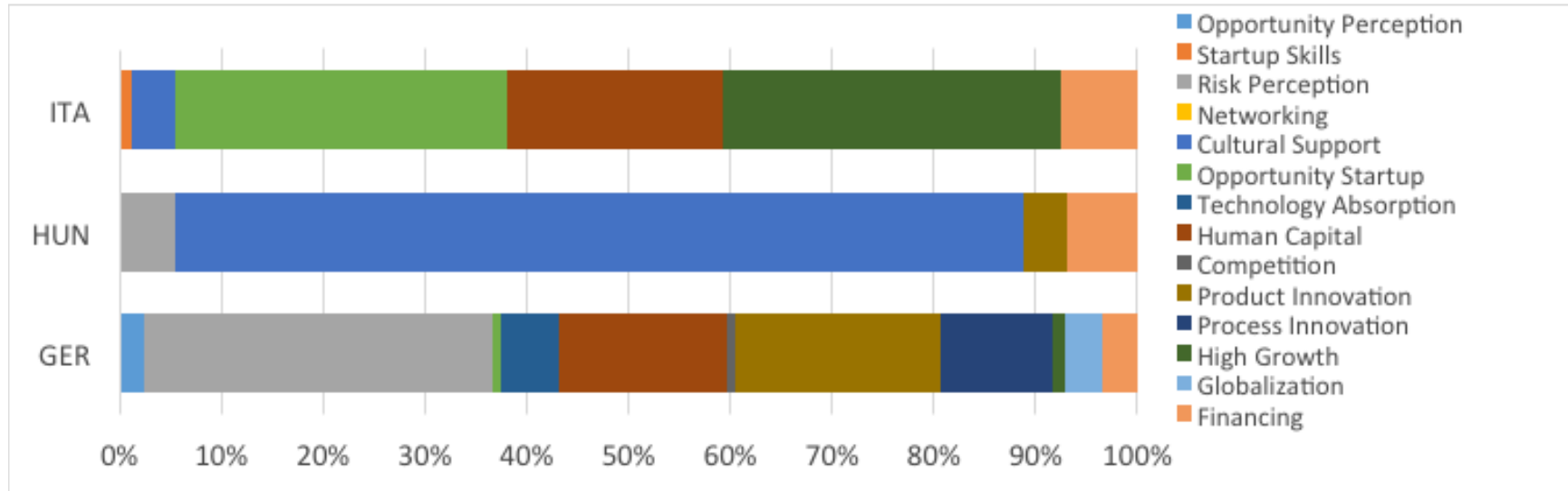
- the size of the REDI shock
- the size of REDI in the region
- human capital development in the region
- trends in human capital change
- the implied employment, migration, investment and interregional trade effects



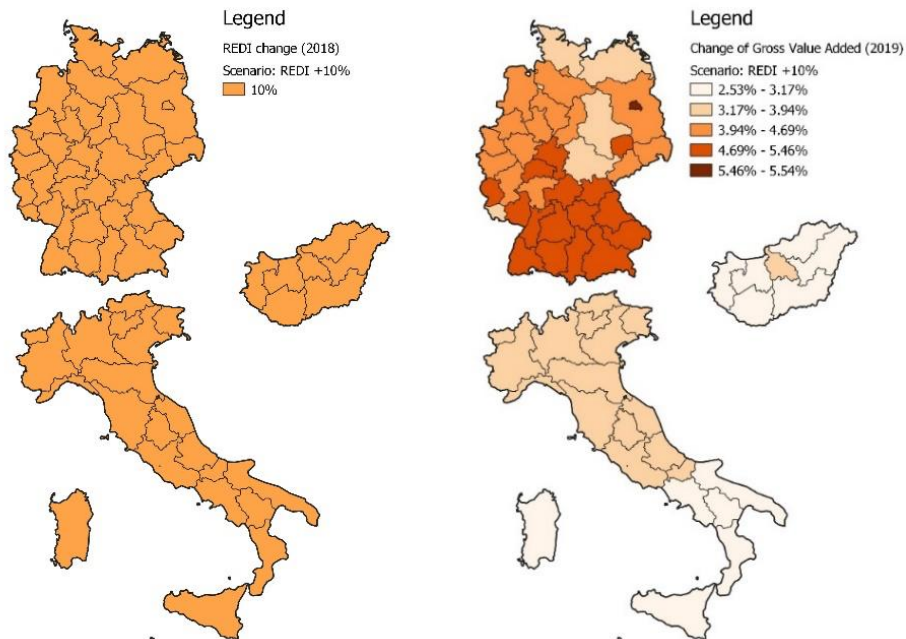
1. The uniform solution



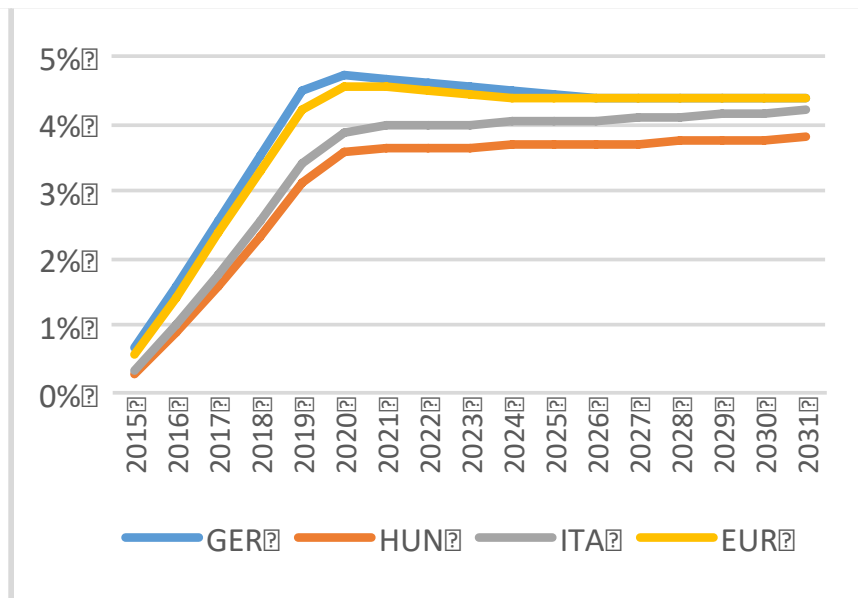
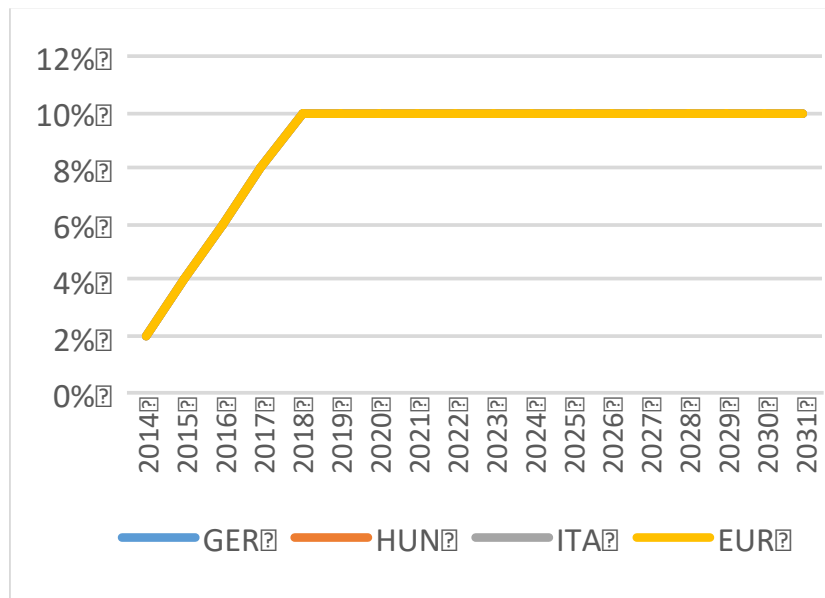
The uniform solution: Country level distributions of additional efforts among the REDI pillars



The uniform solution: impacts on REDI (left-hand panel) and GVA (right-hand panel)



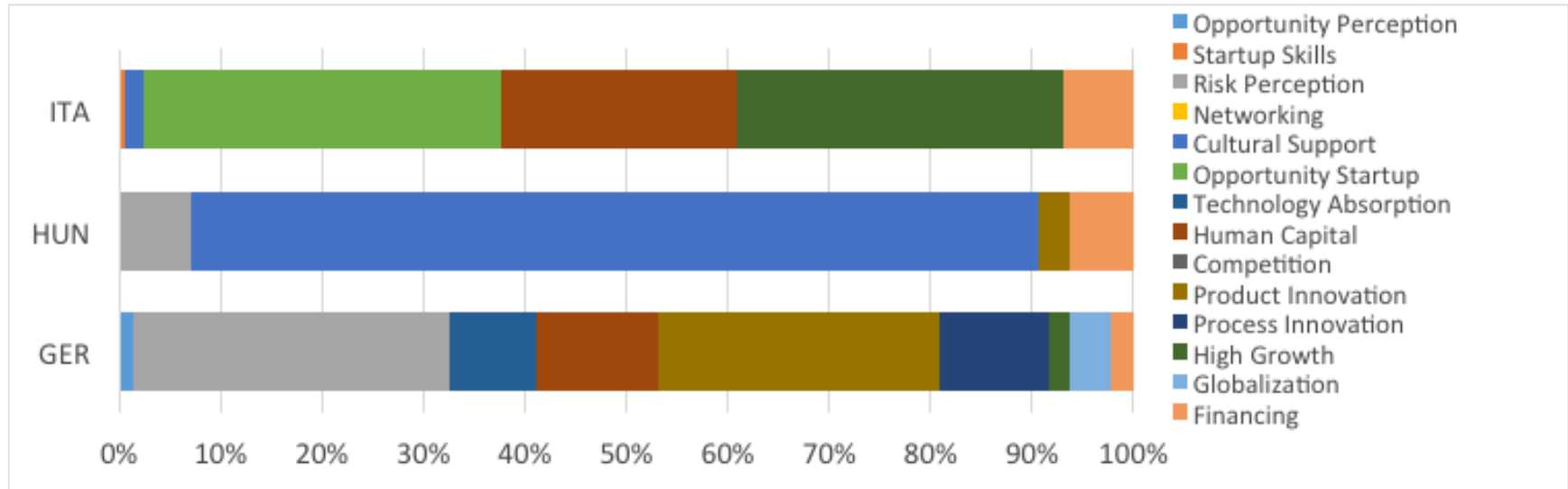
The uniform solution: national impacts on REDI (left-hand panel) and GVA (right-hand panel)



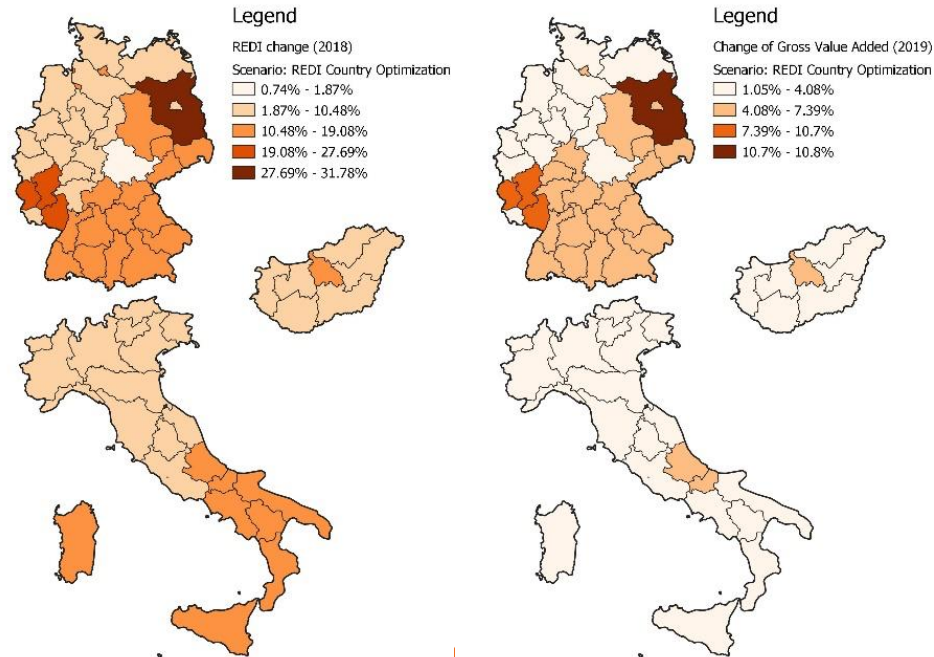
2. Country optimization



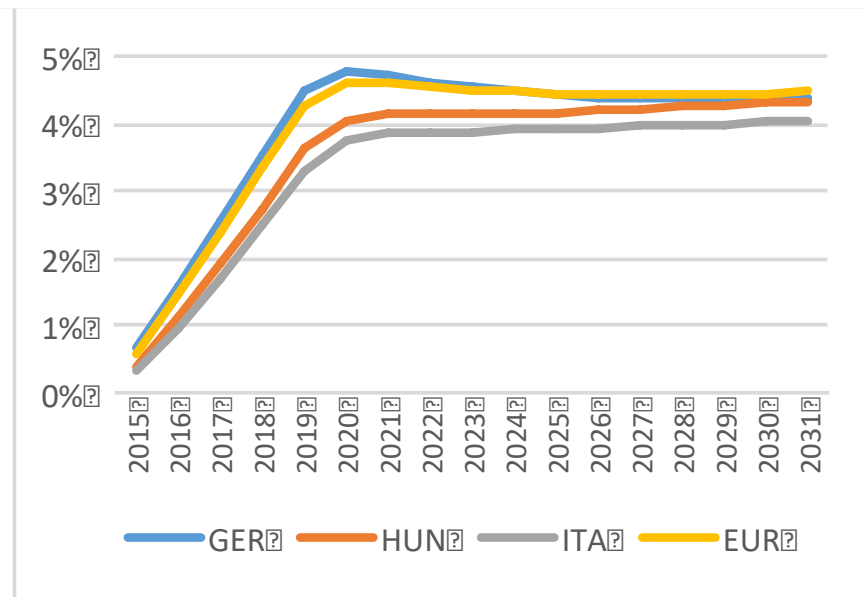
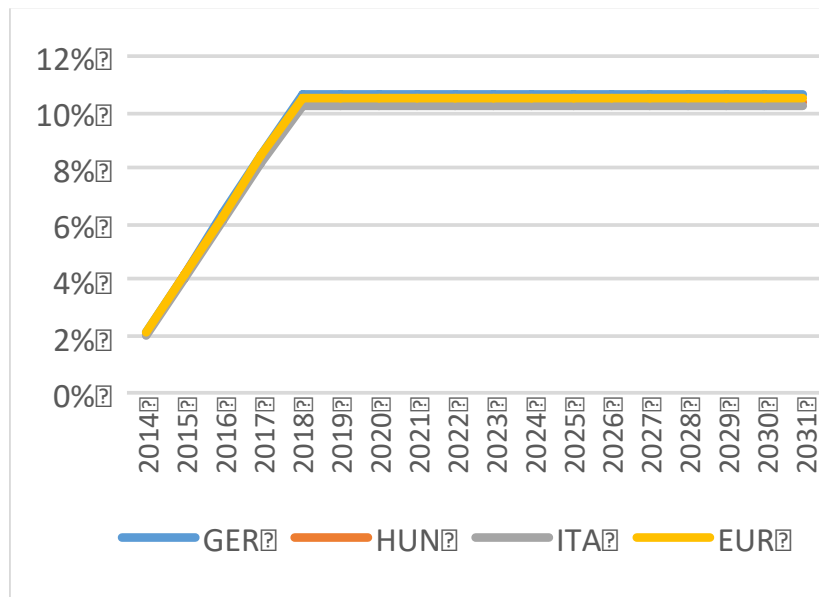
Country optimization: Country level distributions of additional efforts among the REDI pillars



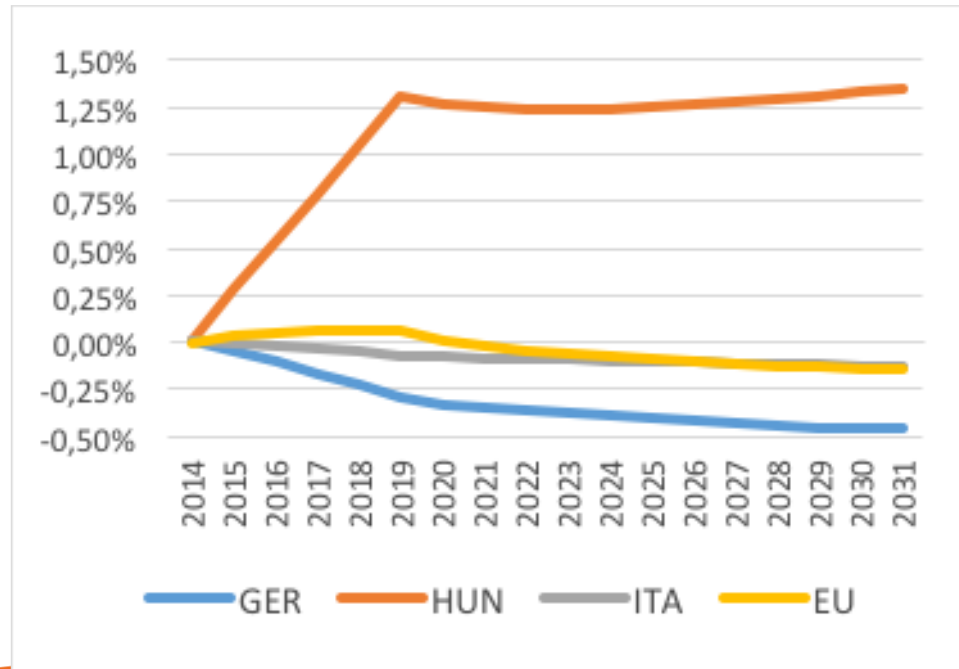
Country optimization: impacts on REDI (left-hand panel) and GVA (right-hand panel)



Country optimization: national impacts on REDI (left-hand panel) and GVA (right-hand panel)



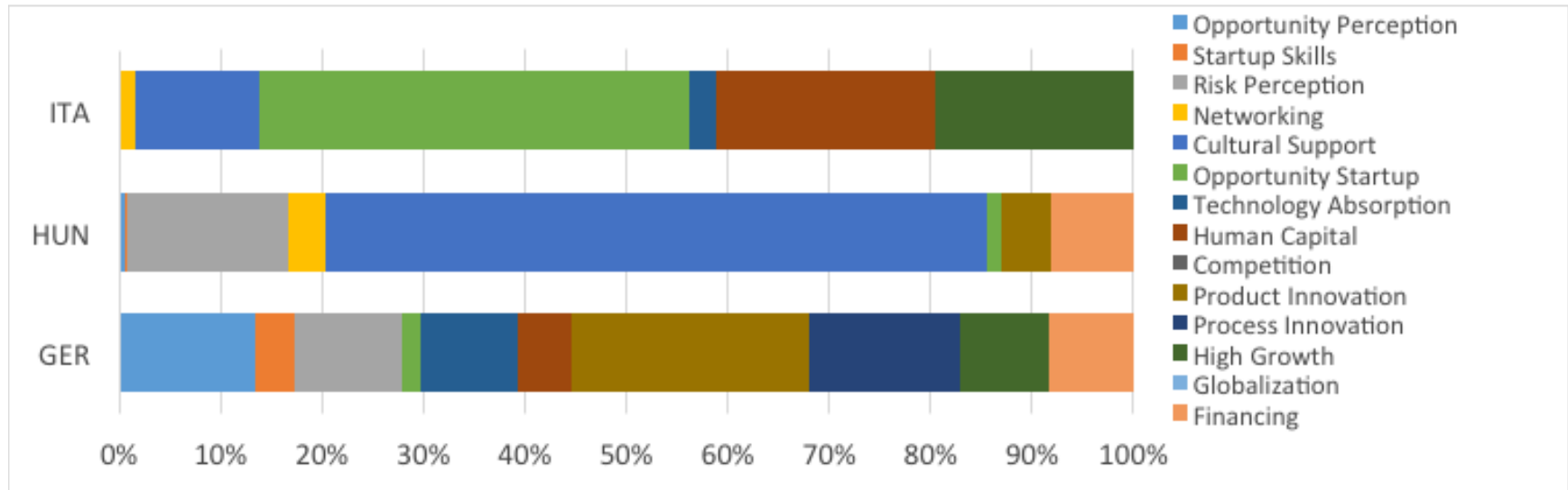
Country optimization: the convergence impacts (GINI coefficients)



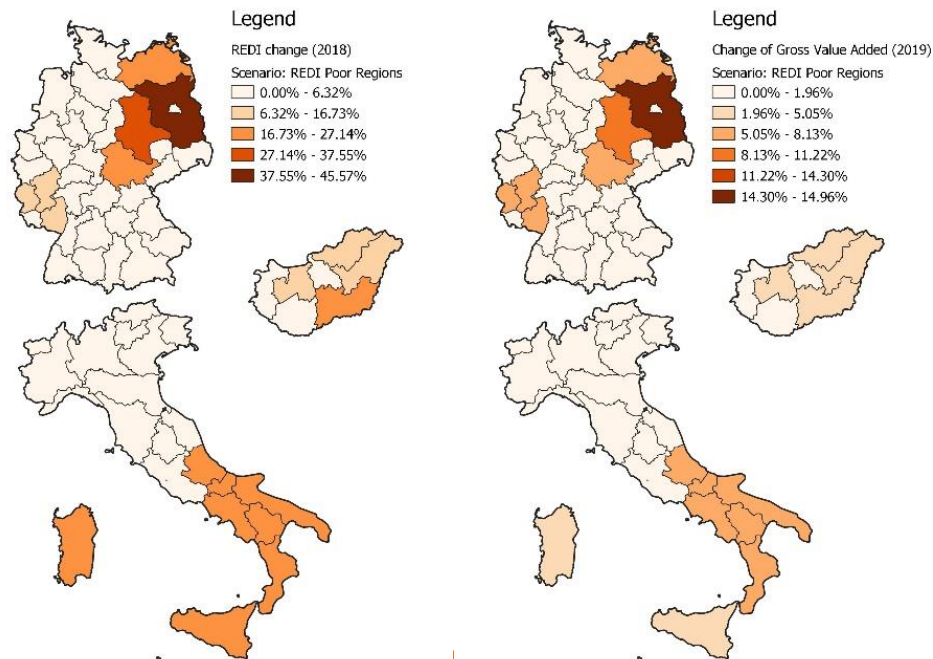
3. Poorest regions



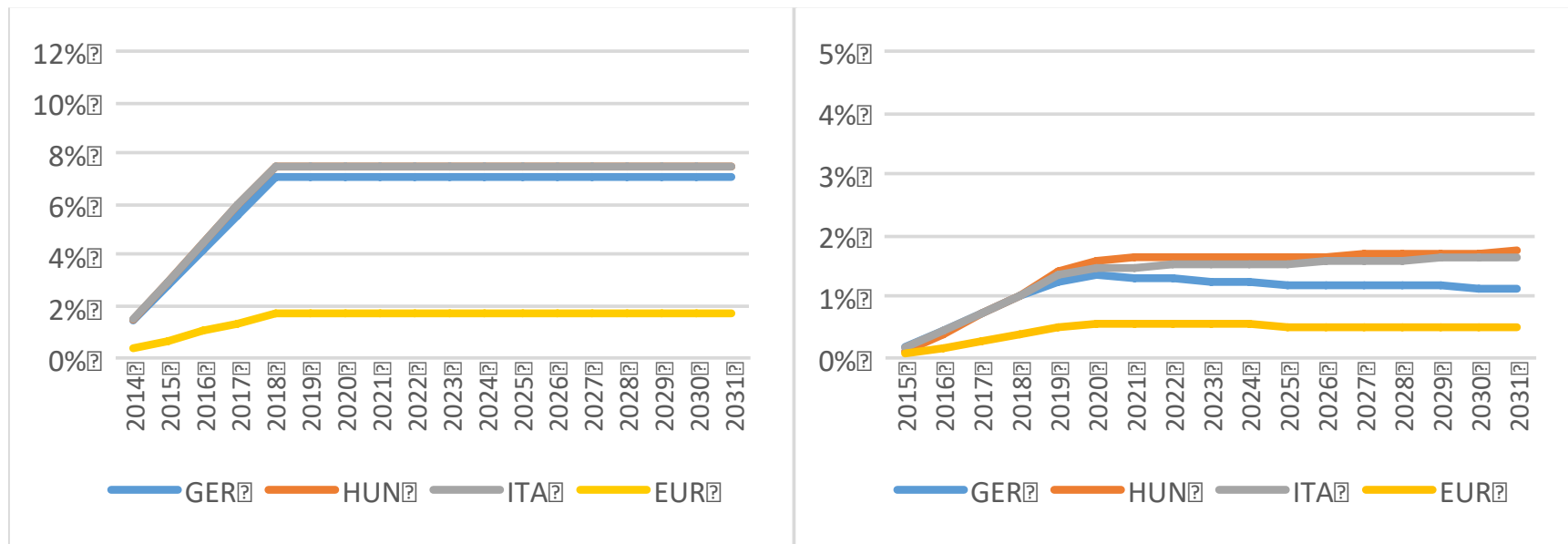
Poorest regions: Country level distributions of additional efforts among the REDI pillars



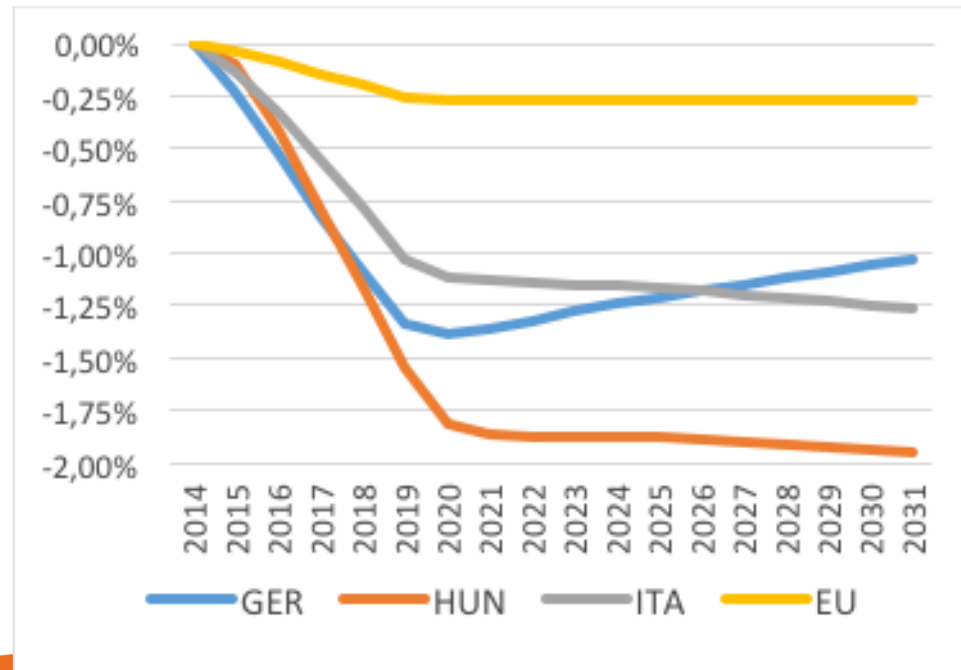
Poorest regions: impacts on REDI (left-hand panel) and GVA (right-hand panel)



Poorest regions: national impacts on REDI (left-hand panel) and GVA (right-hand panel)



Poorest regions: the convergence impacts (GINI coefficients)



Policy learning



1. A successful high-growth entrepreneurship development requires the allocation of additional support to regions characterized by both high initial level of entrepreneurship (REDI) and skilled human capital.



Policy learning



2. Promoting entrepreneurship in underdeveloped regions can successfully decrease regional inequalities, and increase convergence at the cost of lower national economic growth.



Policy learning



3. There is no clear ‘best practice’ recipe of entrepreneurship development. Countries/regions with different levels of economic and entrepreneurial performance can be developed by focusing additional support on different sources (pillars) of entrepreneurship, as indicated by the REDI index.



Policy learning



4 Areas with high potential for entrepreneurship development do not necessarily coincide with areas with high potential for economic growth. Policy makers should treat economic and entrepreneurial development together to find an optimal balance between the two targets to come up with the best solution.

