Innovation and Business-Academia Collaborations

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Outline

Part I: Theories of innovation, measurement, and policy implications

Part II: Business-academia co-operation

Part I: Outline

Motivation

Models of innovation, innovation in economics paradigms

Policy rationales

- derived from theories
- in the EC/ EU practice

Indicators: neutral measurement tools or heralds of policy concepts?

- the European Innovation Scoreboard

Discussion and conclusions

- a persistent devotion to high-tech and its pitfalls
- the relevance of the systemic view of innovation to underpin policies
- challenges in Turkey and CEE countries – possibilities for mutual learning

Motivation

Contrary to various previous claims, countries do not converge, various patterns can be observed: catching-up, stagnation, falling behind and fluctuations (mixed performance)

The age-old questions are still relevant:

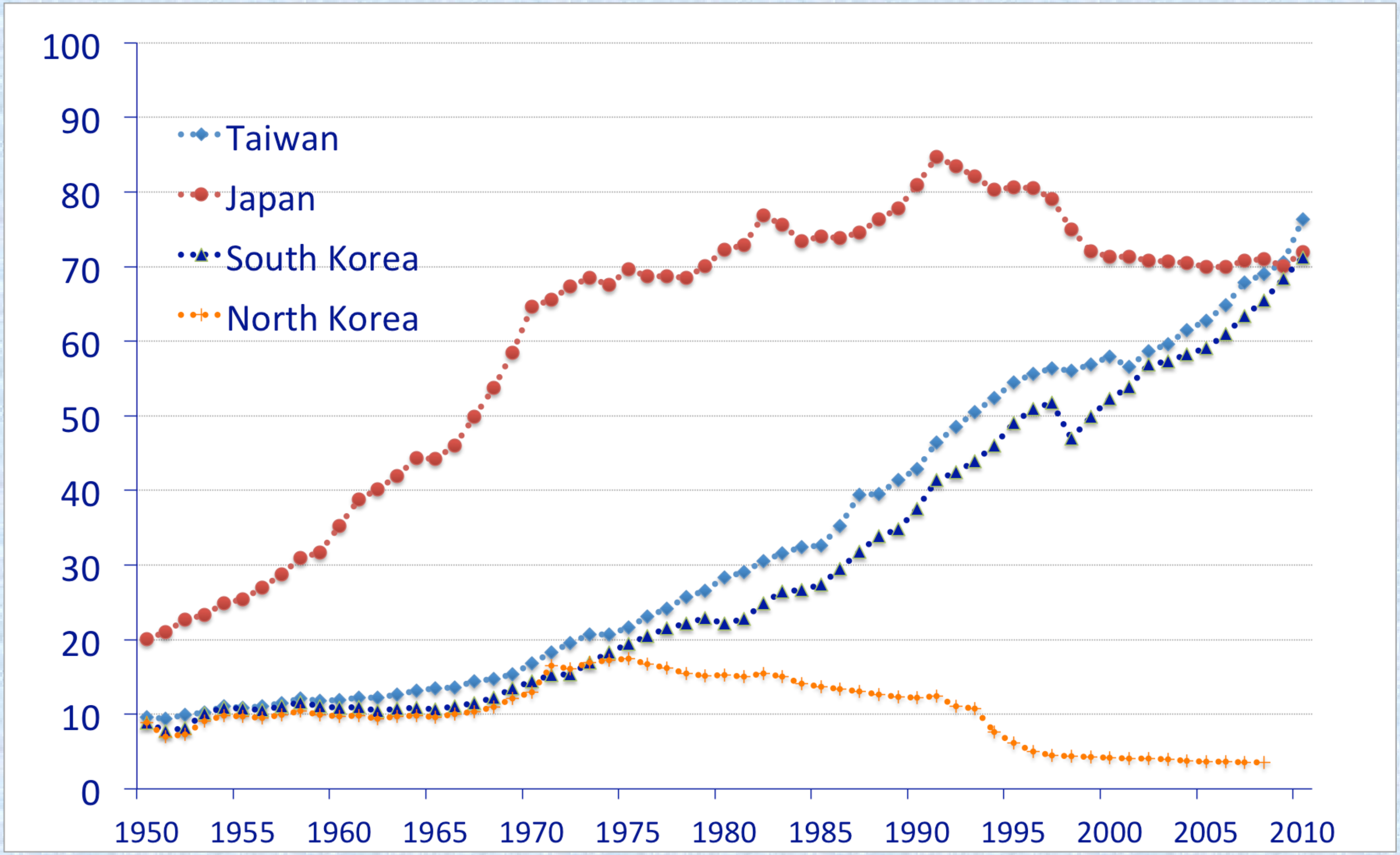
Why some countries are getting persistently richer?

How ‘miracles’ can be performed?

What prevents others to follow suit or at least narrow the gap?

GDP is far from being a perfect measure, but could be a starting point for relevant in-depth analyses

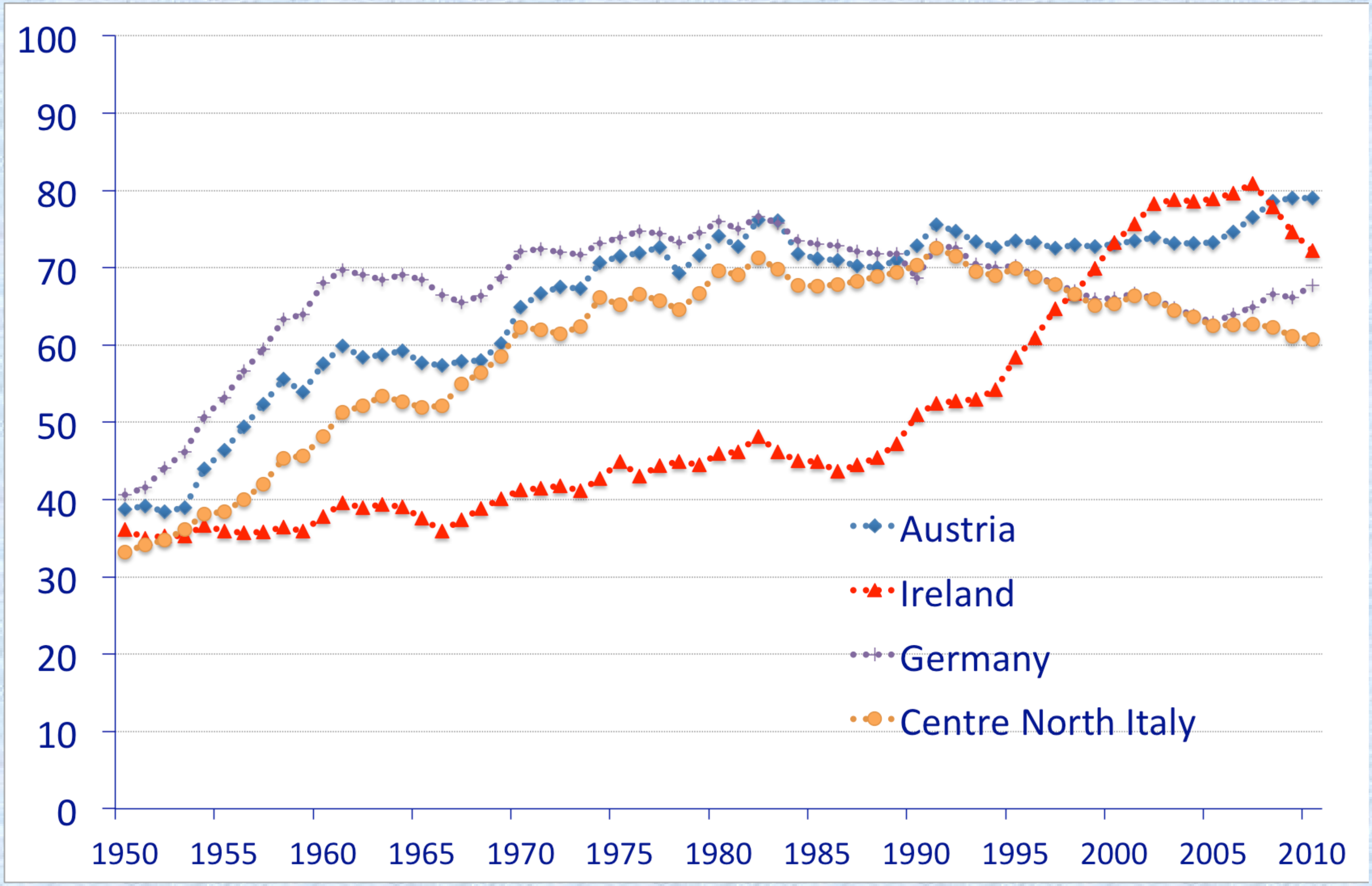
Three Asian 'miracles' and North-Korea



Source: own calculation based on Maddison project data

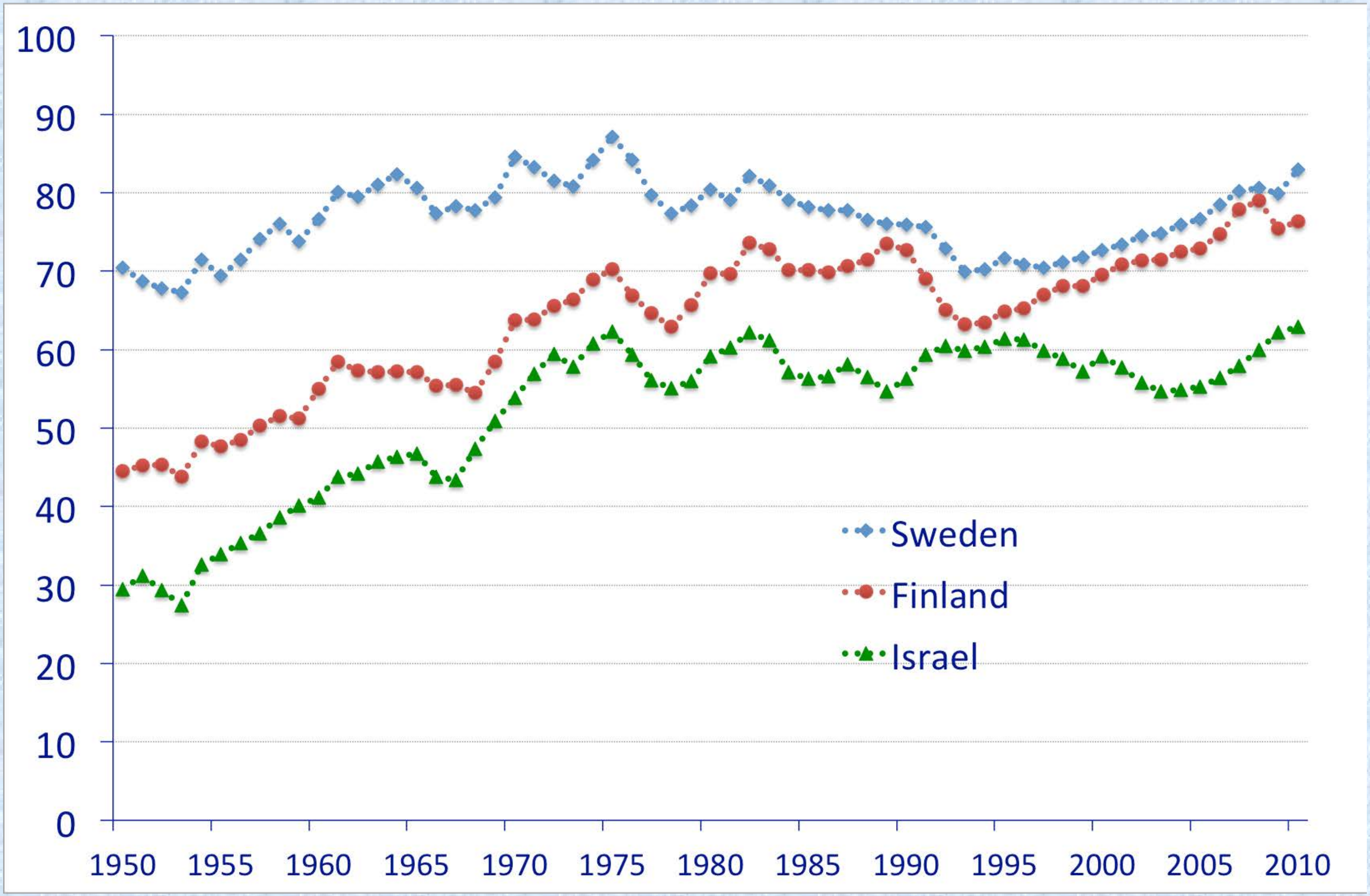
GDP per capita, USA = 100

Four success cases in Western-Europe



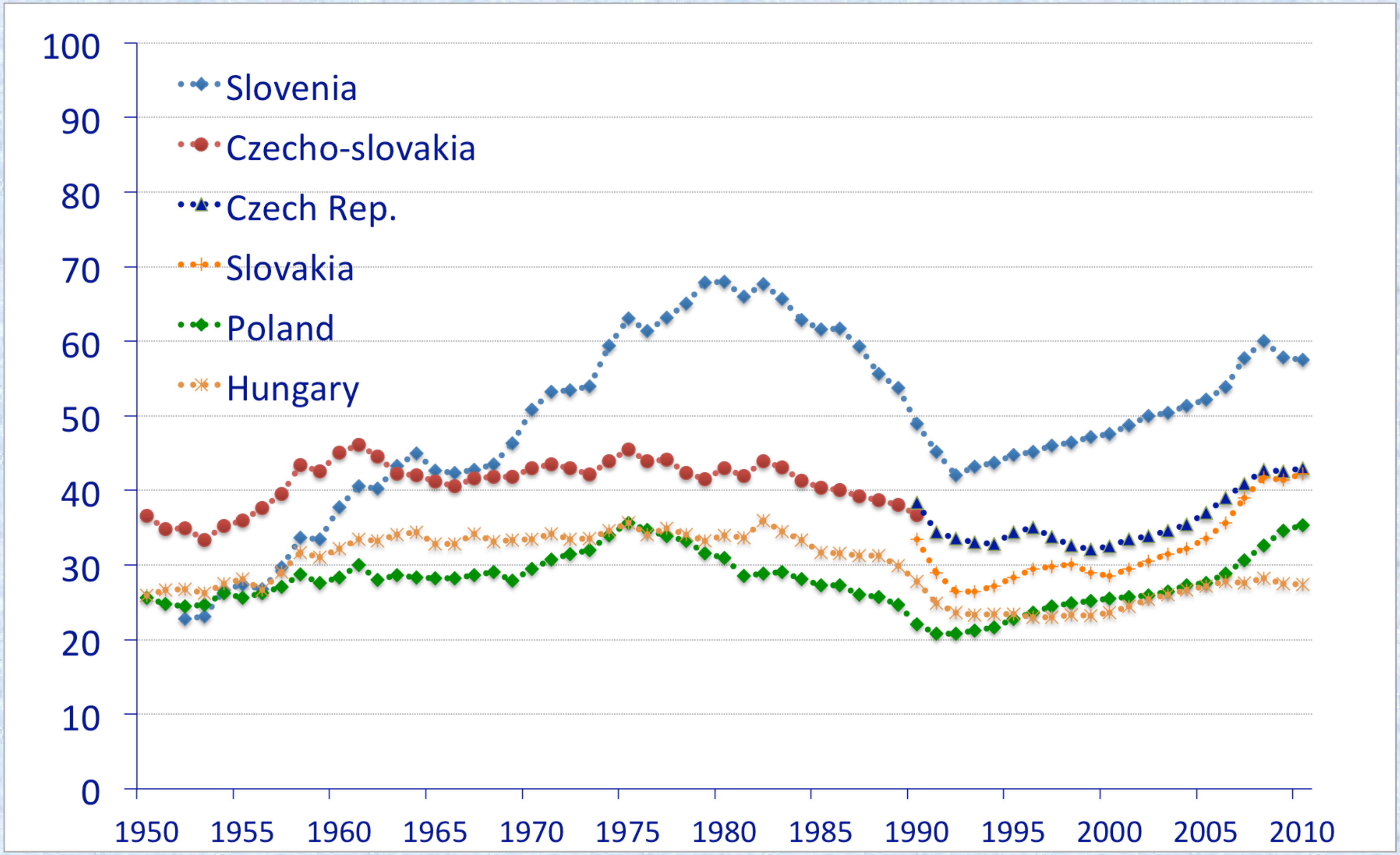
Source: own calculation based on Maddison project data
GDP per capita, USA = 100

Northern-Europe and Israel



Source: own calculation based on Maddison project data
GDP per capita, USA = 100

Central Europe

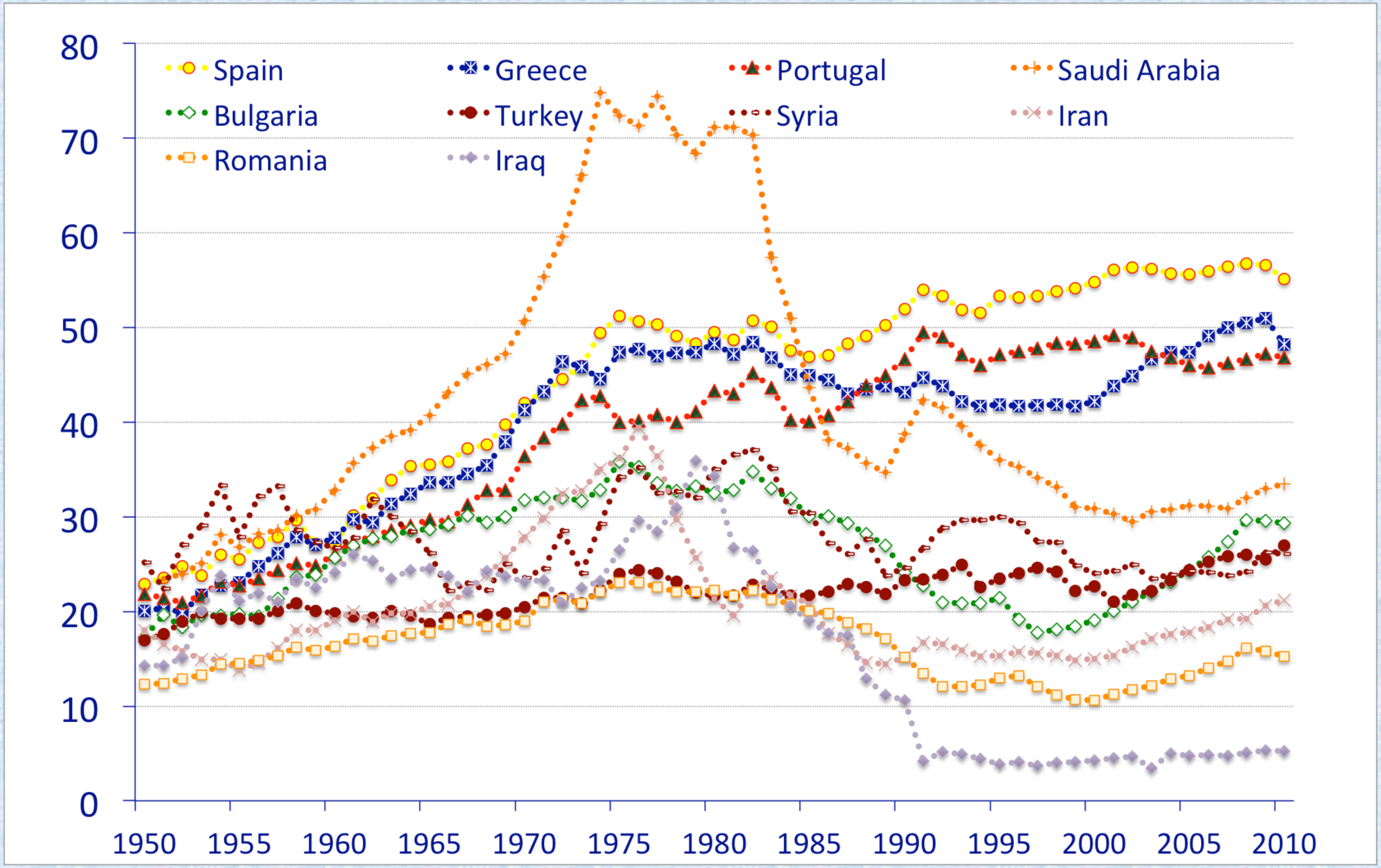


Source: own calculation based on Maddison project data

GDP per capita, USA = 100

Should be a wake-up call for Hungarians – is it?

Middle-East and some EU countries

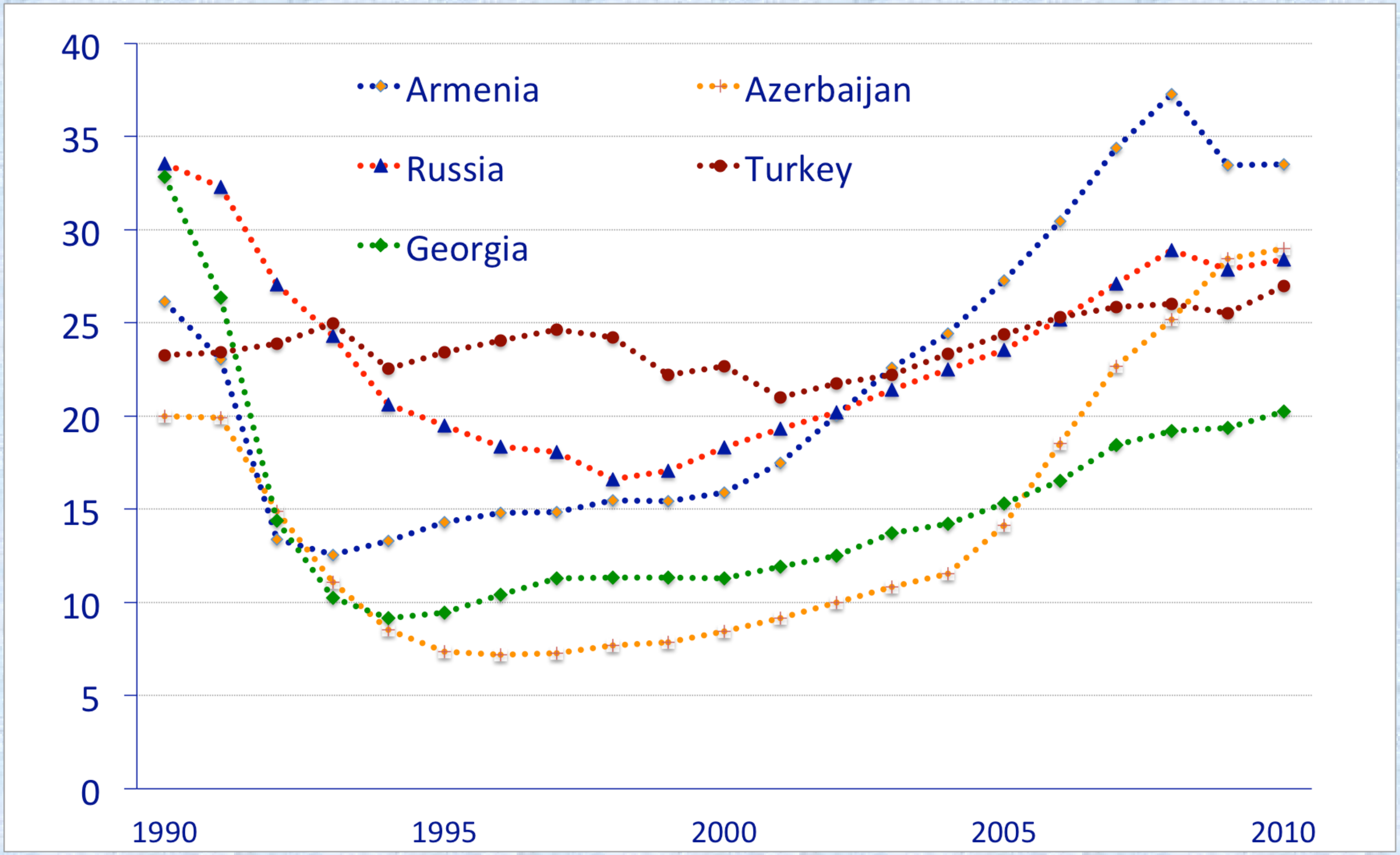


Source: own calculation based on Maddison project data

GDP per capita, USA = 100

Turkey: 10 percentage points improvement; ranked 5-6

Turkey and former Soviet republics



Source: own calculation based on Maddison project data
GDP per capita, USA = 100

Turkey: 4 percentage points improvement; ranked 3

Motivation (2)

Many different explanations and factors:

- natural endowments (Norway vs. …)
- history, external powers, wars
- structural changes, reallocation of production factors (static, or allocative efficiency)
- improved use of production factors (dynamic efficiency)
  - what are the relevant production factors: capital, labour, human capital, social capital?
- ‘expansion’ of existing production factors (a larger number of skilled people), creation of new ones, e.g. radical innovations (‘creative (?) efficiency’)

Various policy approaches

Motivation: types of policy advice

'Best practice', 'one size fits all' recipes, 'silver bullets' or 'panacea' from international organisations, gurus

- get the macroeconomic fundamentals right (Washington consensus)
- invest in high-tech, start-ups, science parks, incubators, …
- introduce IPR (Bayh-Dole Act, tech-transfer offices, …)
- promote clusters
- …

Systemic view:

- actors and the linkages, co-operation among them
- institutions: the rules of the game (guiding behaviour, directing flows), norms, ways of thinking, trust, …
- the role of physical, legal and knowledge infrastructures, framework conditions
- the policy governance sub-system

Motivation: economics paradigms

Rival theories – firm behaviour

managerial implications

Rival theories – policy rationales, policy practice

efficacy of public spending

•EU funds (in the example that follows, but can be generalised)

•potentially strong influence of the EC on national STI policies, especially in the new member states

BUT, *no one-to-one relationship* between a given economics paradigm (or any other theory) and actual policy measures

Other factors influencing policy practice include:

•political, electoral considerations of the incumbent government

•constraints posed by available resources (funds, ideas, policy design and implementation capabilities, etc.)

•influence by other countries' practices, opposition parties, lobbyists, pressure groups, NGOs; activities of charities, foundations

•consultations with stakeholders

Main theses

The systemic view offers a more relevant framework to analyse innovation processes and performance than the science-push (SP) model of innovation

The market failure (MF) argument lends scientific support to the SP of model innovation

Significant opportunity costs of STI policies based on SP and MF

Yet, the SP approach is still highly influential in the EC

- observations, propositions in policy documents
- indicators to monitor/ assess performance

Main theses (2)

Possible reasons:

SP and MF: simple, straightforward reasoning

- can be quantified, looks rigorous compelling
- focal point for orchestrated political action
- Triadic competition

Systemic view: too complex, [can be] perceived as ‘vague’

- hardly any formal models (history-friendly models, simulation)
- no simple, ‘one size fits all’ recipes
- systemic failures: a demanding task to identify them
- dialogues with stakeholders are time-consuming and costly

Sociological factors, too

Policy implications

- non-STI policies have strong(er) impacts on innovation performance
- a daunting challenge to orchestrate them

“There is no single model of the innovation process: enterprises can differ very significantly in their approaches to innovation.” (Smith, 2002)

Models of Innovation

Models of innovation

Linear models

science-push: basic research is the main source of innovation

Basic science → Design and engineering → Manufacturing → Marketing → Sales

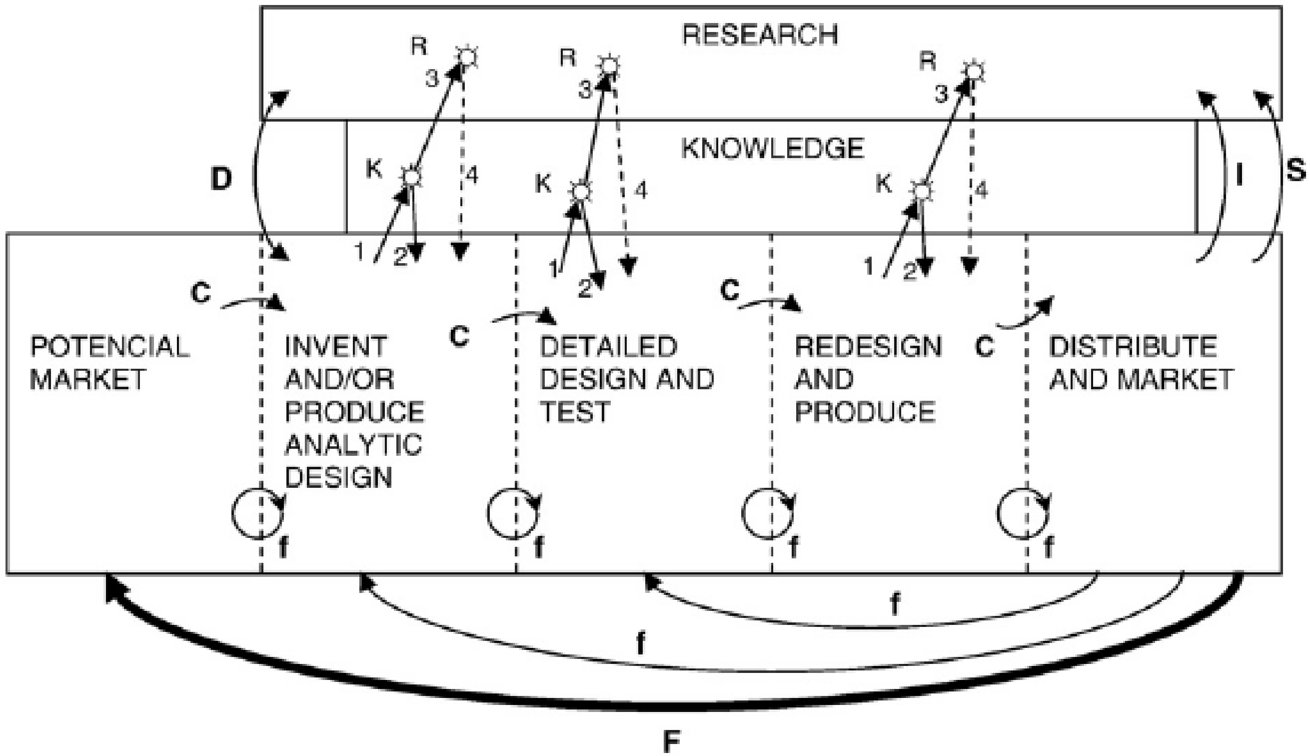
market-pull: demand is the main source of innovation

Market need → Development → Manufacturing → Sales

Models of innovation (2)

Systemic (or: networked) models

- ‘chain-linked’ model
- ‘multi-channel interactive learning model’



Chain-linked model showing flow paths of information and cooperation.
Symbols on arrows: **C** = central-chain-of-innovation; **f** = feedback loops; **F** = particularly important feedback.

K-R: Links through knowledge to research and return paths. If problems solved at node K, link 3 to R not activated. Return from research (link 4) is problematic - therefore dashed line.

D: Direct link to and from research from problems in invention and design.

I: Support of scientific research by instruments, machines, tools, and procedures of technology.

S: Support of research in sciences underlying product area to gain information directly and by monitoring outside work. The information obtained may apply anywhere along the chain.

Fig. 2. The chain-linked model. Source: Kline and Rosenberg (1986), [10].

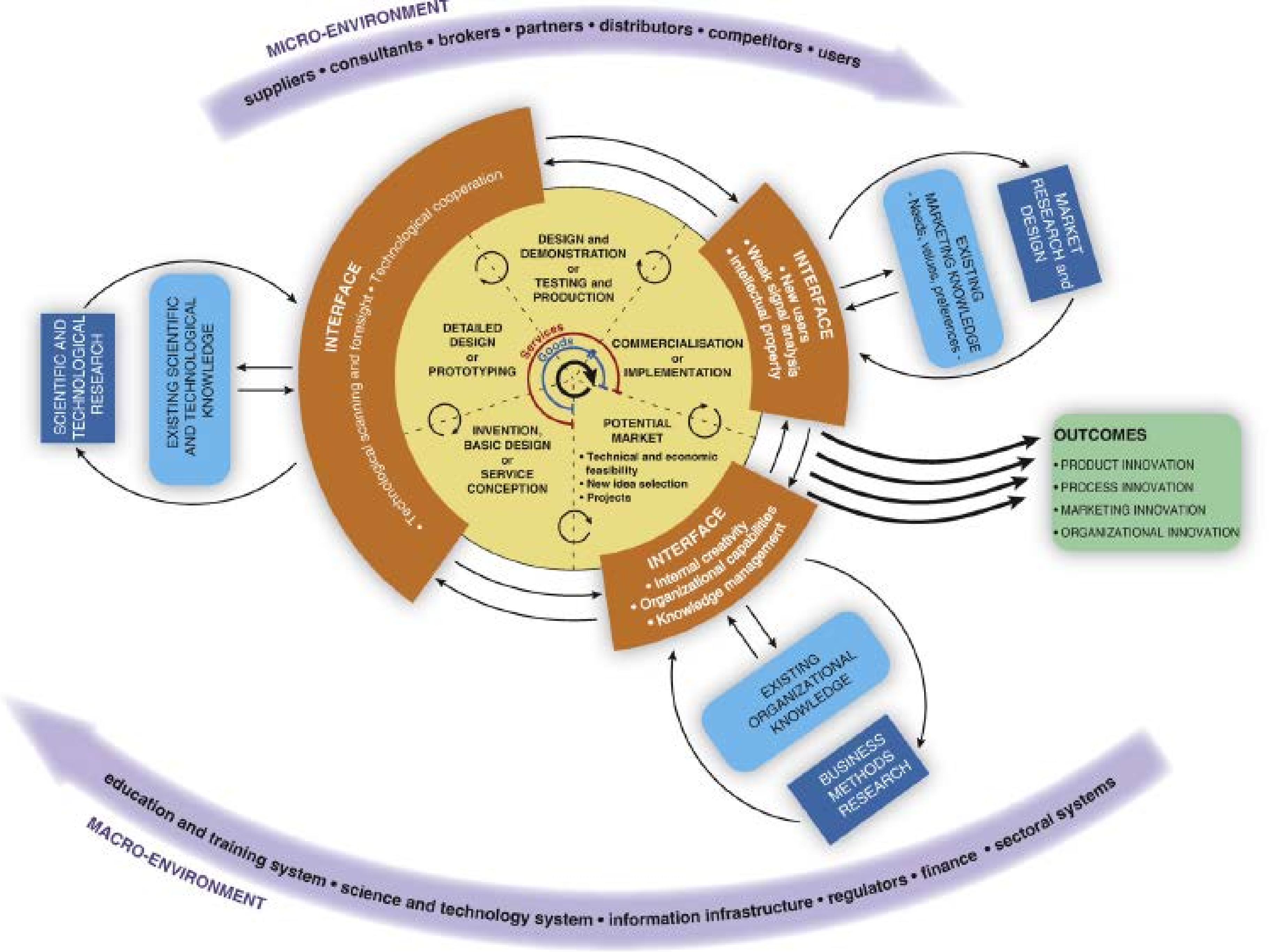


Fig. 3. The multi-channel interactive learning model. Source: J. Caraça et al. (2006), [1] and text.

"From a theoretical perspective, there must be doubts about whether any general theory of innovation is possible." (van de Ven et al., 1999)

Economics of Innovation and Policy Rationales

Classical economics

Technological, organisational, institutional and market changes – including their co-evolution - were central research themes for classical economists

- Adam Smith (1776)
- David Ricardo (1817)
- John Stuart Mill (1848)
- Karl Marx (various)

Neo-classical economics

Allocative efficiency is in the centre of their analysis, that is, a short-term issue.

Technological, organisational, institutional, and market changes are exogenous variables.

Their main new objective was to develop sophisticated models of general equilibrium and by doing so to turn economics into a ‘hard science’, exemplified by Newtonian physics in the 19th century.

Walras (1874/1954, p. 71), for example, perceived “the pure theory of economics or the theory of exchange and value in exchange” as a “physico-mathematical science like mechanics or hydrodynamics” (cited in Clark and Juma, 1988: 206)

Classical vs. neo-classical economics

Two functions of decentralised markets:

- allocation of resources
- transmission of impulses to change

Classical economists had inclined to focus on the latter

"Fundamental dynamic properties such as the relationship between expansion of markets, division of labour, and productivity growth in Smith, or the 'increasing organic composition of capital' in Marx, are examples of a class of propositions argued on the grounds of the *irreversible transformations* originated by processes of what we could call 'dynamic competition'. Moreover, their neglect of explicit microfoundations was justified on the grounds of what we may term a 'holistic' or 'macroinstitutional' assumption about behaviour: it seemed obvious to them that, for example, given an opportunity, capitalists were ready to seize it, or that their 'institutional' function was to invest and accumulate the surplus." (Dosi and Orsenigo, 1988: 14)

Mainstream vs. evolutionary economics

Risk vs. uncertainty (optimisation)

Ahistorical models vs. ‘history counts’
path-dependent, cumulative processes
learning by doing, using and interacting

Information vs. knowledge (codified, tacit) & skills
learning capabilities
  many types and sources of knowledge $\Rightarrow$ collaboration

Representative agents vs. heterogeneity
  learning, path-dependence $\Rightarrow$ diversity

Linear vs. networked (interactive) model of innovation
  V Bush, 1945: science-push model
  (Say’s Law: supply creates its own demand)

Policy implications

Uncertainty $\Rightarrow$ no optimum

'Waste' is inherent in the innovation process

'duplication': (i) learning in a wider circle
(ii) diversity maintained

'error': where not to search

Variety, uncertainty $\Rightarrow$ adaptive policy (policy learning)

Diffusion and exploitation of knowledge is not automatic $\Rightarrow$ adequate policy tools are needed to foster

Co-ordination of various policies affecting innovation processes and performance

Contrasting policy rationales

Market failures in generating new *information*

- unpredictability of knowledge outputs from inputs
- inappropriability of full economic benefits of private investment in knowledge creation
- indivisibility in knowledge production

(Nelson, 1959; Arrow, 1962)

Policy advice (justification for intervention)

- boost private R&D expenditures
  - subsidies
  - protection of intellectual property rights
- fund public R&D activities

Contrasting policy rationales (2)

System failures in generating, diffusing and exploiting *knowledge*

- types and sources of knowledge
  - R&D-based knowledge
  - practical knowledge
    engineering activities: design, scaling up, testing, tooling-up, trouble-shooting; ideas from suppliers and users; inventors' ideas; practical experiments, …
  - knowledge embodied in materials, equipment, software, …
- modes of learning
  - formal (R&D, both intra- and extramural)
  - informal: learning by doing, using and interacting

Properties of innovation systems □ types, quality and frequency of interactions $\Rightarrow$ learning, capabilities to exploit knowledge

Contrasting policy rationales (3)

Policy advice (justification for intervention)

- tackle system failures that hamper generation, diffusion and utilisation of any type of knowledge required for successful innovation
  - promote learning (individuals, organisations)
  - facilitate co-operation, networking to generate and disseminate knowledge

EU STI policy practice

The systems approach has become widespread in academic and policy-making circles, esp. at the EC and the OECD

(Sharif, 2006; Dodgson *et al.*, 2011)

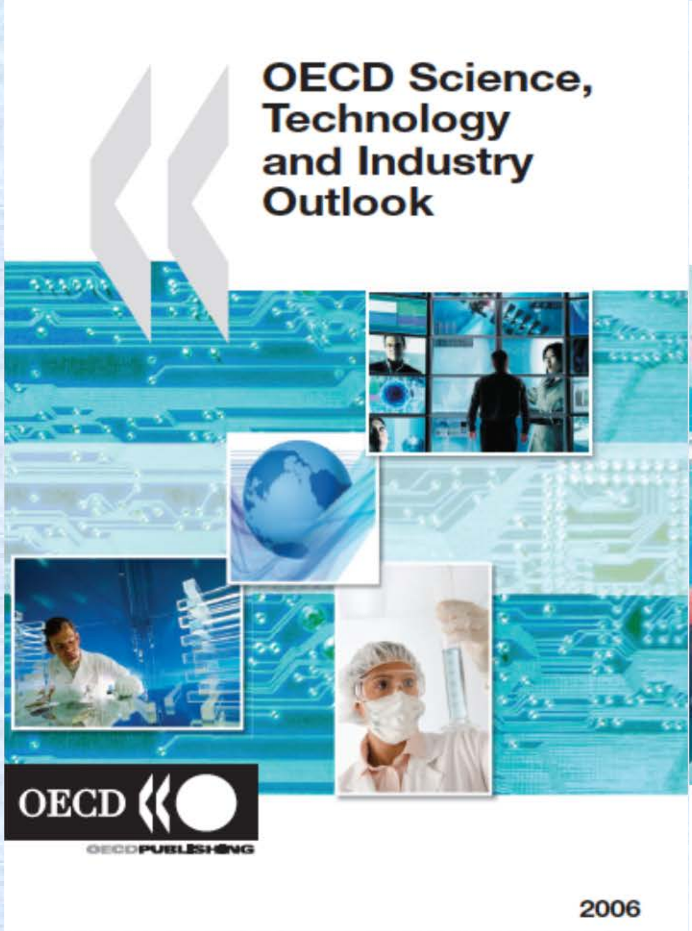
Yet, a persistent devotion to high-tech can be observed

- „Fundamental R&D, mostly undertaken and funded by governments, provides the foundation for future innovation. Science is vital to innovation, especially to generate 'step changes' such as the discovery of the transistor or vaccines." (OECD, 2010: 3-4)
- EC, 2013: „investment in knowledge", „knowledge intensity", „knowledge upgrade"; knowledge = R&D
- images on the covers of EU and OECD publications
- monitoring tools, too

ranking on scoreboards, league tables □ ***attention*** of politicians, policy-makers (opinion leaders)

Eurostat covers

OECD covers



More recently: a new style/ design ⇒ the former one was not the only way

EU STI policy practice (2)

Decision-makers in most EU member states still follow the science-push model of innovation (a recent survey for the European Research and Innovation Area Committee (ERAC): Edquist, 2014a, 2014b)

Indicators:
Neutral Measurement Tools or Heralds of Policy Concepts?

Selection of indicators

Systematic efforts to measure RTDI since the 1960s

Widely used guidelines: Frascati (R&D) , TBP, Oslo (innovation), Patents, and Canberra (HR) Manuals

Yet, it is not straightforward to find the most appropriate way to assess R&D and innovation performance

R&D: a complex, multifaceted process ⇒ it cannot be sufficiently characterised by 2-3 indicators

That applies to innovation *a fortiori*

The choice of indicators: an important decision; reflects the explicit or implicit views of those experts and policy-makers who have chosen them.

⇒ Indicators are ‘subjective’ in that respect, but perceived as ‘objective’ (expressed in numbers)

Composite indicators

Political significance: compress information into a single figure ⇒ eye-catching scoreboards

A major difficulty: choosing an appropriate weight to be assigned to each component

“ (…) even using accepted approaches like BoD [Benefit of the Doubt] or factor analysis may result in drastically changing rankings.” (Grupp and Schubert, 2010, p. 74)

Multidimensional representations, e.g. spider-charts reflect the multidimensional character of innovation processes and performance

⇒ Analysts and policy-makers can identify strengths and weaknesses, and hence more precise targets for policy actions

Modes of innovation

The DISKO survey has identified two modes of innovation (Jensen et al., 2007)

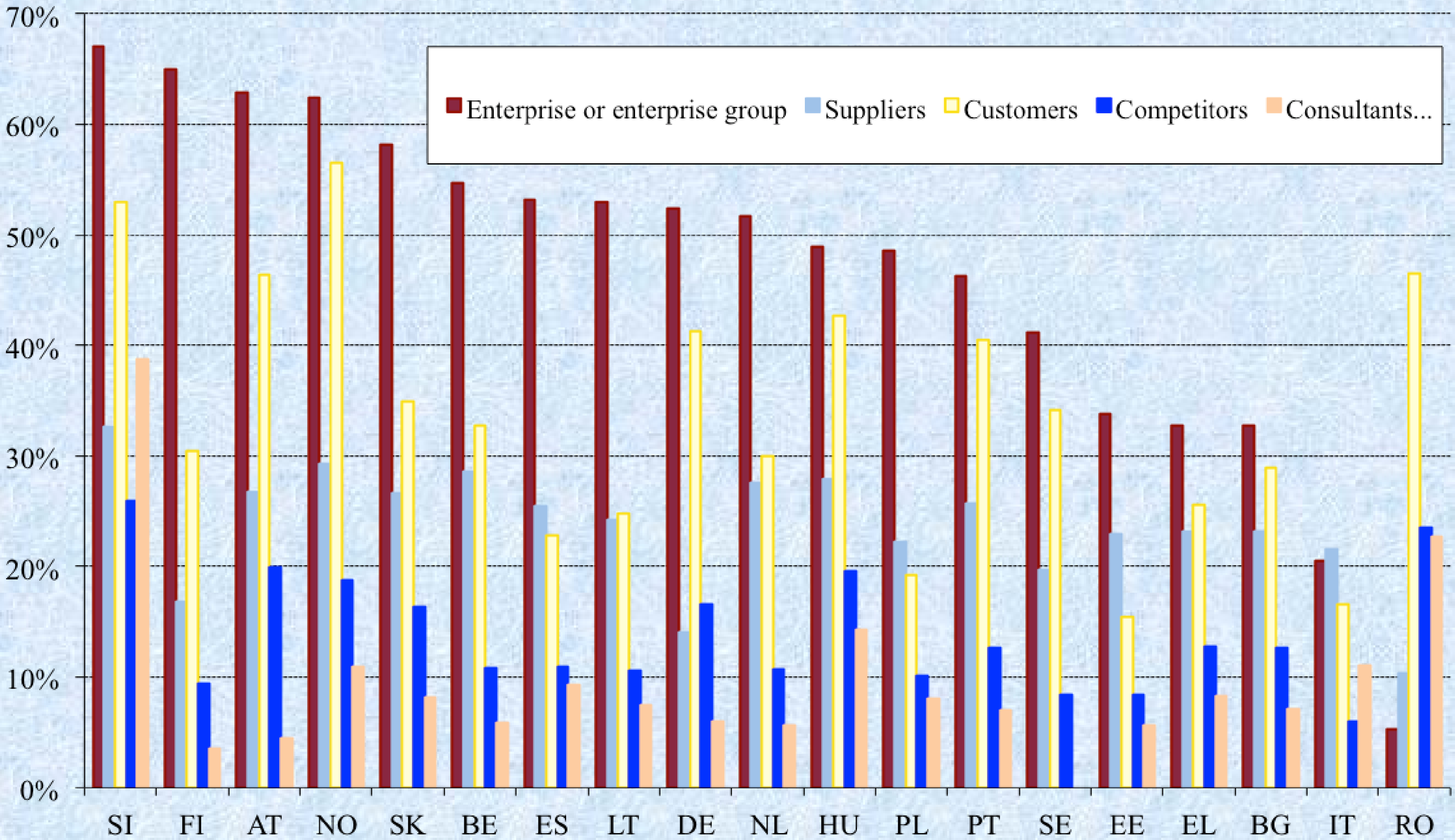
- S&T mode: exploits (in-house) R&D results
- DUI mode: relies on learning by doing, using and interacting (practical knowledge)

Both the DUI and S&T modes of innovation are important for Danish firms

Combining the DUI and S&T modes improves innovation performance

Sources of information for innovation: significantly higher importance of ‘business’ sources (Community Innovation Survey)

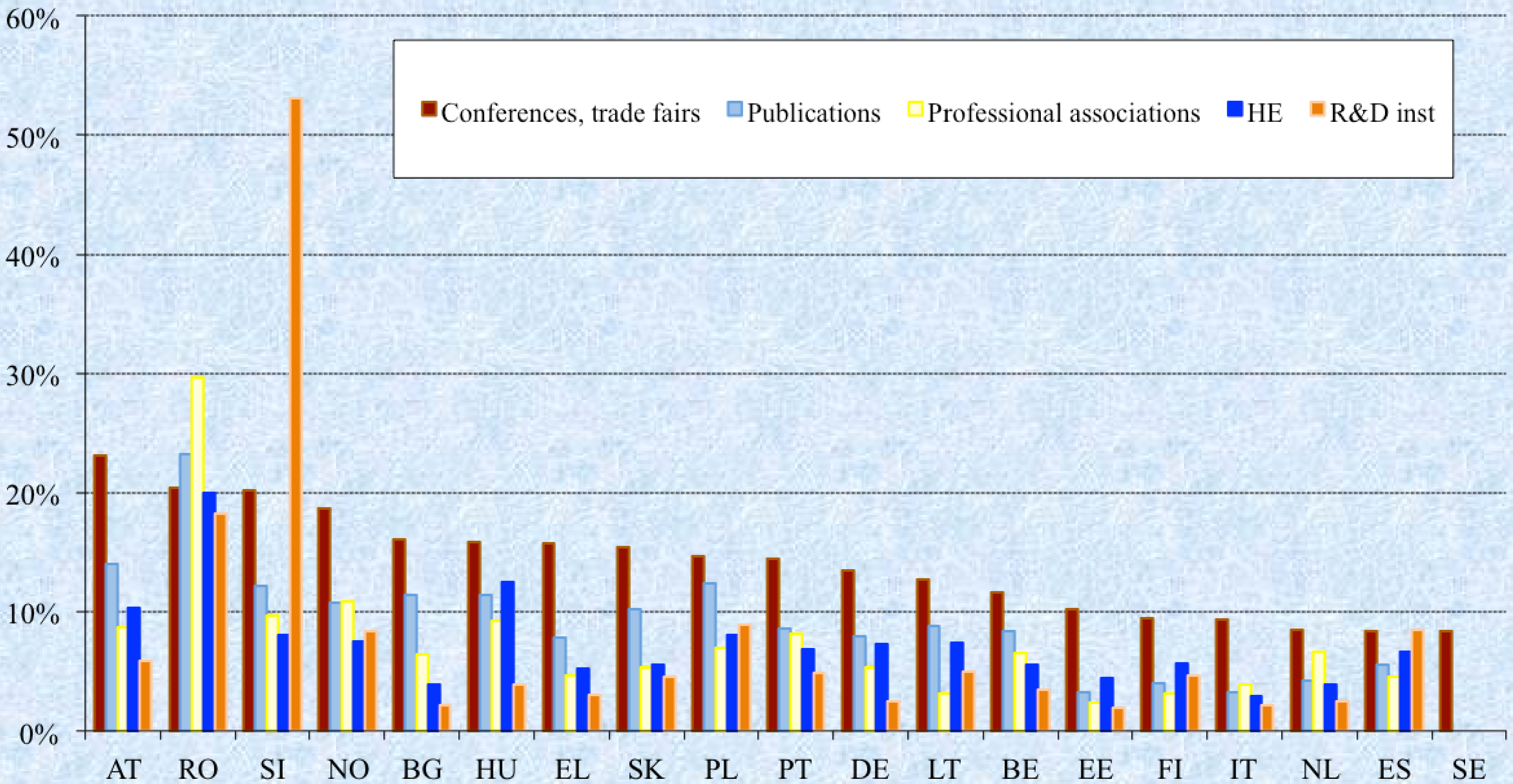
Highly important ‘business’ sources of information for product and process innovation, EU members, 2010-2012



Source: Eurostat, CIS 2012

Note: Data for Cyprus, Luxembourg and Malta are not included in this figure.

Highly important 'scientific' sources of information for product and process innovation, EU members, 2010-2012



Source: Eurostat, CIS 2012

Note: Data for Cyprus, Luxembourg and Malta are not included in this figure.

The Innovation Union Scoreboard*

The IUS focuses on the S&T mode; of the 25 indicators used in 2014:

- 10 only relevant for R&D-based innovations (S&T mode)
- 4 mainly capture R&D-based innovations
- 6 could be relevant for both the S&T and DUI mode
- 4 reflect the DUI mode
- 1 mainly relevant for the DUI mode

The economic weight of LMT sectors; the importance of the DUI mode of innovation $\Rightarrow$

A better reflection of innovation processes and performance by the IUS is needed to underpin effective and sound STI policies

* European Innovation Scoreboard until 2010

The 2014 Innovation Union Scoreboard indicators

	Relevance for R&D- based innovation	Relevance for non-R&D-based innovation
New doctorate graduates (ISCED 6) per 1000 population aged 25-34	X	
Percentage population aged 30-34 having completed tertiary education	b	b
Percentage youth aged 20-24 having attained at least upper secondary level education		x
International scientific co-publications per million population	X	
Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country	X	
Non-EU doctorate students as a % of all doctorate students	X	
R&D expenditure in the public sector as % of GDP	X	
Venture capital investment as % of GDP	x	
R&D expenditure in the business sector as % of GDP	X	
Non-R&D innovation expenditures as % of turnover		X
SMEs innovating in-house as % of SMEs	b	b
Innovative SMEs collaborating with others as % of SMEs	b	b
Public-private co-publications per million population	X	

Source: own compilation

The 2014 IUS indicators (2)

	Relevance for R&D- based innovation	Relevance for non-R&D-based innovation
PCT patents applications per billion GDP (in PPS€)	X	
PCT patent applications in societal challenges per billion GDP (in PPS€) (environment-related technologies; health)	X	
Community trademarks per billion GDP (in PPS€)		X
Community designs per billion GDP (in PPS€)		X
SMEs introducing product or process innovations as % of SMEs	b	b
SMEs introducing marketing or organizational innovations as % of SMEs		X
Employment in fast-growing enterprises in innovative sectors (% of total employment)	b	b
Employment in knowledge-intensive activities (manufacturing and services) as % of total employment	x	
Contribution of medium and high-tech product exports to the trade balance	x	
Knowledge-intensive services exports as % total service exports	x	
Sales of new to market and new to firm innovations as % of turnover	b	b
License and patent revenues from abroad as % of GDP	X	

Source: own compilation

The EIS indicators, 2002-2007

	EIS 2002	EIS 2003	EIS 2004	EIS 2005 EIS 2006	EIS 2007
Indicators reflecting					
only R&D-based innovations	10	9	9	8	7
mainly R&D-based innovations	-	3	3	5	5
both types	8	9	9	12	12
only non-R&D-based innovations	-	-	-	-	-
mainly non-R&D-based innovations	-	-	1	1	1
Number of indicators	**18**	**21**	**22**	**26**	**25**

Source: own compilation

The EIS and IUS indicators, 2008-2014

	EIS 2008	EIS 2009	IUS 2010 - IUS 2013	IUS 2014
Indicators reflecting				
only R&D-based innovations	8	8	10	10
mainly R&D-based innovations	4	4	4	4
both types	15	16	6	7
only non-R&D-based innovations	1	1	4	4
mainly non-R&D-based innovations	1	1	-	-
Number of indicators	**29**	**30**	**24**	**25**

Source: own compilation

Several changes in the composition of the EIS and IUS indicators in 2002-2014: no clear trend

Part I: Discussion and Conclusions

A persistent devotion to high-tech and its pitfalls

The systems view of innovation has not become a dominant, systematically applied paradigm in policy circles, in spite of

- the rich set of policy-relevant research insights and
- some optimistic claims concerning the take-up of the systemic approach to innovation

A persistent devotion to high-tech and its pitfalls (2)

STI policies based on the science-push model neglect

- the wide variety of types, forms and sources of knowledge
- the importance of distributed knowledge bases
  - o collaboration among actors
  - o the significance of institutions governing collaboration to generate, diffuse and exploit all types of knowledge required for innovation
- the LMT sectors

Massive opportunity costs

- lost improvements in productivity
- ‘unborn’ new products and services
- ‘unopened’ new markets
- ‘undelivered’ new jobs

Spending public money guided by a ‘biased’ (incomplete) policy rationale is questionable

Ergas (1986), (1987): mission- vs. diffusion-oriented policies

Austria: knowledge-intensity vs. high-tech sectors

'Austrian paradox'

> "On the one hand, macroeconomic indicators on productivity, growth, employment and foreign direct investment indicate that overall performance is stable and highly competitive. On the other hand, an international comparison of industrial structures reveals a severe gap in the most technologically advanced branches of manufacturing, suggesting that Austria is having problems establishing a foothold in the dynamic markets of the future." (Peneder, 1999: 239)

This good performance has continued: Austrian GDP per capita was No. 4 in the EU in 2013

High-level body for policy co-ordination

Strong domestic firms

Schemes to promote business-academia co-operation

Possible reasons for the observed persistence of the high-tech myth

see, e.g. Havas (2014a), (2015)

Simple, straightforward reasoning

Unprecedented achievements of major R&D efforts during World War II

Major scientific results reported continuously since then

"As regards *community creation* it may be argued that a simple one-dimensional indicator (…) can be identified as a focal point for orchestrated political action: we can all unite on transforming Europe to a high-tech knowledge-based economy." (Laestadius *et al.*, 2005)

Possible reasons for the observed persistence of the high-tech myth (2)

Triadic competition

- misplaced, misleading EU – US comparison
- major structural differences

Sociological factors

- STI policy-makers
- finance ministry staff
- influential scientists as advisors (formal and informal channels)
- quest for evidence-based policies
  - formal modelling, quantitative analyses

The relevance of the systemic view of innovation

Provides a more appropriate framework to analyse innovation processes and performance

a rich picture on the modes of learning and innovation

STI policies should promote *learning in its widest possible sense*:

- competence building at individual, organisational and inter-organisational levels
- in all economic sectors
- in all possible ways, considering all types of knowledge, emanating from various sources, and taking different forms

The relevance of the systemic view of innovation

But it is complex, and can be perceived as ‘vague’

- no ‘one size fits all’, easy-to-digest and -implement policy prescriptions (as opposed to the market failure argument)
- cannot be easily formalised

  history-friendly modelling, simulation; not as appealing as e.g. the endogenous growth models

Demanding in terms of analysis and policy design

- what type of system failure
- in which sub-system

Evolutionary, system and policy failures: Difficulties for policy-makers

Evolutionary failures

- generation of technological opportunities
- learning by firms (accumulation of capabilities)
- lock-in in inferior technology (competence trap), trade-offs
  - exploration vs. exploitation (current vs. future profits)
  - variety generation vs. selection
    - tough selection $\Rightarrow$ low variety $\Rightarrow$ lock-in
    - weak selection $\Rightarrow$ ineffective firms, waste of resources, limited dynamics/ growth
  - tight IPR vs. exploration of new approaches/ diverse competence base

Evolutionary, system and policy failures: Difficulties for policy-makers (2)

System failures (problems)

- missing or weak elements (‘nodes’, actors)
- missing, weak, inappropriate connections among the actors
- transition (system dynamics)

Policy failures

- weak learning (e.g. from previous practice, interactions, good practices)
- inflexibility in implementation
- lack of understanding of sectoral characteristics
- poor (no) vision-building
- ineffective co-ordination

(Malerba, 2009; cf. Bach and Matt, 2005; Smith, 2000)

Unit of analysis/ policy intervention

- micro
- meso
- macro

Further policy implications

Several policies affect innovation processes and performance, perhaps even more strongly than STI policies, and hence policy goals and tools need to be orchestrated across several policy domains

Analysts and policy-makers need to

- avoid the trap of paying too much attention to simplifying ranking exercises based on composite indicators, and
- devote their efforts to conduct thorough comparative analyses instead

New indicators are needed, which better reflect the evolutionary processes of learning and innovation

The choice of an economics paradigm to guide policy evaluation is likely to be decisive

Mutual learning

Several common (similar) issues of relevance in CEE and Turkey ("emerging" economies):

- the impacts of FDI (global production and innovation networks)
- brain drain (?)
- effectiveness of business-academia collaboration (?)
- the persistent high-tech myth (science-push model)
- ad hoc use of modern, transparent decision-preparatory methods (?)
- excellence vs. relevance (what R&D activities to support?)
- poverty alleviation (social innovation, frugal innovation)
- …

Potentially useful learning opportunities, BUT what funding for thorough comparative analyses?

Part II
Business-Academia Collaborations

Part II: Motivation

Different types of knowledge, skills and experience are required for successful innovation processes

These elements are rarely possessed by a single entity; rather, these are distributed among various actors

Hence, their co-operation is vital to integrate these elements to exploit them for economic and social ends

Mapping these collaborations is vital both for IS analysts and policy-makers

Business-academia (B-A) co-operation is one form among others

B-A is the best known form, but not sufficiently 'mapped': usually a single method (info source) is used

Methods

Novelties

- multiple mapping methods are applied
  - various types of statistics, interviews
- both R&D and innovation are considered
- dynamics can be traced (not presented here)

Caveat: More of an essay than a ‘report on a purpose-designed’ project

Interviews only with firms, conducted in 2006-2012

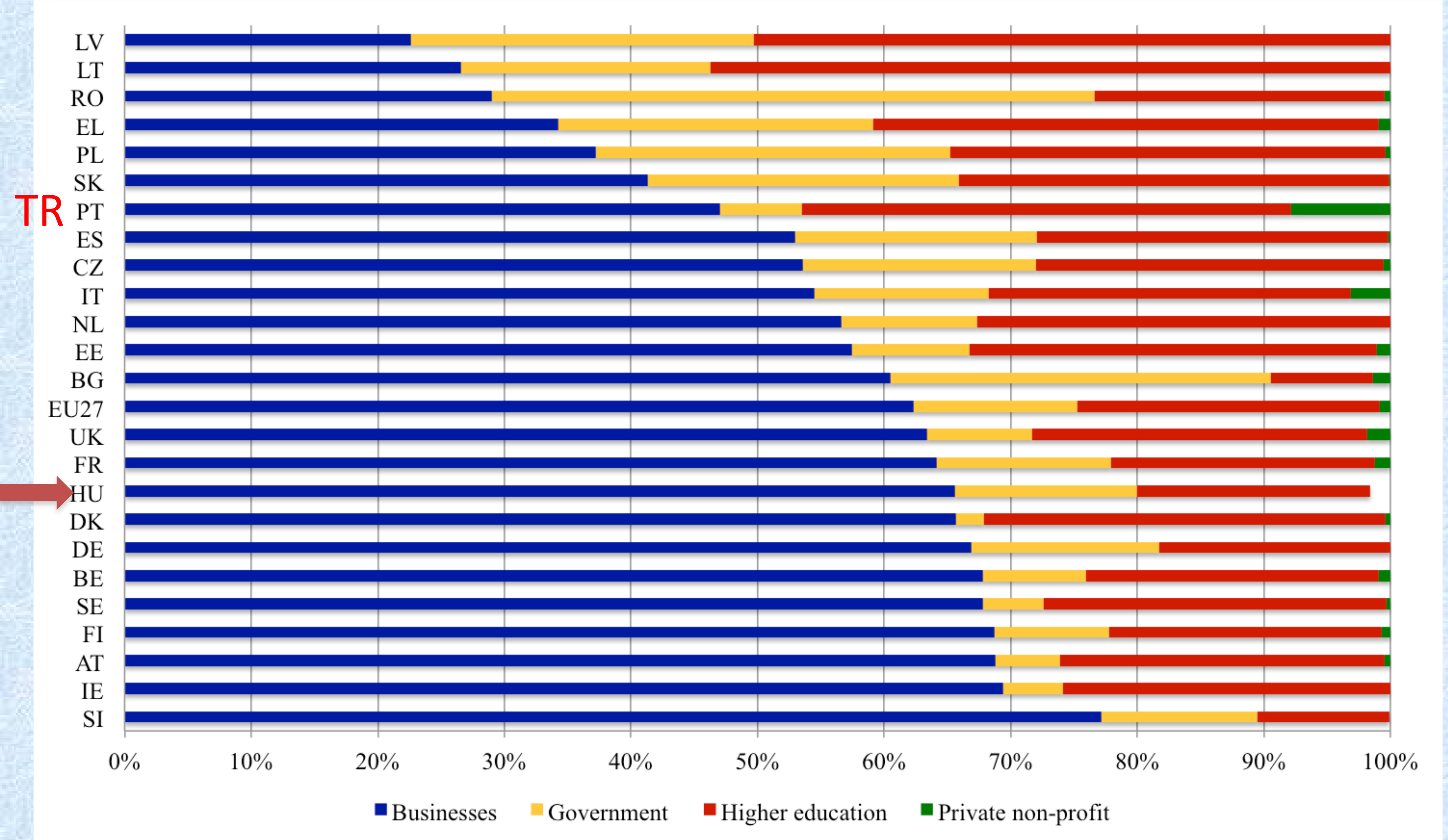
- automotive industry, pharmaceuticals, telecom equipment manufacturing, and software development
- 4-6 in each; aiming at a qualitatively representative sample: firms with different major features in terms of their size, ownership, age, technological level, etc.

The weight of R&D performing sectors, Hungary, Turkey, and the EU28 (per cent)

	2001	2013
Business sector		
BERD/GERD Hungary	40.09	69.43
BERD/GERD Turkey	33.74	47.49
BERD/GERD EU28	64.59	63.76
Higher education sector		
HERD/GERD Hungary	25.74	14.39
HERD/GERD Turkey	58.90	42.09
HERD/GERD EU28	21.48	23.19
Government sector		
GOVERD/GERD Hungary	25.88	14.89
GOVERD/GERD Turkey	7.36	10.42
GOVERD/GERD EU28	13.20	12.21

Source: author's calculation based on Eurostat data

Share of research performing sectors in performing GERD, EU countries, 2012



Source: author's calculation based on Eurostat data

Findings

Business funding in Hungarian HERD and GOVERD is markedly higher than the EU27 or OECD average [Turkey: business funding in HERD]

Sources of information for innovations

- universities and PROs are less important for Hungarian firms than other firms in their enterprise groups, customers, suppliers, competitors and/or other firms in the same sector
- similar pattern in all EU countries (already shown in Part 1)

Innovation co-operation

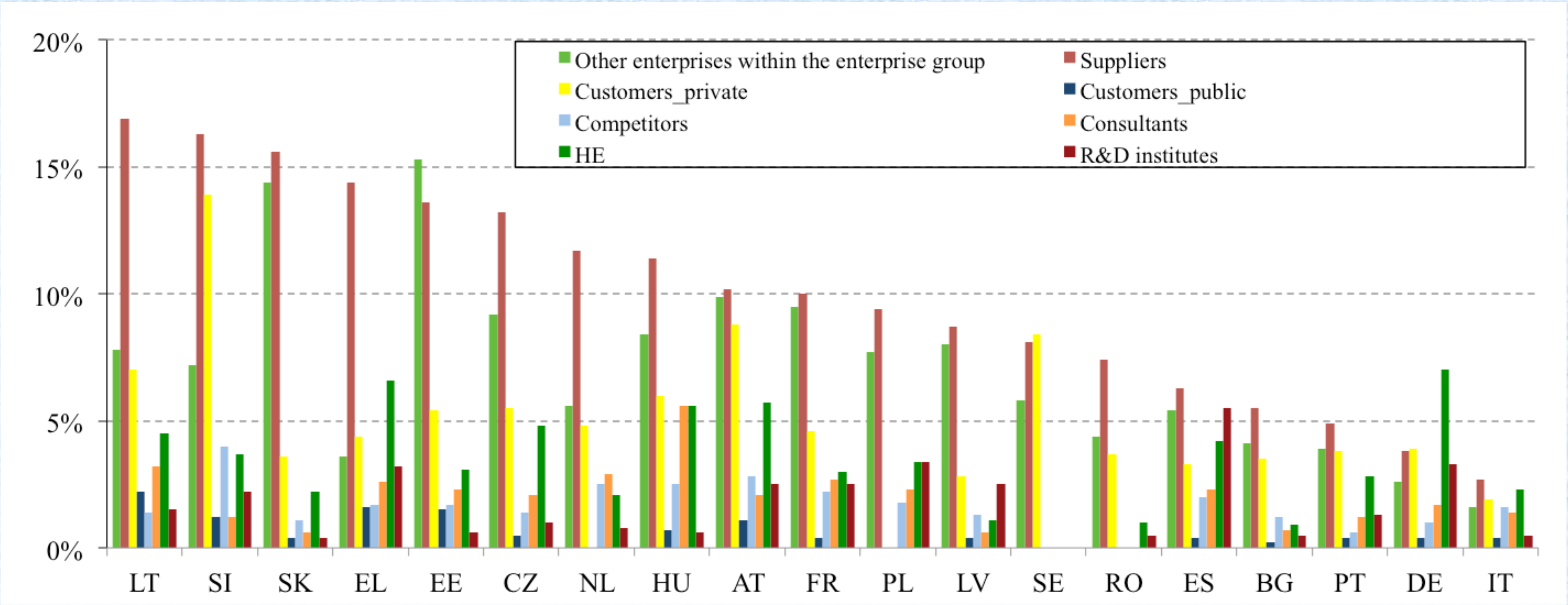
- universities had been the second most valuable innovation co-operation partners of Hungarian firms in 2008-2010, slipped to No. 4-5 in 2010-2012
- Hungarian universities had the second highest appreciation compared to those in the other EU countries in 2008-2010, No. 4 in 2010-2012

The share of businesses in funding HERD and GOVERD, Hungary, Turkey, and EU28

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
HERD														
HU	5.5	4.4	11.8	10.6	12.9	11.8	13.0	13.7	14.7	15.5	13.6	11.3	9.5	8.6
TR	19.4	21.1	22.0	20.8	21.6	22.7	23.8	23.3	17.4	16.0	16.2	14.6	13.9	13.9
EU	6.4	6.6	6.3	6.2	6.2	6.4	6.6	6.7	6.8	6.4	6.4	6.5	6.4	n.a.
GOVERD														
HU	10.9	13.1	6.4	5.7	7.2	10.3	14.3	12.3	13.3	12.6	12.7	11.5	9.8	9.7
EU	6.2	6.7	6.4	5.5	5.9	8.3	8.7	8.7	8.4	9.0	8.3	8.2	8.7	n.a.
TR	5.4	1.0	1.3	4.0	4.1	1.5	4.2	4.1	6.6	3.4	1.8	2.0	2.1	2.0

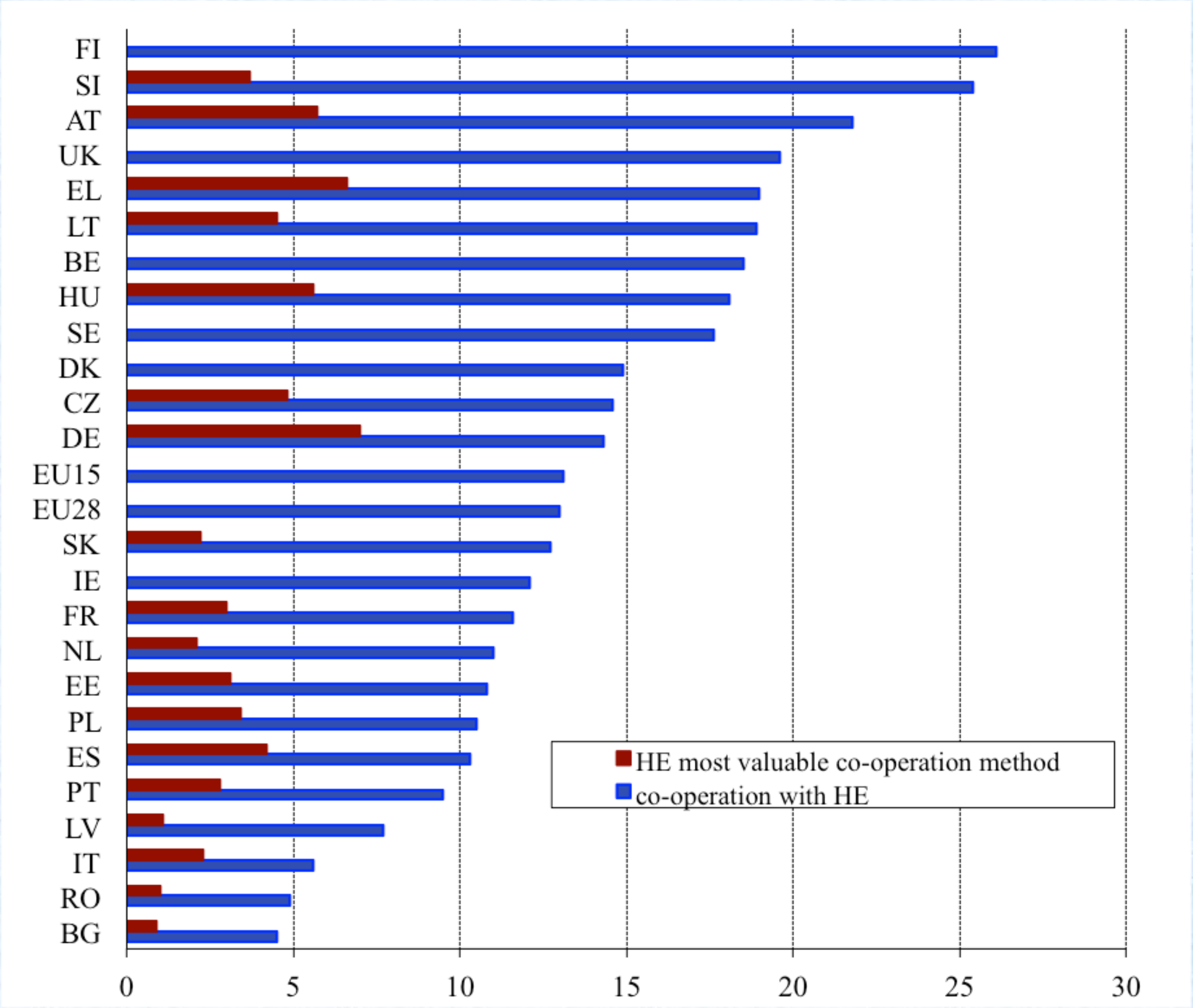
Source: author’s calculation based on CSO and Eurostat data; for Turkey: OECD

Most valuable innovation co-operation, EU members, 2010-2012



Source: Eurostat, CIS2012

Innovation co-operation with HE institutes, EU members, 2010-2012



Source: Eurostat, CIS2012

Findings (2)

Motivations, incentives, and norms of firms and academics for conducting RTDI activities are diametrically different

- business vs. scientific achievements
- tight vs. looser project mgmt (milestones, deadlines)
- keeping commercially sensible information secret vs. fast, wide dissemination

Obstacles to collaborate

Not unique to Hungary: "profound differences in the 'scientific' and 'industrial' cultures" (Lukasik [2013])

(General Secretary, European Council of Academies of Applied Sciences, Technologies and Engineering)

Findings (3)

Different needs, RTDI strategies, and internal resources of different firms $\Rightarrow$

Diverse types/ objectives of co-operation

- R&D-intensive spin-off companies and their founding PRO
- problem-solving, minor product and process innovations
- strategic, long-term R&D and innovation
  - o training the next generation of engineers with the right skills and attitudes
  - o PhD dissertations: selecting the best students by knowing their qualities
  - o academics have more freedom for thinking $\Rightarrow$ chance for developing really new ideas, exploring new technological opportunities
  - o wider networks of academics, richer pool of knowledge

Part II: Conclusions, Directions for Future Work

Conclusions, directions for future work

From a tentative typology to a more detailed taxonomy of academia-industry collaboration

- the objectives, organisational form and duration of co-operation (dynamics)
- types of participants (domestic vs. foreign universities and firms)
- major characteristics of the business participants (size, ownership, sectoral/ technological/ strategic features, etc.)

More refined policy measures, better tuned to the needs of the actors

Revised evaluation criteria for academics

- one size doesn’t fit all
- strong traditions; fierce opposition?

Conclusions, directions for future work (2)

Funding, publication ⇒ Researchers tend to focus on a single, well-defined research question

⇒ It is important to keep in mind the diversity of B-A co-operations

less general conclusions than usually offered?

Support schemes

- additionality?
- the role of consultancy firms: rent-seeking vs. 'bridging'

Quantitative – qualitative analyses (merits, limits)

- patent statistics: large enough samples, long time series vs. one aspect of one type of B-A collaboration in certain sectors (propensity to patent)
- dynamics (time series, interviews, case studies, 'serial' collaborators)

Conclusions, directions for future work (3)

Motivations of academic partners

Generalisation beyond Hungary

- the major lessons seem to be valid
- yet, context does matter:
  tailor the research design to analyse B-A collaborations (identify their types and impacts) to the innovation system in question
  adapt policy recommendations (what type of policy support is missing, what should be strengthened, redirected or even stopped)

Thank you!

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A compendium of evidence on the effectiveness of innovation policy:

http://www.innovation-policy.org.uk/compendium/

Background papers

Havas A (2014a): Trapped by the High-tech Myth: The need and chances for a new policy rationale, in: H. Hirsch-Kreinsen, I. Schwinge (eds): *Knowledge-Intensive Entrepreneurship in Low-Tech Industries*, pp. 193-217, Cheltenham: Edward Elgar

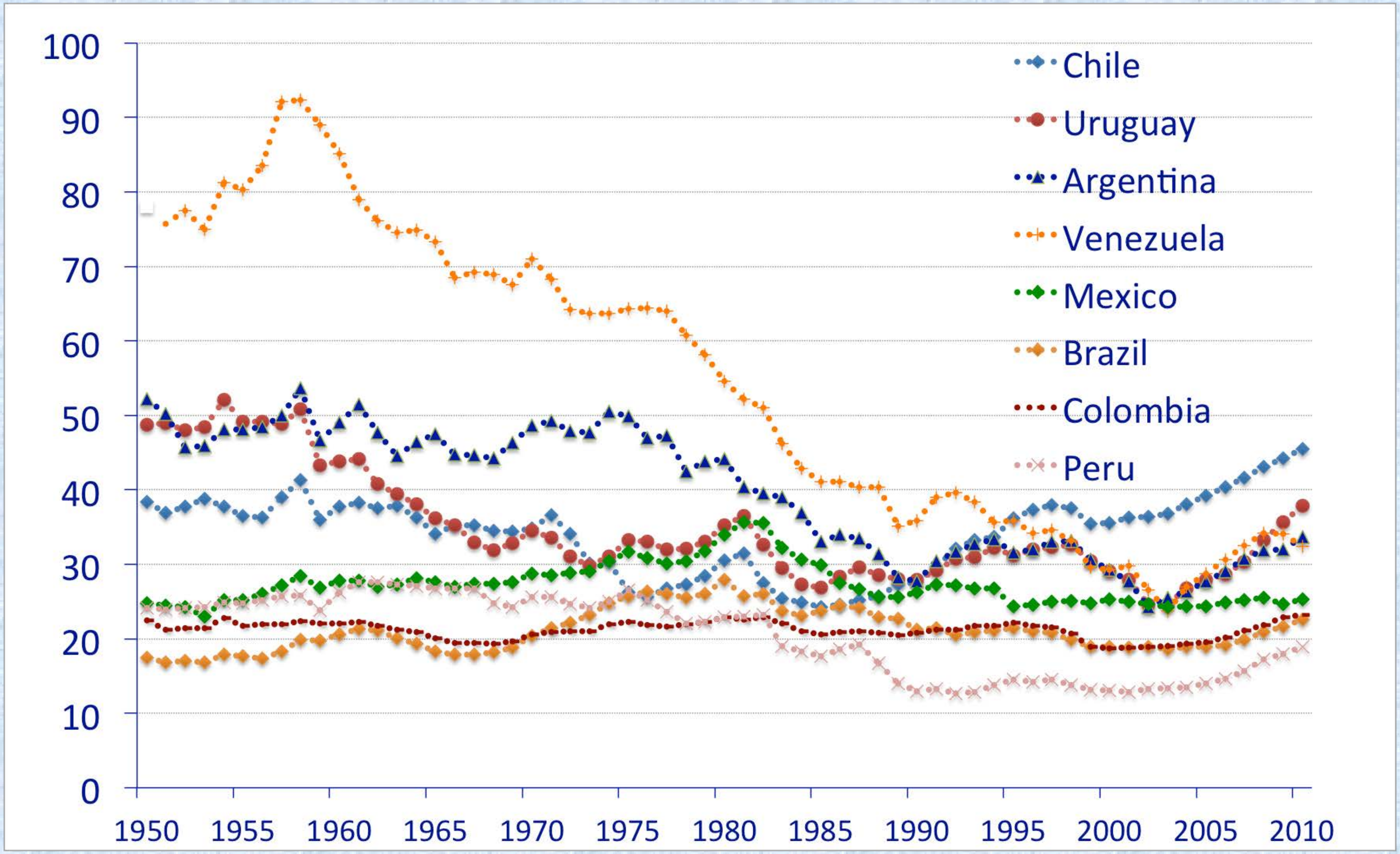
Havas A (2014b): Types of knowledge and diversity of business-academia collaborations: Implications for measurement and policy, *IE CERS MT-DP* 2014/19 [a revised version submitted to *Triple Helix*, forthcoming]

Havas A (2015): The persistent high-tech myth in the EC policy circles: Implications for the EU10 countries, *IE CERS MT-DP* 2015/17 [revised, extended version]

… and the references cited in these papers

APPENDİX

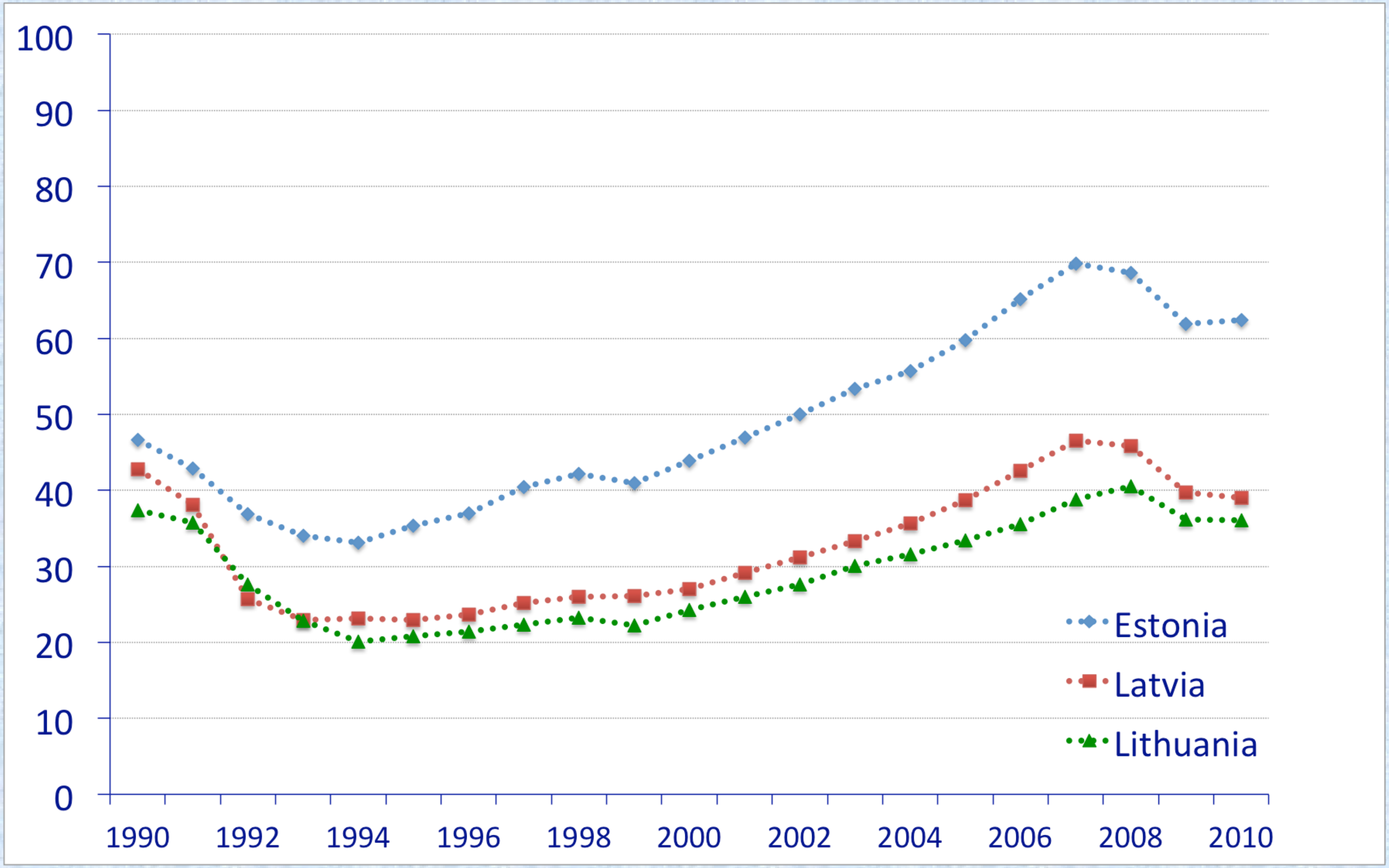
Eight Latin American countries



Source: own calculation based on Maddison project data

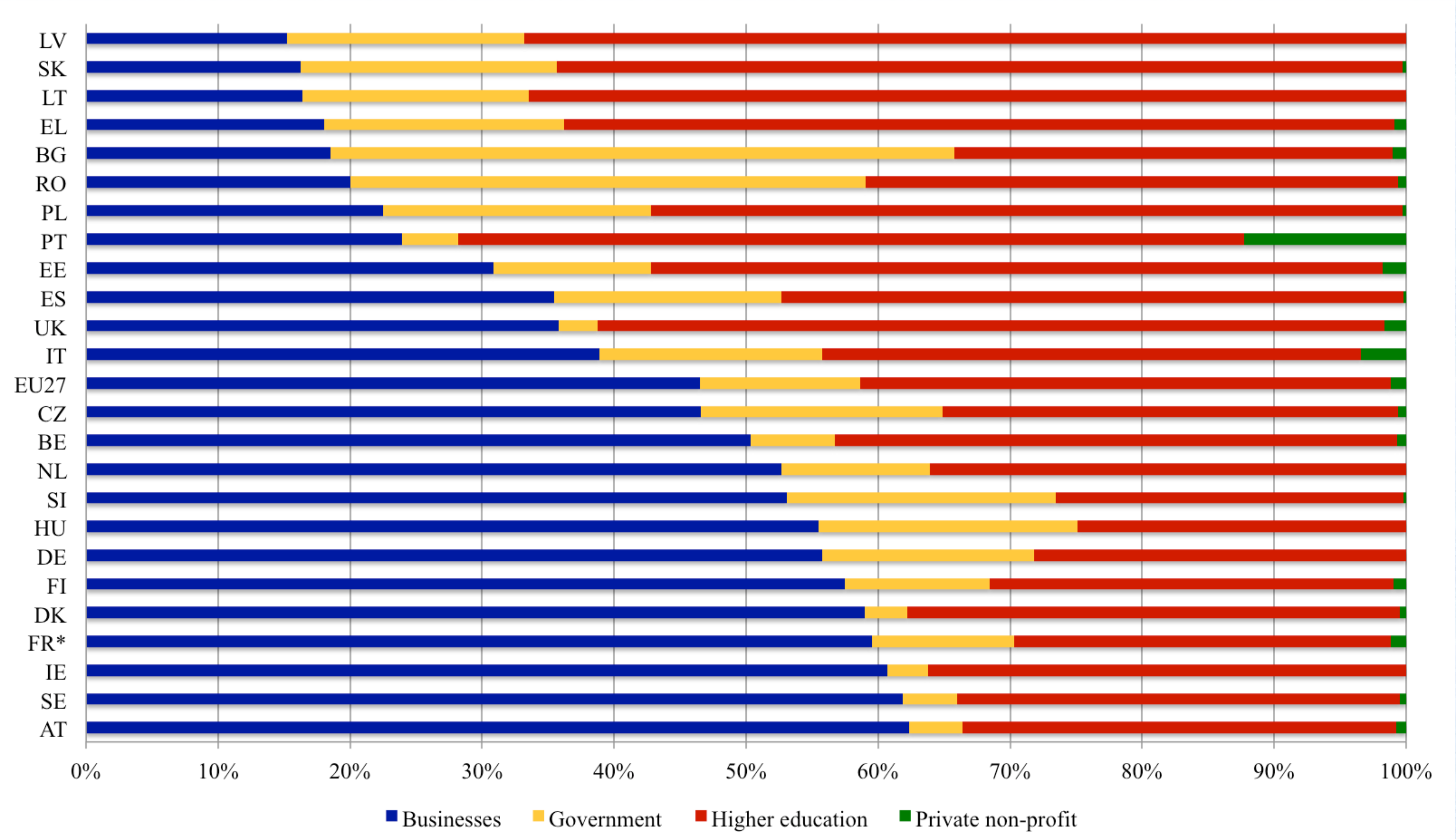
GDP per capita, USA = 100

Baltic countries



Source: own calculation based on Maddison project data
GDP per capita, USA = 100

Share of research performing sectors in employing FTE researchers, EU countries, 2012



Source: author's calculation based on Eurostat data