S&T Benchmarking: 2001 Innovation Scoreboard

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Content of the Presentation

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Objectives of the Scoreboard

- Outcome of the Lisbon European Council in 2000 and the Communication "Innovation in a knowledge-driven economy"
- Complement of the "structural indicators"
- Scoreboard should "zoom" into the area of innovation policy

Indicators in the Innovation Scoreboard

- 17 indicators on
  - Human resources
  - Creation of new knowledge
  - Transmission and application of new knowledge
  - Innovation finance, output and markets
- The scoreboard distinguishes between the trend (change) and the level of each indicator

Indicators: Human Resources

- S&E graduates / 20 - 29 years
- Population with tertiary education
- Participation in life-long learning
- Employed in med/high-tech manufacturing
- Employed in high-tech services

Indicators: Creation of New Knowledge

- Public R&D / GDP
- Business R&D / GDP
- High-tech EPO patents / population
- High-tech USPTO patents / population

Indicators: Transmission and Application of New Knowledge

- SMEs innovating in-house
- SMEs innovation co-operation
- Innovation expenditure/total sales

Indicators: Innovation Finance, Output and Markets

- High-tech venture capital / GDP
- New capital raised / GDP
- Sales of new-to-market products
- Home internet access
- ICT markets / GDP
- High tech value added in manuf.

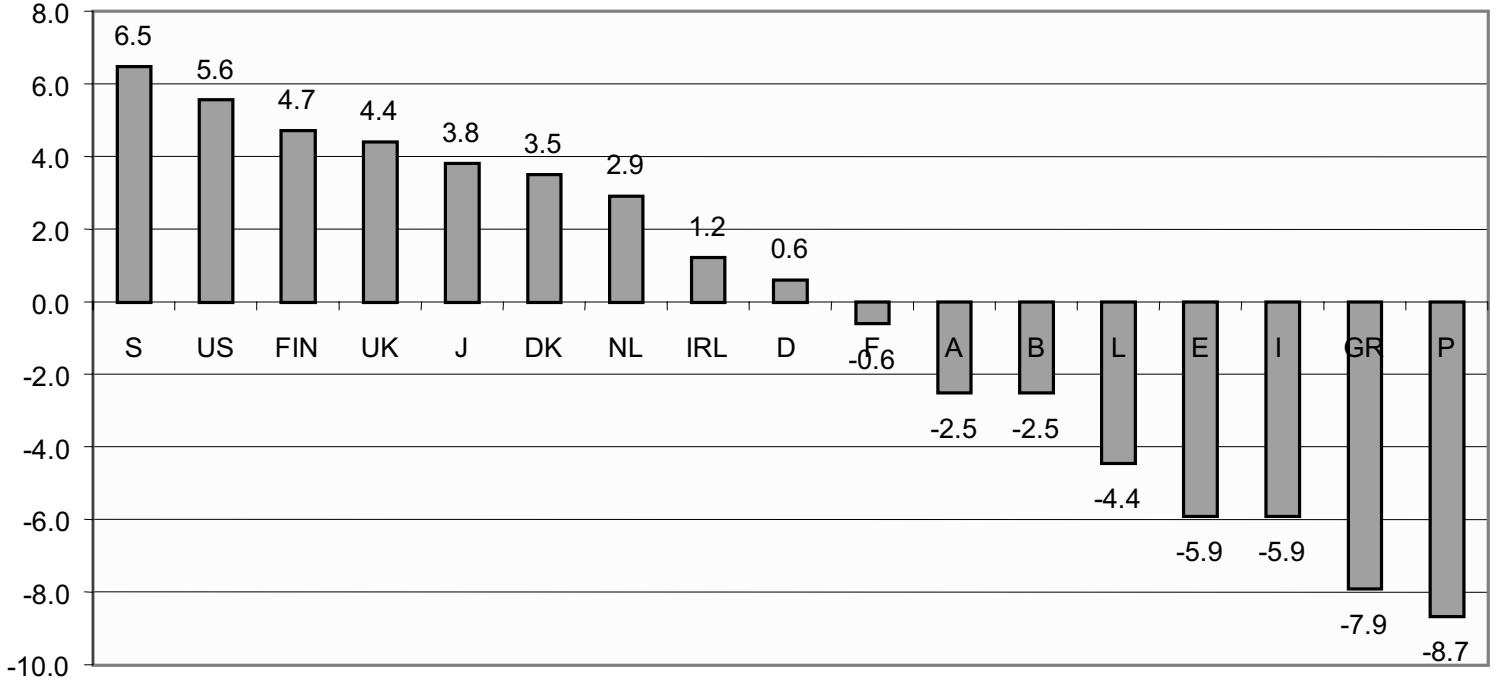
Table A: European Innovation Scoreboard (indicators, sources and years)[1]		
N°	**Short definition of indicator**	**Year[2]**
1.	**Human resources**	
1.1	New S&E graduates (‰ of 20 - 29 years age class)	1999
1.2	Population with tertiary education (% of 25 – 64 years age classes)	2000
1.3	Participation in life-long learning (% of 25 – 64 years age classes)	2000
1.4	Employment in medium-high and hi-tech[3] manufacturing (% of total workforce)	1999
1.5	Employment in high-tech[4] services (% of total workforce)	1999
2.	**Knowledge creation**	
2.1	Public R&D expenditures (GOVERD + HERD) (% of GDP)	1999
2.2	Business expenditures on R&D (BERD) (% of GDP)	1999
2.3a	EPO high tech patent applications (per million population)	1999
2.3b	USPTO high tech patent applications (per million population)	1998
3.	**Transmission and application of knowledge**	
3.1	SMEs innovating in-house (% of manufacturing SMEs)	1996
3.2	SMEs involved in innovation co-operation	1996
3.3	Innovation expenditures (% of all turnover in manufacturing)	1996
4.	**Innovation finance, output and markets**	
4.1	High technology venture capital investment (% of GDP)	2000
4.2	Capital raised on parallel markets plus by new firms on main markets as a % of GDP	1999
4.3	'New to market' products (% of sales by manufacturing firms)	1996
4.4	Home internet access (% of all households)	2000
4.5	Share of ICT markets as a percent of GDP	2000
4.6	Share of manufacturing value-added in high-tech sectors	1997

Construction of Summary Indicator

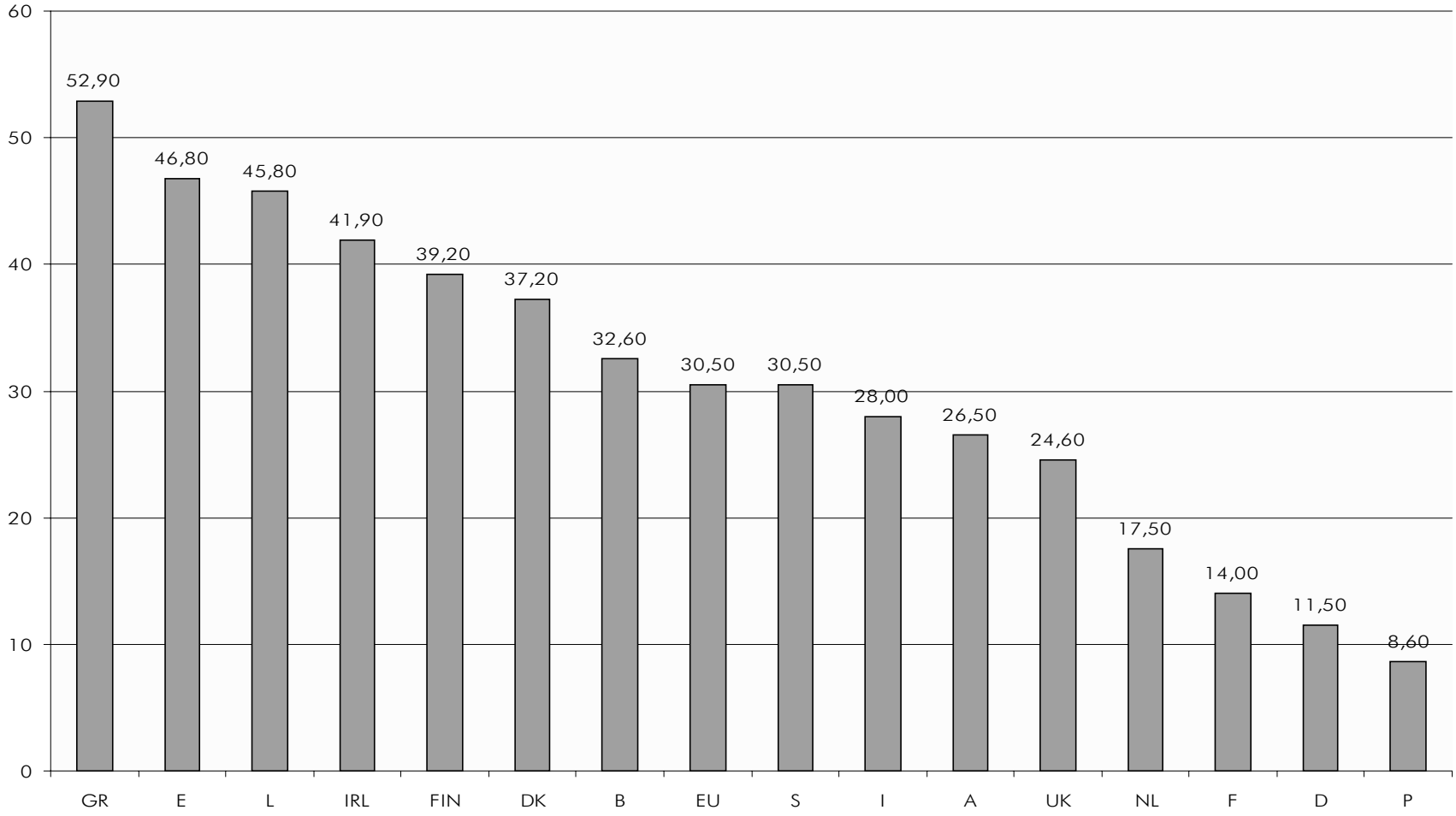
- Each indicator separates countries which are 20% above, at about, or 20% below EU average
- Each country scores for each indicators where it is above or below average
- The sum of scores is between +10 (i.e. all indicators above average) and -10 (i.e. all indicators below average)

Results: Summary Indicator

Fig 2: Tentative Summary Innovation Index

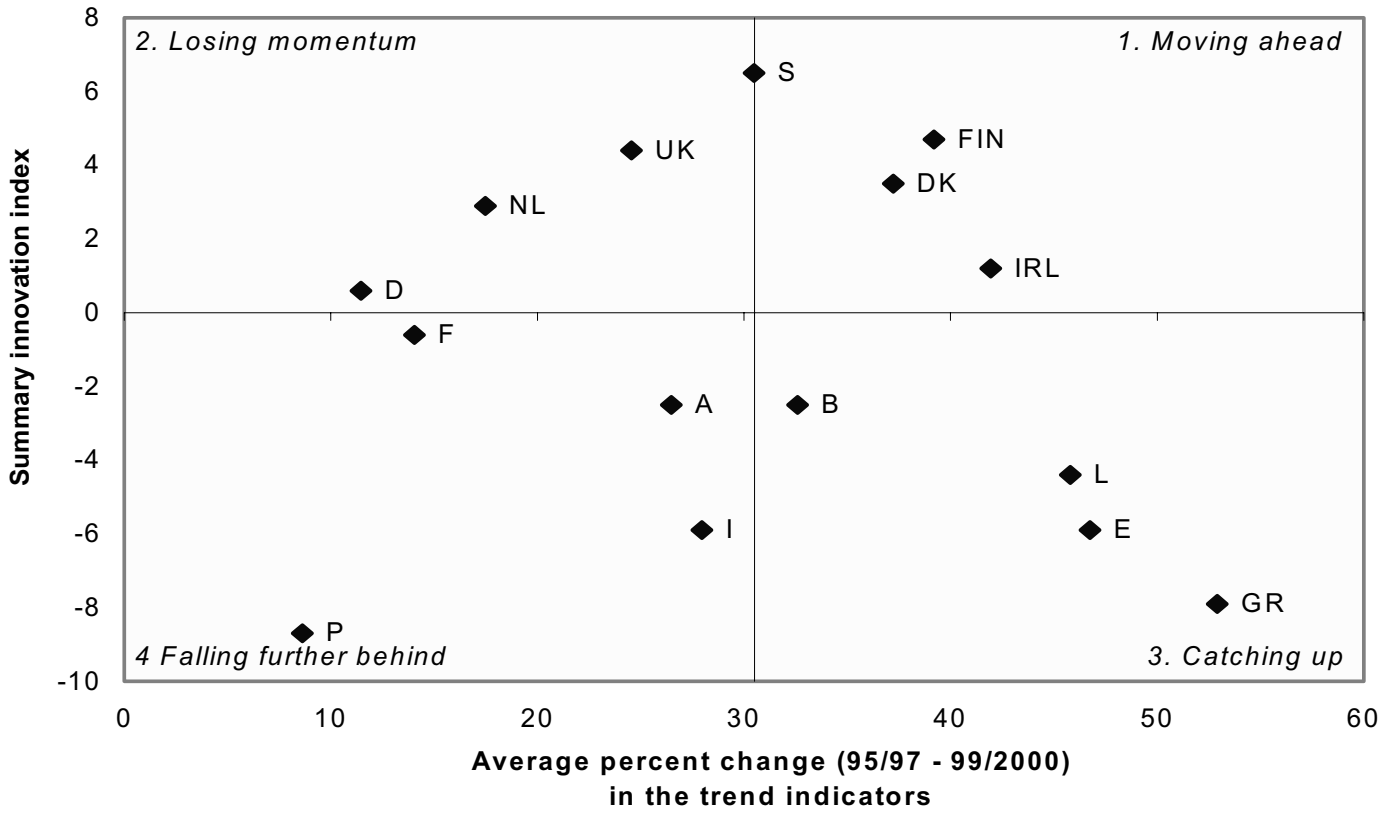


Results: Country Trends



Results: Overall Country Scoring

Fig. 1 Overall country trends by innovation index



Country	Average change[1]	Major trends
Greece	52.9 %	Increasing public R&D and ICT investment; declining business R&D
Spain	46.8 %	Increasing business R&D and USPTO patenting
Luxembourg	45.8 %	Rapid increase of employment in high tech services.
Ireland	41.9 %	Increased high-tech service employment, EPO patenting, high-tech value-added, declining public R&D
Finland	39.2 %	Surging ahead on many indicators: tertiary education share, public and business R&D, USPTO patenting, high-tech value added
Denmark	37.2 %	Increase in USPTO patents; decline of educated workforce
Belgium	32.6 %	Increase in USPTO patents
Sweden	30.5 %	Leading Member State; increased high-tech value added in manufacturing; otherwise no major changes
EU mean[2]	30.5 %	-
Italy	28.0 %	Lowest increase in EPO high-tech patents; increase in ICT investment.
Austria	26.5 %	Catching up on tertiary education share, but few other signs of a major improvement.
United Kingdom	24.6 %	Declining public and business R&D
Netherlands	17.5 %	Declining share of high-tech value-added in manufacturing
France	14.0 %	Declining business R&D
Germany	11.5 %	Declining share of high-tech value-added in manufacturing
Portugal	8.6 %	Increase in R&D, limited improvement of trend indicators

1: Average percentage change in the indicators for which trend data are available.

2: The EU country-level mean *(see footnote 9)* is used for all trend analyses.

Austrian Scoring in the Scoreboard

Indicator	Level	Trend
S&E grads/20-29 pop		No Trend
Pop with 3rd education		
Life-long learning		
Empl. h-tech manuf		
Empl. h-tech services		
Public exp. R&D / GDP		No DATA
BERD / GDP		No DATA
EPO h-tech pats /pop		?
USPTO h-tech pats /pop		?
SMEs innov in-house		No Trend
SMEs innov co-op		No Trend
Innov exp /total sales		No Trend
Vent capital / GDP		
New capital / GDP		No Trend
New-to-markt products		No Trend
Home internet access		No Trend
ICT markets / GDP		
H-tech value added		No Trend

Problems with Innovation Scoreboard Indicators

- What is a benchmarking system?
  - Model or collection of indicator?
  - What is the structure and relationship within the selected indicators?
  - Are indicators correlated?

Korrelationen												
	S&Egrads		3rdedu		Lifell		h-t-man		h-t-serv		PubR&D	
S&Egrads	1,00											
3rdedu	0,27		1,00									
Lifell	0,07		0,71	*	1,00							
h-t-man	0,37		0,35		0,47		1,00					
h-t-serv	0,37		0,77	*	0,69	*	0,35		1,00			
PubR&D	0,09		0,49	*	0,57	*	0,29		0,60	*	1,00	
BERD	0,34		0,82	*	0,57	*	0,62	*	0,78	*	0,68	*
EPO	0,20		0,80	*	0,67	*	0,46		0,74	*	0,84	*
USPTO h-tech	0,17		0,86	*	0,79	*	0,48		0,77	*	0,75	*
SMEinno	-0,10		0,15		0,47		0,49		0,40		0,23	
SMEco-op	0,30		0,74	*	0,72	*	0,41		0,87	*	0,52	*
innovexp	0,21		0,54	*	0,61	*	0,45		0,78	*	0,84	*
ventcap	0,42		0,79	*	0,69	*	0,55	*	0,74	*	0,58	*
newcap	-0,17		0,19		-0,09		-0,44		-0,09		-0,09	
new-to-mar	0,21		-0,33		-0,56	*	0,01		-0,25		-0,23	
internet	-0,07		0,61	*	0,85	*	0,18		0,78	*	0,62	*
ICT	0,01		0,01		0,29		-0,27		0,19		0,35	
h-t-va	0,44		0,62	*	0,44		0,20		0,77	*	0,04	
SI	0,42		0,89	*	0,83	*	0,53	*	0,92	*	0,64	*
Achg	0,05		0,09		-0,10		-0,33		0,07		-0,32	

Problems with Innovation Scoreboard Indicators

- Are indicators relevant for policy?
  - time period to make an impact
  - impact from other developments (i.e. business cycle, input-output indicators)
  - What is the contribution of the indicator to the overall goals of economic policy?
- Are all indicators of the same importance?
- How volatile are indicators?

tip

Conclusion

- Benchmarking systems should measure relevant properties of innovation systems which relate to well defined output variables
- The relationship between input and output variables is unclear
- The overall results are influenced by data availability and methodological issues (VC)
- The Innovation scoreboard resembles a collection of indicators which try to measure different dimension of the innovation system

Conclusions for Austria

- The result are biased by data availability
- The recommendation are either very general or unfounded
- Resources should be devoted to outline the structure of the benchmarking system so that it more resembles an economic model